

NATIONAL INDEX

OF

AGRICULTURAL

FIELD

EXPERIMENTS

VOL. 11 PART 3

NORTH WESTERN REGION

**MARYANA; HIMACHAL PRADESH; JAMMU & KASHMIR
AND PUNJAB**

1960—65

THE COMPENDIUM PREPARED BY

P. N. Bhargava

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Under the overall guidance of D. Singh and K. S. Krishnan



ICAR

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FOREWORD

The I. C. A. R. has adopted the 'Co-ordinated approach' to crop improvement as the strategy in agricultural research. This approach is based on the principle of giving high priority to problem solving research and for the purpose an intimate knowledge of research in progress and trends of results is very essential. To give impetus to this approach, I. C. A. R. started a scheme for collecting data of all field experiments conducted in the country. It was aimed at compilation of agronomic experiments in the country, with a view to indicate the gaps in the knowledge and to avoid duplication. The scheme entitled "National Index of Field Experiments" is running under the Institute of Agricultural Research Statistics which has rendered a very valuable service by preparing compendia of agricultural field experiments conducted in the country. Two series of the compendia containing results of about 7,200 and 12,000 experiments conducted during the periods 1948-53 and 1954-59 respectively have already been published by the Institute. The present is the third series of compendia and is expected to contain the results of about 18,000 experiments conducted during the period 1960-65.

The number and the types of experiments have been increasing at a fast rate. Further, many of the experiments were being repeated over a number of years. The conclusions drawn from such experiments should take into account the seasonal variations. For this purpose, it was necessary to carry out consolidated analysis of results over years. Thus the task of compilation, analysis and interpretation of results of experiments being covered in the third series became more formidable compared to those covered in the earlier two series.

The preparation of this compendium has been possible by the whole-hearted co-operation of State Departments of Agriculture, Agricultural Universities and Central Research Institutes who ungrudgingly made the results of their experimental research available. My thanks are due to various officers of these institutions for participating in this work.

I hope that the present series will be followed by periodical publications of similar compendia for later years in order that the availability of results of scientific experiments in agriculture in India may be maintained up-to-date in a consolidated form.

NEW DELHI,
January 1, 1973.

B. K. SONI
Deputy Director General (AS)
Indian Council of Agricultural Research

PREFACE

The present set of volumes forms Part III in the series of compendia of Agricultural Field Experiments being published under the project of National Index of Agri. Field Experiments. Volumes comprising in Parts I and II of the series pertaining to the periods 1948-53 and 1954-59 were published in 1962 and 1965 and contained the results of about 7,200 and 12000 experiments respectively. The present volumes include results of experiments conducted during the period 1960-65. During the last decade there has been an enormous increase in agricultural research and experimentation, so much so that for the period 1960-65 to which the present volumes refer, results of about 18,000 experiments are available.

Like the earlier two series, the compendium for Part III is divided into 15 volumes, one each for (1) Andhra Pradesh, (2) North-Eastern Region (Assam, Manipur, Nagaland, Meghalaya, Tripura, Arunachal Pradesh and Mizoram), (3) Bihar, (4) Gujarat, (5) Kerala, (6) Madhya Pradesh, (7) Maharashtra, (8) Mysore, (9) Orissa, (10) North-Western Region (Punjab, Haryana, Jammu & Kashmir and Himachal Pradesh), (11) Rajasthan, (12) Tamil Nadu, (13) Uttar Pradesh, (14) West Bengal and (15) All Central Institutes. A departure has, however, been made in the presentation of the material contained in each volume. Whereas the results of individual experiments were presented in the volumes of previous series, the present series contain results of pooled statistical analysis of experiments that were conducted for two or more years and concluded during the period 1960-65. In respect of those experiments conducted for more than one year but were conducted beyond 1965, the results of individual experiments have been presented

The work under the scheme was carried out at the Institute of Agricultural Research Statistics. Collection of data from different research stations, their scrutiny and preliminary analysis were carried out in successive periods under the charge of Shri T.P. Abraham, Assistant Statistical Adviser, now Additional Director, Central Statistical Organisation; Dr. B.N. Tyagi, Senior Statistician, now Additional Agriculture Census Commissioner to the Govt. of U.P., Lucknow and Shri M.G. Sardana, Senior Statistician, now Joint Director, Central Statistical Organisation, Dr. O.P. Kathuria, Shri R.K. Khosla, Junior Statisticians, now Associate Professors, Shri P.P. Rao, Statistical Investigator and now Assistant Professor and Shri D.P. Singh, Statistical Assistant, now Scientist were also associated with the scheme at the preparatory stage.

The final stage of analysis and printing was carried out under the guidance and supervision of Shri P.N. Bhargava and Shri K.S. Krishnan, Senior Scientists of this Institute duly assisted by Dr. Basant Lal, Jr. Scientist and S/Shri P.R. Yeri, P.K. Batra, M.P. Saksena, Senior Research Assistants. S/Shri Onkar Swaroop, H.C. Jain, O.P. Sharma, G.L. Khurana, Prabhat Kumar, P.K. Azad, Ashok Kumar, N.K. Sharma and Kuldeep Singh, statistical staff of the Institute deserve special mention for their careful work in analysing the data and combining the results of similar experiments. The tabulation of the large volume of data involved was facilitated by the assistance rendered by the staff of the computer centre located at the Institute. Shri H.V.L. Bathla, Dr. Basant Lal, Jr. Scientists and Shri G.L. Khurana have done the most painstaking job of going through the proofs of this volume. It is not out of place to mention the names of Shri Narendra Kumar and Shri Sudershan Sharma, typists in this Institute for their laborious work in typing the part of voluminous manuscript of this compendium.

The collection of data of experiments from various research stations, was done by the regional staff of the Institute placed in different States. They deserve to be congratulated for the hard work they have put in.

Thanks are due to the State Departments of Agriculture, the Central Institutes and the Agricultural Universities who made the data of the experiments conducted under their jurisdiction readily available to the staff of the Institute. The I. A. R. S. acknowledges with thanks their willing co-operation without which the consolidation of the results would not have been

possible. The Institute is also thankful to various officers in the state Departments of Agriculture and Agricultural Universities who worked as Regional Supervisors for the project from time to time and provided guidance to the regional staff working in the scheme. The list of the names of the Regional Supervisors and Regional Staff of the project is given on the following pages.

NEW DELHI.
March, 31, 1978.

D. SINGH
Director
I.A.S.R.I.
(I.C.A.R.) New Delhi

**Regional Supervisors and Regional Staff of the National Index of
Field Experiments**

Sl. No.	Region & Headquarters	Statistical staff from the Institute of Agricultural Research Statistics	Regional Supervisor
1.	Andhra Pradesh (Hyderabad)	1. Shri C. H. Rao 2. Shri G. V. S. R. Krishna 3. Shri P. R. Yeri	1. Shri P. Govinda Rao, Head of the Agri. Res. Inst 2. Shri S. Vittal Rao, H. Q. Dy. Director (Research)
2.	Assam (Shillong)	1. Shri A. Sinha 2. Shri K. D. Saha	1. Shri U. C. Borah, Research Officer (Stat.)
3.	Bihar (Sabour)	1. Shri R. K. Jain 2. Shri S. M. G. Saran	1. Shri G. P. Singh, Statistician
4.	Gujarat (Ahmedabad)	1. Shri S. P. Doshi	1. Dr. D. K. Desai, Dy. Director of Agriculture (Stat.) 2. Shri J. B. Trivedi, I/C. Dy. Director (Stat.) 3. Shri R. L. Shah, Dy. Director of Agriculture (Stat.)
5.	Kerala (Trivandrum)	—	1. Shri N. George John, Research Officer 2. Shri G. Rama Chandran Nair, Research Officer 3. Shri K. George, Research Officer
6.	Madhya Pradesh (Bhopal)	1. Shri Rama Rao Patil 2. Shri S. S. Kutaula	1. Shri A. G. Khare, Dy. Director of Agriculture (Stat.)
7.	Maharashtra (Poona)	1. Shri P. R. Yeri 2. Shri B. Ramakrishnan	1. Shri V. G. Sharma, Sr. Statistician 2. Shri G. C. Shaligram, Dy. Statistician 3. Shri D. T. Sawant, Asstt. Statistician
8.	Mysore (Bangalore)	1. Shri K. A. Balakrishnan 2. Shri P. T. N. Nambiar	1. Dr. N. P. Patil, Director of Research
9.	Orissa (Bhubaneswar)	1. Shri Rama Rao Patil	1. Shri B. Mishra, Dy. Director of Agri. (Hq.) 2. Shri A. Mishra, Chief Statistician

- | | | |
|---|---|--|
| 10. Punjab, Haryana,
Himachal
Pradesh, Jammu
& Kashmir
(Ludhiana) | 1. Shri B. L. Kaistha
2. Shri U. N. Dixit
3. Shri D. L. Manocha
4. Shri M. S. Batra
5. Shri D. P. Singh | 1. Shri P. S. Sahota,
Director of Crop Insurance
2. Shri Darshan Singh,
Asstt. Statistician
3. Shri M. S. Pannu,
Statistician, Department of
Agriculture
4. Dr. D. Raghavarao,
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Maths. & Stat., P.A.U.,
Ludhiana |
| 11. Rajasthan
(Jaipur) | 1. Shri N. K. Ohri
2. Shri C. H. Rao | 1. Shri H. C. Kothari,
Dy. Director (Statistics),
Department of Agriculture |
| 12. Tamil Nadu
(Coimbatore) | 1. Shri P. Narayanan
2. Shri M. V. George | 1. Shri K. R. Nagaraja Rao,
Secretary, Research Council
2. Dr. K. Ramakrishnan,
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3. Dr. D. Daniel Sunderaraj,
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| 13. Uttar Pradesh
(Lucknow) | 1. Shri S. N. Bajpai
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3. Shri G. N. Bahuguna
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6. Shri C. B. Tiwari
7. Shri R. S. Singh
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of Agriculture (Statistics)
2. Shri K. P. Avasthy,
Officer-on-Special Duty |
| 14. West Bengal
(Calcutta) | 1. Shri A. K. Mukherjee
2. Shri A. Sinha | 1. Shri S. N. Mukherjee,
Dy. Director of Agriculture
(Statistics) |
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ABBREVIATIONS COMMON TO EXPERIMENTS ON ANNUAL AND PERENNIAL CROPS AND EXPERIMENTS ON CULTIVATORS' FIELDS GIVEN IN EXPERIMENTAL DATA

Crop :—In the top left corner, is given the name of the crop on which the experiment is conducted. Within brackets along side the crop, is mentioned the season wherever the information is available.

Ref :—Against the sub-title 'Reference' is mentioned the name of the State, the year in which the experiment is conducted and the serial number of the experiment for that year is given in brackets.

Abbreviations adopted for States are as follows :

1.	A.P.	—	Andhra Pradesh	11.	Mn.	—	Manipur
2.	As.	—	Assam	12.	Ms.	—	Mysore
3.	Bh.	—	Bihar	13.	N.L.	—	Nagaland
4.	Gj.	—	Gujarat	14.	Or.	—	Orissa
5.	H.P.	—	Himachal Pradesh	15.	Pb.	—	Punjab
6.	Hr.	—	Haryana	16.	Rj.	—	Rajasthan
7.	J.K.	—	Jammu & Kashmir	17.	T.N.	—	Tamil Nadu
8.	K.	—	Kerala	18.	Tr.	—	Tripura
9.	M.P.	—	Madhya Pradesh	19.	U.P.	—	Uttar Pradesh
10.	Mh.	—	Maharashtra	20.	W.B.	—	West Bengal

For the experiments conducted under the schemes sponsored by the Indian Council of Agricultural Research, like the All India Co-ordinated Agronomic Experiments (Model Agronomic Experiments and Simple Fertilizer Trials) scheme, no serial number has been given at the source as the data of these experiments were collected at the headquarters (New Delhi). In such cases, the abbreviation MAE or SFT is given in the bracket against the year in which the experiment is conducted.

Site & Centre :—Name of the Research Station is mentioned along with the place where it is located, e.g. Agri. Res. Stn., Vyara for Agricultural Research Station, Vyara.

For Central Institutes, the corresponding standard abbreviations have been adopted as given below :

C. A. Z. R. I.	—	Central Arid Zone Research Institute.
C. P. C. R. I.	—	Central Plantation Crops Research Institute.
C. P. R. I.	—	Central Potato Research Institute.
C. R. R. I.	—	Central Rice Research Institute.
C. S. S. R. I.	—	Central Soil Salinity Research Institute.
C. T. C. R. I.	—	Central Tuber Crops Research Institute.
C. T. R. I.	—	Central Tobacco Research Institute.
C. T. R. L.	—	Cotton Technological Research Laboratory.
I. A. R. I.	—	Indian Agricultural Research Institute.
I. G. F. R. I.	—	Indian Grassland & Fodder Research Institute.
I. H. R.	—	Institute of Horticultural Research.
I. I. S. R.	—	Indian Institute of Sugarcane Research.
I. L. R. I.	—	Indian Lac Research Institute.
J. A. R. I.	—	Jute Agricultural Research Institute.
J. T. R. L.	—	Jute Technological Research Laboratory.
S. B. I.	—	Sugarcane Breeding Institute.

In case of the experiments conducted on cultivators' fields, whether under an Indian Council of Agricultural Research scheme or by the State Government, the abbreviation (c.f.) is given along with the site or centre as, for example, Cuttack (c.f.).

Type :—Abbreviations used against this item are one, or more than one, of the following :
C—Cultural ; D—Control of Diseases and Pests ; I—Irrigational ; M—Manurial ; R—
Rotational ; V—Varietal and X—Mixed cropping. In factorial experiments, the treatments
will be abbreviated as, for example, Cultural-cum-Manurial as CM.

Object :—A statement of the objective of the experiment is given indicating the main crop
and the type of the experiment.

Results :—Information under this heading should be read against the following items :

(i) General mean. (ii) S. E. per plot. (iii) Results of test of significance. (iv) Summary
table(s), with critical differences for individual effect means which are significant.

Other abbreviations used in the Experimental Data

Kg	=	Kilogram(s)	Dical. Phos.	=	Dicalcium Phosphate
Kg/ha.	=	Kilogram(s) per hectare	Zn. Sul.	=	Zinc Sulphate
N	=	Nitrogen	Cu. Sul.	=	Copper Sulphate
P	=	Phosphate	Mg. Sul.	=	Magnesium Sulphate
K	=	Potash	Mn. Sul.	=	Manganese Sulphate
Nitro. Phos.	=	Nitrogen Phosphate	Ammo. Molybdate	=	Ammonium Molybdate
Ammo. Phos.	=	Ammonium Phosphate	B.	=	Boron
A/S	=	Ammonium Sulphate	Fe. Sul.	=	Ferrous Sulphate
A/S/N	=	Ammonium Sulphate Nitrate	F. M.	=	Fish Manure
C/A/N	=	Calcium Ammonium Nitrate	G. N. C.	=	Groundnut Cake
A/N	=	Ammonium Nitrate	M. C.	=	Municipal Compost
A/C	=	Ammonium Chloride	T. C.	=	Town Compost
C/N	=	Chilean Nitrate	G. M.	=	Green Manure
Mur. Pot.	=	Muriate of Potash	G. L. M.	=	Green Leaf Manure
Pot. Sul.	=	Potassium Sulphate	F. Y. M.	=	Farm Yard Manure
Super.	=	Super Phosphate	C. M.	=	Cattle Manure

The information regarding the particulars of research stations may be obtained under the
respective items as given below :

PARTICULARS OF RESEARCH STATIONS

A. General Information :

(i) District and the nearest railway station with Latitude, Longitude and Altitude, if
available. General topography of the experimental area. (ii) Type of tract it represents.
(iii) Year of establishment. (iv) Cropping pattern. (v) Programme of research.

B. Normal Rainfall :

Average fortnightly rainfall, specifying the period on which the figures are based.

C. Irrigation and Drainage Facilities :

(i) (a) Whether available ; if so, since when. (b) Type of facilities available. (ii)

Whether there is a proper drainage system.

D. Soil type and Soil analysis :

(i) Broad soil type with depth, colour and structure etc. (ii) Chemical analysis. (iii)
Mechanical analysis.

E. No. of Experiments :

No. of experiments conducted on different crops that have been included in the
compendium.

Information under the following heads is to be read against the respective items under
experimental data as given on next page.

BASAL CONDITIONS*A. For experiments on annual crops :*

(i) (a) Crop rotation followed, if any. (b) Previous crop. (c) Manuring of previous crop (State amount and kind). (ii) Soil type. (iii) Date of sowing/planting. (iv) Cultural practices : (a) Preparatory cultivation. (b) Method of sowing. (c) Seed-rate. (d) Spacing. (e) No. of seedlings per hole. (v) Basal manuring given to the whole experiment with time and method of application. (vi) Variety (indicate also early, medium or late). (vii) Irrigated or un-irrigated. (viii) Important post-sowing/planting cultural operations such as weeding, etc. (ix) Rainfall during crop season. (x) Date of harvest.

B. For experiments on perennial crops :

(i) Previous history of the experimental area (Give manuring and other operations). (ii) Soil type. (iii) Method of propagation of plants. (iv) Variety. (v) Date and method of sowing/planting (including spacing). (vi) Age of seedlings at the time of planting. (vii) Basal manuring given to the whole experimental area. (viii) Important cultural operations during the experimental year. (ix) Inter-cropping, if any. (x) Irrigated or un-irrigated (If irrigated, give the source, number, interval and intensity of irrigation). (xi) Rainfall during the experimental year. (xii) Date(s) of harvest.

C. For experiments on cultivators' fields :

(i) (a) Crop rotation followed, if any. (b) Previous crop. (c) Manuring of previous crop (State amount and kind). (ii) Soil type and soil analysis, if available. (iii) Basal manuring (Give time and method of application). (iv) Variety. (v) Cultural Practices : (a) Preparatory cultivation. (b) Method of sowing. (c) Seed-rate. (d) Spacing. (e) No. of seedlings per hole. (vi) Date of sowing/planting. (vii) Irrigated or un-irrigated. (viii) Important post-sowing/planting cultural operation such as weeding etc. (ix) Rainfall during crop season. (x) Date of harvest.

DESIGN*A. For experiments on annual crops :*

(i) Abbreviations for designs : C. R. D.—Completely Randomised Design ; R. B. D.—Randomised Block Design ; L. Sq.—Latin Square ; Fact.—Factorial ; Confd.—Confounded ; other designs and modifications of the above to be indicated in full. (indicate confounded effects, if any). (ii) (a) No. of plots per block (in a split-plot experiment, the number of main-plots per replication as well as the number of sub-plots per main-plot should be given). (b) Block dimensions. (iii) No. of replications. (iv) (a) Gross plot-size. (b) Net plot-size. (v) Border or guard rows kept. (vi) Whether treatments are randomised (independently in each block).

B. For experiments on perennial crops :

(i) Abbreviations for designs: C. R. D.—Completely Randomised Design ; R. B. D.—Randomised Block Design ; L. Sq.—Latin Square ; Fact.—Factorial ; Confd.—Confounded ; other designs and modifications of the above to be indicated in full. (indicate confounded effects, if any) (ii) (a) No. of plots per block (in split-plot experiments, the number of main-plots per replication as well as the number of sub-plots per main-plot should be given). (b) Block dimensions. (iii) No. of replications. (iv) (a) Net plot-size. (b) No. of trees per plot (In case of experiments on grasses give plot-size). (v) Border or guard rows kept. (vi) Whether treatments are randomised (independently in each block).

C. For experiments on cultivators' fields :

(i) Design with No. of plots/block and No. of replications (In split-plot experiments, the number of main-plots per replication as well as the number of sub-plots per main-plot should be given). (ii) Method of selection of sites with number and distribution of experiments. (iii) (a) Gross plot-size. (b) Net plot-size. (iv) Whether treatments are randomised (independently in each block).

GENERAL INFORMATION

A. For experiments on annual crops :

(i) General crop condition during growth (if lodged, state date of lodging). (ii) Incidence of pests and diseases and control measures taken, if any. (iii) Types of quantitative observations taken. (iv) (a) If the experiment has continued for more than one year, indicate year of commencement and year of termination. (b) Whether treatments assigned to the same plots every year. (c) Reference to combined analysis, if any. (v) Other centres, if any, where the same experiment has been conducted with reference numbers. (vi) Abnormal occurrences such as heavy rains, frost, storm, drought, etc. (vii) Any other important information.

B. For experiments on perennial crops :

(i) General crop condition during growth. (ii) Incidence of pests and diseases and control measures taken, if any. (iii) Types of quantitative observations taken. (iv) If the experiment has continued for more than one year, indicate year of commencement and year of termination (Give reference of previous years, if any). (v) Other centres, if any, where the same experiment has been conducted with reference numbers. (vi) Reference to combined analysis, if any. (vii) Abnormal occurrences such as heavy rains, frost, storm, drought, etc. (viii) Any other important information.

C. For experiments on cultivators' fields :

(i) General crop condition during growth. (ii) Incidence of pests and diseases and control measures taken, if any. (iii) Types of quantitative observations taken. (iv) In case of repetition in successive years. (a) Year of commencement and termination. (b) Whether treatments assigned to the same plots every year. (c) Reference to combined analysis, if any. (v) In case of repetition at other places, give names with references, if any. (vi) Abnormal occurrences such as heavy rains, drought, etc. (viii) Any other important information.

GLOSSARY OF VERNACULAR NAMES OF CROPS

Sl. No.	Name of Crop	Botanical Name	Assamese	Bengali	Oriya	Telugu	Tamil	Malayalam	Kannada	Marathi	Gujarati	Hindi	Punjabi	Kashmiri
1	Paddy	<i>Oryza sativa</i> L.	Dhan	Dhan	Dhano	Vadlu,	Nel	Nellu	Bhatta	Bhat	Dangar	Dhan	Dhan	Shali
2	Wheat	<i>Triticum sativum</i> Lamk,	Gaum ;	Gam	Gaham	Godumalu	Gothambu	Gothambu	Godhi	Gahu	Ghahu	Gehon	Kanak	—
3	Maize	<i>Zea mays</i> L.	Gom dhan	Bhuta	Macea	Makka-jonna	Makka-cholam	Cholam	Musukina Jola	Makka	Makkai	Makka	Makki	—
4	Barley	<i>Hordeum Vulgare</i> L.	Ja'dhan	Joba	Jaba	Barley	Baarlirisi	Barley	Barley akki	Salu	Jau	Jau	Jaun	—
5	Gram	<i>Cicer arietinum</i> L.	Butmah	Chola	Boot	Sanagalee	Kadalai,	Kadala	Kadali	Harbara	Chana	Chana	Chana	Moong
6	Bajra	<i>Pennisetum typhoides</i> Stapf & Hubbard	—	Bajra	Bajro	Sajja	Kaulu	Kambu	Sajje	Bajri	Bajra	Bajra	Bajra	Bajra
7	Urd	<i>Phaseolus mungo</i> Var.	Matimah	Mashpalai	Biri	Minumulu	Vzhundu	Uzhuenu	Uddu	Udid	Udad	Urd	Mash	Mash
8	Tobacco	<i>Nicotiana tabacum</i> L.	Dhopat	Tamak	Vanpatra	Pogab	Puga yilai	Puba yila	Hoge soppu	Tambaku	Tambaku	Jambaku	Tambaku	—
9	Sugar cane	<i>Saccharum Officinarum</i> L.	Kuhar	Akh	—	Cherupee	Karumbu	Karumbu	Kabhu	Oos	Sherdi	Ganna	Kamad	—
10	Cotton	<i>Gossypium spp</i>	Kapah	Karpas	Kapa Kaunsia	Partri Gogar	Paruthi	Paruthi	Hatti	Kapus	Kapas	Kapas	Kapas	—
11	Ground nut	<i>Arachis hypogaea</i> L.	China Badam	Cheena Badam	China Badam	Nelash anga	Nilabadaia	Nilakkadaia	Kadali Kayi	Bhuimug	Bhoising	Mongphali	Mugfali	—
12	Castor	<i>Ricinus Communis</i> L.	Eri	Rahri	Sada	Amudala	Amanakka	Avanakku	Naralu	Erandi	Divali	Rehri	Arind	—
13	Sarson	<i>Brassica Campestsis</i> Var.	Sariah	Sarisha	—	Ana	Kadugu	—	Sarshapa	Shiras	Sarhari	Sarsoon	Brown Sarsonh	—
14	Raya (Mustard)	<i>Brassica Juncea</i> Coss	Sariah	RaiSarisha	Rai	Avalu	Kadugu	Kadaku	Kempu Sasiue	Mohri	Rai	Rai	Rai	Rai
15	Napiar grass	<i>Pennisetum purpureum</i>	Nolghah	Nepies ghas	Nepiar ghasa	Napier Gaddi	Napier pul	—	Napier hullu	Hatti gauat	—	Napier	Mathighoh	—

Sl. No.	Name of Crop	Botanical Name	Assamese	Bengali	Oriya	Telugu	Tamil	Malaya- lam	Kannada	Marathi	Gujrati	Hindi	Punjabi	Kashmi
16	Lucerene (Burdomer)	<i>Medicago hispida</i>	—	—	Notknown	—	—	—	—	—	—	Lucorne	—	—
17	Sweet Sudan													
18	Teosinte	<i>Euchlaena mesicana</i>	—	—	No Known	—	—	—	—	—	—	—	Makchari	—
19	Pea	<i>Pisum arnense L.</i>	Motor	Chota	Badh Chana	Desavahi	Patta ami	—	Holada batani	Matar	Vatana	Muttar	Mattri	Chana
20	Bhindi	<i>H 1 hiscus esculentus</i>	Bhendi	Dhenresh	Vendi	Benda	Bendi Kai	Venda	Bende Kayi	Bhendi	Bhida	Bhindi	Bhindi	—
21	Brlnjai	<i>Solanum melongena L.</i>	Bengona	Beun	Baigan	Vankaya	Katha ribai	Vazhu- thana	Badane Kayi	Vange	Vengan	Baingan	Bengan	—
22	Potato	<i>Solanum tuhersoum L.</i>	Alooguti	Alu	Bilati Alu	Bangala phumpa	Uruzhai	Urala Kizangu	Alugedde	Batata	Aloo	Aaloo	Alu	—
23	Radish	<i>Raphanus ralinus L.</i>	Mula	Mula	Mula	Mullangi	Mullangi	Mullanbi	Mullangi	Mula	Mulo	Mcoli	Muli	—
24	Tomato	<i>Lycopersicum esculentum</i>	Bilahi Cha	Prilati begun Cha	Bilati baigan Cha	Tomto Theyabu	Thakkiali Thuylai	Thakkali Tea Theyila	Tomato Tea	Welwangi Chaha	Vilti wagm Chah	Tamattar Chaie	Tamatar Chah	—
25	Tea	<i>Camellia thea</i>												
26	Cabbage	<i>Brassica oleracia L. Var. Capitata L.</i>	Bandha Kalri	Bondha Kapi	Baindha Kobhi	L. Akuga- lu	Muttai kase	Mutha kase	Yele Kosu	Kobi	—	Bund Goby	Goby	—
27	Cauliflower	<i>Brassica oleraca L.</i>	Pool Kahi	Fulkapi	Fula Kolri	Poogolu	Gospoovu	Caulejlo- war	Hokosu	Phul Kabi	Fullkolin	Phool Gobhy	Phulgobhi	—
28	Turnip	<i>Brassica Vapa L.</i>	Salgom	Salgnm	Salgum	Turnip	—	Seema Muttanpi	Turnip	Salgam	Salgham	Saljam	Genglu	—
29	Carrot	<i>Daucus Carota L.</i>	Gajor	Gajar	Gajar	Gajara gadda	Kaaret	Carrot	Kampu malangi	Gajar	Kohuj	Gajar	Gajar	—
30	Beans (Indian)	<i>Dolichos Labbab L.</i>	Desi urahi	Deshi Shim	Jhata Simba	Anapa	Mochehai	Ramcha	Avare	Wal	Wal	Sern	Lobia desi	—
31	Sugar beet (Beetroot)	<i>Beta Vulgaris L.</i>	Beet	Beet	Beet	Beetud umpa	—	Beetroot	Beetroot	Beet	Beet	Chukandar	Chakandar	—

Sl. No.	Name of Crop	Botanical Name	Assamese	Bengali	Oriya	Telugu	Tamil	Malaya-lam	Kannada	Marathi	Gujarati	Hindi	Punjabi	Kashmiri
32	Sesamum	<i>Sesamum indicum L.</i>	Til	Til	Rasi	Nuwull	Ellu	Elln	Yellu	Til	Tal	Til	Til	—
33	Linseed	<i>Linum uritatisimum L.</i>	Tisi	Tishi	Peshi	Avise	Alirithai	Chenechanavithu	Agare	Alsi	Alsi	Alsi	Alsi	—
34	Chilli	<i>Capsicum frutescens L.</i>	Salabiya	Lanka	Lanker	Mirapabaya	Mila Kai	Mulaku	Menasim Kayi	Mirchi	Marcha	Lalmirch	Lal mirch	—
35	Zira (cumin)	<i>Cuminum cyminum L.</i>	Jani	Jura	Jira	Jeelaparra	Seeragan	Jeerakom	Jeerige	Jire	Jiru	Jeera	Jira	—
36	Apple	<i>Pyrus malus L.</i>	—	Apel	Seo	Apple	Appal	Apple	Sebu	Apple	Safarjand	Seb	Seb	—
37	Apricot	<i>Prunus armeniaca L.</i>	Apricot	Khuhani	Apricot	Apricot	Aabrikot	—	—	Aprikol	Akhrot	Khohani	Khurmani	—
38	Malta	<i>Citrus sinensis</i>	Malta	Mosammi	Mitha Kamala	Battayi	Sathugudi	Maduramaranga	Sathkudi	Mosameri	Mosamlej	Malta	Malta	—
39	Sweet orange	<i>Citrus sinensis osheck</i>	Malta	Mosammi	Mitha Kamala	Battayi	Cheeni	Maduramaranga	Sathkudi	Mosambi	Mosambi	Malta	Malta	—
40	Mandarin Orange	<i>Citrus reticulata Blanco</i>	Kamala	Kamla lebu	Santro	Kamala phalamu	Kamla; Koorg	Arangu	—	Santra	Santra; Nanangi	Santra	Santra	—
41	Plum	<i>Prunus domestica L.</i>	Ahom Bogori	Alubokhara	Alubokhara	Alubokha	All Pabada Puzhan	—	Abhakora	—	—	Aaloo Bukara	Alucha	—
42	Khol	<i>Brassica olerca var</i>	Olkalir	Old kadi	Olbochi	Gadda Gobi	Knool Khol	—	Nasulukoru	Nawal Kal	Wal Kolkol	Knool Khol	Knool Khol	—
43	Onion	<i>Allium cepa L.</i>	Piyas	Piaj	Peas	Ulli	Vengayam	Ulli	Eerulli	Kanda	Dungli	Paiz	Gantha	—
44	Safflower	<i>Carthamus tinctorius L.</i>	Kusum	Kusum	—	Kusama	Senthoo-rapan	—	Kusum	Kardai	Kosamti	Kusum	Jangli Kesear	—
45	Masoor or Lentil	<i>Lensesculenta</i>	Masurmah	Musami	Masur	Chirusanaga	Masur pasuppa	—	Masooru bele	Masur	Masure	Masur	Massar	Massar
46	Mustard	<i>Brassica nigra Koch</i>	Kala Sariah	Banarsi Rayi	Rai	Nalla avalu	Sirubadagu	Kadabu	Kare sasave	Kali Mohri	Kali Rai	Kali Sarson	Banarasi rayee	—
47	Toria	<i>Brassica campestris Var.</i>	Sariah	Tori sarisha	—	Area	Kaduyu	—	—	Saras	Sarsare	Toria	Toria	—
48	Sweet Lime	<i>Citrus aurantijolia</i>	Mithnaman	Sarbati behu	Sarbati	Nimnaka	Fabmencha	—	Kittale	Sthkkar limbu	Mitha Limboo	Meetha imboo	Mitha	—
49	Grape fruit	<i>Citrus paruchiri Mact.</i>	Graft fruit	—	—	Pamparakana	Parna	—	—	Grap fruit	—	Grap fruit	Grape phal	—

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NORTH-WESTERN REGION

(Salient Features of Experimentation)

The North-Western region comprises of the states of Haryana, Himachal Pradesh, Jammu & Kashmir and Punjab. The general information regarding the agro-climatic divisions, extent of irrigation, normal cropping pattern etc, of this region is available in the volumes of the first and second series of the National Index of Agricultural Field Experiments already published for the periods 1948-53 and 1954-59 respectively,

This volume includes the results of 1000 experiments reported for the period 1960-65, as against 864 experiments for the period 1954-59 and 739 experiments for the period 1948-53. Besides these, results of experiments conducted under the All India Co-ordinated Agronomic Experiments Scheme of ICAR are also included in the present compendium.

The detailed discussions on the salient features of experimentation in these states is given below :

HARYANA

Table : Hr-1 (a)—Distribution of experiments Crop-wise and type-wise

Type Crop	Type												TOTAL
	M	MV	C	CV	CM	CMV	I	IM	IMV	ICM	D	X	
Paddy	10	—	—	—	2	—	—	—	—	—	—	—	12
Wheat	13	—	3	1	2	—	—	1	1	—	—	—	21
Barley	2	—	3	—	2	1	1	—	—	—	—	—	9
Oats	—	—	—	1	—	—	1	—	—	—	—	—	1
Bajra	1	—	—	—	—	—	—	—	—	—	2	—	4
Maize	—	—	—	—	—	—	1	—	—	1	—	—	1
Gram	2	—	1	—	—	—	—	—	—	—	—	—	3
Urd	1	—	—	—	—	—	—	—	—	—	—	—	1
Tobacco	5	1	—	7	4	3	—	—	—	—	3	—	23
Sugarcane	10	4	2	—	—	1	—	—	—	—	—	—	16
Cotton	26	—	3	—	5	—	—	3	—	—	12	—	50
Groundnut	—	—	—	—	—	—	—	1	—	—	—	—	1
Castor	1	—	1	—	—	—	—	—	—	—	—	—	2
Sarson	2	—	3	—	2	—	—	—	—	—	—	—	7
Raya	3	2	1	—	1	—	—	—	—	—	—	—	8
Napier Grass Fodder	—	—	2	—	—	—	—	—	—	—	—	—	2
Berseen Fodder	4	—	—	—	—	—	—	—	—	—	—	—	4
Lucerne	2	—	1	—	—	—	—	—	—	—	—	—	3
Sweet Sudan	1	—	1	—	—	—	—	—	—	—	—	—	2
Teasinte	—	—	1	—	—	—	—	—	—	—	—	—	1
Mixed crops	—	—	—	—	—	—	—	—	—	—	—	7	7
TOTAL	83	7	22	9	18	5	3	5	1	1	17	7	178

The results of 178 experiments, conducted on different crops during 1960-65 in the state of Haryana are presented in this volume. The crop-wise and type-wise distribution of the experiments is given in the table Hr. 1 (a). The experiments which had been conducted for more than one year have been grouped and the combined results of such experiments are presented in the group form. There are such 40 groups comprising of 84 experiments, the distribution of these are presented in the table Hr. 1 (b). From these tables, it can be seen that the experiments conducted on paddy, wheat, sugarcane, tobacco and cotton together contribute to 70% of the total experiments. A brief summary of results for these crops is given below :

PADDY :

Paddy crop covered about 192 thousand hectares i.e. 4.2% of the total cropped area in the state. 12 experiments were reported for this crop; all under irrigated condition. The net plot size used for experimentation varied from 2.3 sq.m. to 44.5 sq.m. Most of the experiments were laid in RBD with 4 replications. All the experiments had manurial treatments as one of the factors under investigation and the levels of N, P, and K varied between 0 to 57Kg/ha, 0 to 28Kg/ha and 0 to 28Kg/ha respectively.

WHEAT :

Wheat crop covered 738 thousand hectares i.e. 16.0% of the total cropped area and nearly 12% of the reported experiments were on this crop. Out of these 10 experiments were such that those were conducted for more than a year and these formed five groups. All the experiments were under irrigated conditions. Important varieties of wheat used in experimentation were C-273 and C-591. Nearly 50% of the experiments were laid out in RBD and the rest were in split plot design. The number of replications varied from 3 to 8. The range of the net plot size was from 13sq.m. to 490sq.m.

13 experiments reported were of purely manurial type, nearly 80% of the experiments had manures as one of the factors. The nitrogen levels applied were of the order of 44.8 to 93.3Kg/ha of N while for P and K, the corresponding range was 0 to 22.3Kg/ha.

SUGARCANE :

Sugarcane crop covered 151 thousand hectares i.e. 3.28% of the total cropped area in the state. Out of the 16 expt. reported on this crop, 14 were conducted under irrigated conditions. The designs adopted to lay out these experiments were RBD and split plot with 3 to 4 replications. The plot-size varied from 102.4 sq.m. to 136.2 sq.m. About 87% of the experiments were conducted with manures as one of the factors under investigation. The doses of nitrogen varied from 0 to 280Kg/ha of N, while that of P and K varied from 0 to 56Kg/ha. In cultural type of experiments, the row spacing tried were 60 to 90cm. The important varieties included for the experimentation were Co.L.—29, Co.L.—92, Co.J.—1148 and Co.J. 46.

COTTON :

This crop covered 183 thousand hectares i.e. 3.9% of the total cropped area. 50 experiments were reported on cotton for the period under report. In all the experiments the variety H—14 was used. The experiments were laid in RBD and Split plot with the number of replications varying from 2 to 6. The net plot size varied from 33.4 sq.m. to 606.7sq.m.

About 62% of the experiments conducted on cotton were either purely manurial or manures as one of the treatments. The manurial doses varied from 0 to 200Kg/ha of N and 0 to 67Kg/ha of P and K. 24% of the experiments were conducted on control measures for pests and diseases of cotton.

TOBACCO :

Tobacco was grown on one thousand hectares of land in the state and 23 experiments were reported for the period 1960—65. The experiments were conducted under irrigated conditions and the variety C-302 was most commonly used. The other varieties used were C—303, C—390, C—194, T—238 etc. The designs used were RBD and Split plot with 3 to 6 replications.

About 35% of the experiments were conducted as purely manurial type or manuring being one of the factors while 30% of the experiments were of cultural—cum—varietal type. The doses of nitrogen in manurial experiments varied from 167 to 334Kg/ha of N. While those for P and K varied from 0 to 112Kg/ha.

Besides the crops mentioned, this volume contains the results of experiments conducted as minor millets, pulses and oilseeds.

Table : Hr-1(b)—Distribution of groups of experiments concluded during the period 1960—65, Crop-wise and type-wise

Type Crop	Type									Total
	M	MV	C	CV	CM	CMV	IM	D	X	
Paddy	4 (8)	—	—	—	1(2)	—	—	—	—	5(10)
Wheat	4 (8)	—	1(12)	—	—	—	—	—	—	5(10)
Gram	1 (2)	—	—	—	—	—	—	—	—	1(2)
Tobacco	1 (3)	—	—	1(2)	1(2)	1(2)	—	1(3)	—	5(12)
Sugarcane	2 (4)	1(2)	—	—	—	—	—	—	—	3(6)
Cotton	8(16)	—	1(2)	—	1(12)	—	1(2)	2(4)	—	13(26)
Sarson	1 (2)	—	1(2)	—	—	—	—	—	—	2(4)
Raya	1 (2)	1(2)	—	—	—	—	—	—	—	2(4)
Berseem	1 (2)	—	—	—	—	—	—	—	—	1(2)
Mixed crops	—	—	—	—	—	—	—	—	3(6)	3(6)
TOTAL	23(47)	2(4)	3(6)	1(2)	3(6)	1(2)	1(2)	3(7)	3(6)	40(82)

HIMACHAL PRADESH (H.P.)

This compendium volume contains the results of 233 experiments, conducted in H.P. during the period 1960—65. Out of these, 61 experiments were conducted for more than one season; 25 groups were formed for these experiments and pooled results of those experiments are presented in this volume. The type-wise and crop-wise distribution of these experiments are presented in Table—HP—2(a) and HP—2(b). A glance at these tables show that about 65% of the total experiments were conducted on the crops like paddy, wheat, maize, oilseeds, potato and tea. A study of these experiments is given below.

PADDY :

Paddy crop covered about 98 thousand hectares i.e. 11.28% of the total cropped area. 47 experiments were reported for this crop, all under irrigated conditions. 4 groups of experiments consisting of 11 experiments were conducted during the period under report. The

Table : HP-2 (a)—Distribution of experiments, cropwise and type wise

Crop	Type							Total
	M	MV	C	CV	CM	CMV	D	
Paddy	12	—	—	28	4	2	2	48
Wheat	28	—	—	—	1	—	1	30
Barley	5	—	—	—	1	—	—	6
Maize	8	—	—	1	2	—	3	14
Gram	1	—	—	—	—	—	—	1
Pea	—	—	1	—	—	—	2	3
Bhindi	1	—	1	—	—	—	—	2
Brinjal	1	—	—	—	—	—	—	1
Potato	10	2	10	—	2	—	8	32
Radish	—	—	1	—	—	—	—	1
Tomato	2	—	3	1	—	—	2	8
Cabbage	2	—	6	—	—	—	—	8
Cauliflower	3	—	1	—	—	—	1	5
Turnip	2	—	3	—	—	—	—	5
Carrot	4	—	4	—	—	—	—	8
Beans	1	—	—	—	—	—	—	1
Veg. Marrow	1	—	—	—	—	—	—	1
Sugarbeet	5	—	—	—	—	—	—	5
Sugarcane	—	—	2	—	—	—	—	2
Groundnut	—	—	1	—	—	—	—	1
Sesamum	—	—	1	—	—	—	—	1
Sarson	2	—	—	—	—	—	—	2
Linseed	4	—	1	—	3	—	—	8
Chilli	3	—	—	—	—	—	—	3
Zira	1	—	1	—	—	—	—	2
Tea	9	—	9	—	—	—	—	18
Apple	—	—	—	1	—	—	—	1
Apricot	2	—	—	—	—	—	—	2
Malta	3	—	2	—	—	—	—	5
Sweet Orange	1	—	3	—	—	—	—	4
Orange	2	—	1	—	—	—	—	3
Plum	2	—	—	—	—	—	—	2
TOTAL	115	2	51	31	13	2	19	233

varieties used were China. 4—CH—4, CH—988; Hy—23, 27, 51, 100 etc. The net plot size varied from 23 sq.m. to 34 sq.m. The designs adopted for the experiments were RBD in 4 experiments, Fact. RBD in 23 experiments, 3³ confounded in 4 experiments and spMt plot in rest of the experiments. The replications varied from 2 to 4 but in two cases it was as high as 8 also.

About 25% of the experiments reported were of M type, 53.79% were of CV type and 4.1% of D type. In M type the doses for N varied from 0 to 67.5Kg/ha while that for P₂O₅ was from 0 to 22.4Kg/ha and for K₂O, it varied from 0—50Kg/ha. In some of the experiments different sources of N, micro nutrients etc. were tried as treatments.

In case of CV type experiments, different cultural practices such as dates of transplanting, methods of sowing and spacing etc. were the treatments. In D type trials the treatments tried were different fungicides.

WHEAT :

This crop covered about 269 thousand hectares i.e. 30.9% of the total cropped area, 28 experiments were reported for this crop out of which, there were 3 groups comprising of 7 experiments. The varieties for this crop used were NP-770, NP-829 and C-273. The net plot size varied from 15 sq.m. to 24 sq.m. The design adopted were RBD and 3^3 confounded. The number of replications varied from 1 to 6.

About 93.3% of the experiments reported were of M type, The nitrogen doses varied from 0 to 75Kg/ha and P_2O_5 0-112Kg/ha. While for K_2O the range of the doses was 0-75 Kg/ha. In some of the experiments micro-nutrients were also included as treatments.

MAIZE :

This crop covered about 240 thousand hectares i.e. 27.62% of the total cropped area. 14 experiments were reported for this crop under un-irrigated conditions. 2 groups of experiments consisting of 4 experiments were concluded during the period under report. The variety mostly used was Ganga 101, The net plot size varied from 75 sq.m. to 185 sq.m. The designs adopted were RBD and split plot. The replications varied from 4 to 9 but mostly 4 replications were used.

About 57.1% of the experiments reported were of M type, 14.3% were of CM type and 21.4% were of D type. The nitrogen doses varied from 0 to 270Kg/ha and that of P_2O_5 from 0 to 44.5Kg/ha and for K_2O , 0 to 22.5Kg/ha. In some of the experiments micronutrients were also used.

POTATO :

Potato crop covered about 19 thousand hectares i.e. 2.19% of the total cropped area. 32 experiments were reported for this crop under irrigated and un-irrigated conditions. Mostly recently developed varieties were considered for experimentation purposes. The net plot size varied from 4 sq.m. to 16 sq.m. The designs adopted were RBD, fact RBD and Split plot. The number of replications varied from 1 to 4 but in one case it was 11 also.

About 31.2% of the experiments were of M type and 31.2% of C type and 25% on D type. The doses used for N, P and K varied from 0 to 168Kg/ha. In cultural trials treatments like different depth of ploughing, different spacing, method of sowing and dates of sowing etc. were used.

OILSEED]:

Sesamum, Sarson and linseed constituted oilseed crops and these crops covered 21.3 thousand hectares i.e. 2.45% of the total cropped area. 11 experiments were reported for these oilseed crops. These trials were conducted under irrigated conditions. The net plot size varied from 13 sq.m. to 21 sq.m. The designs adopted were RBD, fact. in RBD and 3^3 partially confounding.

About 54.5% of the experiments were of M type and 25.4% of CM type. The doses of N varied from 0 to 44.8 Kg/ha and in one case as high as 112Kg/ha, while those P and K varied from 0-44.8kg/ha.

TEA :

This crop covered 0.42 thousand hectare i.e, 0.05% of the total cropped area, 18 experiments were reported for this crop under unirrigated conditions. The variety used was China-Hyb. The net plot size varied from 24 bushes to 36 bushes. The design adopted for conducting the experiments was RBD and the replications varied from 3 to 4.

About 50.0% of the experiments reported were of M type while 50.0% of C type experiments. The doses used were 0 to 134kg/ha of N. Under cultural practices different dates and times of pruning were tried.

Table ; HP--2(b) —Distribution of groups of experiments, crop-wise and type wise

Type	M	C	CV	CM	Total
Crop					
Paddy	—	—	3(8)	1(3)	4(11)
Wheat	3(7)	—	—	—	3(7)
Maize	2(4)	—	—	—	2(4)
Patato	—	1(2)	—	—	1(2)
Cabbage	—	1(4)	—	—	1(4)
Carrot	1(2)	1(2)	—	—	2(4)
Sugarbeat	2(4)	—	—	—	2(4)
Linseed	1(3)	—	—	—	1(3)
Tea	4(9)	3(9)	—	—	7(18)
Apricot	1(2)	—	—	—	1(2)
Plum	1(2)	—	—	—	1(2)
Malta	1(2)	—	—	—	1(2)
TOTAL	16(35)	6(17)	3(8)	1(3)	26(63)

JAMMU AND KASHMIR**Table : J & K—3 (a) Distribution of experiments crop-wise and typewise**

Type	M	MV	C	CV	CM	CMV	D	TOTAL
Crop								
Paddy	4	3	1	2	—	—	17	27
Wheat	—	—	—	—	—	—	4	4
Maize	—	—	—	—	—	—	16	16
Pea	4	—	—	—	—	—	—	4
Potato	10	—	3	1	2	—	6	22
Radish	1	—	—	—	—	—	—	1
Tamato	2	—	—	—	—	—	—	2
Cabbage	2	—	—	—	—	—	—	2
Cauliflower	4	—	2	—	—	—	—	6
Turnip	2	—	—	—	—	—	—	2
Knol-Khol	—	—	—	—	3	—	—	4
Onion	—	—	4	—	5	—	—	9
Apple	—	—	—	—	5	1	—	1
Saffron	3	—	4	—	—	—	—	7
TOTAL	32	3	14	3	10	1	44	107

The results of 107 experiments conducted in the state during the period 1960-65 have been reported in this compendium, out of these 58 experiments have formed 22 groups as the results for those being available for more than one crop season. Most of the experiments were manurial trials. The crop-wise and type-wise distributions is presented below in tables JK-3 (a) and JK-3 (b) The tables show that most of the experiments were on the crops of Paddy, Maize, Potato,. Other experiments were on vegetable crops and fruit crops.

PADDY :

Paddy crop covered about 224 thousand hectares i.e. 26.14% of the total cropped area. 27 experiments for this crop were reported all under irrigated conditions. 4 groups of experiments consisting of 11 experiments were concluded during the period under report. The varieties mostly used were CH-1039 and Basement 370. The net plot size varied from 5 sq.m. to 38 sq.m. The designs adopted were RBD, 3³ confounded and split-plot. The replications tried varied from 3 to 4.

About 15% of the experiments were of M type. The doses of N used were from 22 to 150kg/ha, that of P₂O₅ were 0 to 100kg/ha and that for K₂O were, 0 to 100kg/ha. 11.1% of the experiments reported were of MV type. In 63% of the experiments, different type of weedicidal and seed treatments were used.

MAIZE ;

Maize crop covered about 240 thousand hectares i.e. 28% of the total cropped area. 16 experiments were reported, all under unirrigated conditions on this crop. 3 groups of experiments consisting of 11 experiments were concluded during the period under report. In all the experiments local variety was used. The net plot size in most of the experiments was 38 sq.m. The layout adopted was RBD only. The replications mostly applied were 4.

POTATO :

Potato crop covered one thousand hectares i.e. 0.12% of the total cropped area. Most of the experiments were conducted under irrigated conditions. 22 experiments were reported for this crop. 4 groups of experiments consisting of 8 experiments were concluded during the period under report. The varieties used were S-4234, S-4215 and S-2434. The net plot size varied from 4 sq. m. to 11 sq.m. The designs adopted were RBD, Factorial in RBD, confounded and split plot. The replications varied from 3 to 6.

About 45.4% of experiments were of M type, 13.6% of C type and 22.7% of D type. The doses of N, P and K tried were 0 to 168 and 0 to 224kg/ha respectively. The cultural practices adopted were different dates of sowing, methods of sowing, row spacing etc. In case of D types different insecticides and fungicides etc. were used.

Table : J & K—3 (b)—Distribution of group of experiments, crop-wise and type-wise

Type	M	C	CM	D	TOTAL
Crop					
Paddy	1(2)	—	—	3(9)	4(11)
Wheat	—	—	—	1(4)	1(4)
Maize	—	—	—	3(11)	3(11)
Pea	1(2)	—	—	—	1(2)
Potato	2(4)	1(2)	—	2(4)	5(10)
Radish	—	—	—	—	—
Tomato	—	—	—	—	—
Cabbage	1(2)	—	—	—	1(2)
Cauliflower	1(3)	—	—	—	1(3)
Turnip	—	—	—	—	—
Knol-Khol	—	—	1(2)	—	1(2)
Onion	—	2(4)	1(2)	—	3(6)
Apple	—	—	—	—	—
Saffron	1(3)	1(4)	—	—	2(7)
TOTAL	7(16)	3(8)	3(6)	9(28)	22(58)

PUNJAB

Table : Pb—4 (a)—Distribution of experiments crop-wise and type-wise

Type	M	MV	C	CV	CM	CMV	I	IM	IMV	IC	ICV	ICM	D	X	TOTAL
Crop															
Paddy	15	1	6	4	3	—	—	—	—	—	—	—	—	—	29
Wheat	57	7	5	9	9	—	1	1	1	—	—	—	1	—	91
Maize	25	—	—	—	—	—	—	—	—	—	—	—	—	—	25
Barley	1	—	1	—	1	—	—	1	—	—	—	—	—	—	4
Bajra	7	1	6	1	9	—	—	—	—	—	—	—	—	—	24
Gram	3	—	9	—	6	1	—	—	—	—	1	3	—	—	23
Mash	2	—	3	—	—	—	—	—	—	—	—	—	—	—	5
Masoor	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
Pea	2	—	—	—	—	—	—	—	—	—	—	—	—	—	2
Potato	—	2	—	—	—	—	—	—	—	—	—	—	—	—	2
Sugarcane	31	11	12	—	6	—	—	—	1	1	1	—	4	—	67
Cotton	43	—	16	—	11	—	—	2	—	—	—	—	23	—	95
Tobacco	11	2	1	10	2	2	—	—	—	—	—	—	5	—	33
Groundnut	15	—	9	—	4	—	—	—	—	—	—	—	—	—	28
Sesamum	1	—	1	—	1	—	—	—	—	—	—	—	—	—	3
Castor	—	—	2	—	—	—	—	—	—	—	—	—	—	—	2
Mustard	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Toria	3	—	—	—	—	—	—	—	—	—	—	—	—	—	3
Grasses	21	—	—	—	—	—	—	—	—	—	—	—	—	—	21
Sweetlime	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
Sweet Orange	1	3	1	1	3	—	—	—	—	—	—	—	—	—	5
Citrus	2	—	—	—	—	—	—	—	—	—	—	—	—	—	2
Grape Fruit	—	2	—	—	—	—	—	—	—	—	—	—	—	—	2
Mixed Crops	—	—	—	—	—	—	—	—	—	—	—	—	—	14	14
TOTAL	240	29	73	24	55	3	1	4	2	1	2	3	33	14	485

The results of 483 experiments, conducted during the period 1950-65 and reported from the state of Punjab have been presented in this compndium. The cropwise and type-wise distribution of these experiments is presented in table No. Pb-4 (a). Out of these 483 experiments, 256 experiments continued for more than one season and hence the groups of such experiments are formed. The distribution of these 102 groups crop-wise and type-wise is shown in table No. Pb-4 (b). A glance at these table revealed that more than 65% of the total experiments were conducted on following crops viz. Paddy, Wheat, Sugarcane, Cotton and Tobacco. Apart from these experiments, results of the experiments on Pulses (Gram, Mash, Masoor and Pea), Oilseeds (Ground nut, Sesamum and Castor) and fruits were also available. A summary discussion of the results of the experiments on the major crops mentioned above is given below.

PADDY :

Paddy crop covered 285 thousand hectares i.e. 5.5% of the total cropped area. 29 experiments were reported for this crop all under irrigated conditions, 4 groups of experiments consisting of 9 experiments were concluded during the period under report. The varieties used were C-27, Jhona 349 etc. The net plot size varied from 10sq.m. to 100sq.m. The experiments were laid out in RBD, Fact. RBD and split-plot. The replications varied from 4 to 6 mostly, but in one case it was 10 also.

About 51.7% of experiments reported were for M type, 10.4% on CM type. 20.8% on C type, while 13.9% on CV type. The doses of N, P, and K were 0 to 89.7Kg/ha, 0 to 67.2Kg/ha. and 0 to 56Kg/ha respectively. The cultural practices were of the nature like depths of transplanting, earthing and date of transplanting etc.

WHEAT :

Wheat crop covered 1615 thousand hectares i.e. 31.23% of the total cropped area 91 experiments were reported for this crop, mostly under irrigated conditions. 11 groups of experiments consisting of 3) experiments were concluded during the period under report. The varieties used were C-273, 286, 285, 281, 303,306. The net plot size varied from 100sq m. to 204sq.m. The experiments were conducted in RBD, fact RBD and split-plot,

About 62.6% of the experiments were of M type, 7.7% were of MV type, 7.7% were of C type, 5.5% were of CV type, 3.2% were of CM type and rest others. In case of manurial trials, the doses of N, P, and K were 0 to 66.8Kg/ha, 0 to 150Kg/ha and 0 to 44.8Kg/ha respectively. In other experiments, treatments applied were sources of manures and fertilizers, different number of ploughings and different depths of ploughing etc.

SUGARCANE :

Sugarcane crop covered 156 thousand hectares i.e.3% of the total cropped area.67 experiments were reported for this crop all under irrigated conditions. 17 groups of experiments consisting of 39 experiments were concluded during the period under report. The varieties used for the experimentation were Co-312, Co.J. 39, 29, 46, Co-976, Co.J.36. The net plot size was of the order of 200sq.m. The experiments on this crop were laid out in RBD, Fact. RBD, 3³ partially confounded and split-plot. The replications varied from 2 to 8.

About 46.2% of the experiments reported were of M type, 16.4% were of MV type. 17.9% were of C type and 9.0% were of CM type. The doses of N,P, and K varied from 0 to 247Kg/ha, 0 to 56Kg/ha and 0 to 124Kg/ha respectively. In cultural trials different methods of sowing, spacing etc. were used.

COTTON :

Cotton crop covered 432 thousand hectares i.e. 8.35% of the total cropped area. 95 experiments were reported for this crop all under irrigated conditions. 23 groups of experiments consisting of 55 experiments were concluded during the period under report. The varieties used for experimentation were F-320, R-231. The net plot size used varied from 20sq.m. to 34sq.m. The designs used were RBD, Fact. RBD, and split-plot. The replications ranged from 2 to 6.

About 45.3% of the experiments were of M type, 16.8% were of C type, 11.5% were of GM type and 24.2% D type. The doses of N,P and K used were 0 to 120Kg/ha, 0 to 60Kg/ha and 0 to 60Kg/ha respectively. Different micro-nutrients, times of application and sources of N etc. were other types of treatments.

In cultural types of experiments, treatments like different spacing, times of ploughing, pruning etc. were used, weedicidal trials formed the D-type experiments.

TOBACCO :

Tobacco crop covered 0.4 thousand hectare i.e. 0.01% of the total cropped area. 33 experiments were reported for this crop all under irrigated conditions, 8 groups consisting of 17 experiments were concluded during the period under report. The varieties used were T-17, N-Tobacco etc. The net plot size was 22sq.m. in most of the experiments. The designs adopted were RBD and split-plot. The replications varied from 4 to 6.

About 33.3% of the experiments were of M type, 3.3% were of CV type and 16.5% of D type. The doses of N used were 112 to 448Kg/ha. There were experiments with different trace elements as treatments.

Table: Pb-4(b)—Distribution of group experiments, Crop wise and type-wise

Crop	Type										TOTAL
	M	MV	C	CV	CM	CMV	IM	ICM	D	X	
Paddy	3(7)	—	2(4)	—	—	—	—	—	—	—	5(11)
Wheat	10(28)	—	1(2)	—	1(3)	—	—	—	—	—	12(33)
Maize	6(15)	—	—	—	—	—	—	—	—	—	6(15)
Bajra	2(6)	—	2(5)	—	2(6)	—	—	—	—	—	6(17)
Gram	—	—	2(5)	—	1(4)	—	—	1(2)	—	—	4(11)
Sugarcane	8(19)	2(5)	4(9)	—	2(4)	—	—	—	1(2)	—	17(39)
Cotton	11(29)	—	5(12)	—	1(2)	—	1(2)	—	5(11)	—	23(56)
Tobacco	2(4)	1(2)	—	2(5)	—	1(2)	—	—	2(4)	—	8(17)
Groundnut	2(6)	—	3(7)	—	1(2)	—	—	—	—	—	6(15)
Toria	1(2)	—	—	—	—	—	—	—	—	—	1(2)
Castor	—	—	1(2)	—	—	—	—	—	—	—	1(2)
Grasses	6(21)	—	—	—	—	—	—	—	—	—	6(21)
Sweetlime	—	—	—	—	1(3)	—	—	—	—	—	1(3)
Sweet Orange	—	1(3)	—	—	—	—	—	—	—	—	1(3)
Citrus	1(2)	—	—	—	—	—	—	—	—	—	1(2)
Grapefruit	—	1(2)	—	—	—	—	—	—	—	—	1(2)
Mixed crops	—	—	—	—	—	—	—	—	—	3(7)	3(7)
TOTAL	52(139)	5(12)	20(46)	2(5)	9(24)	1(2)	1(2)	1(2)	8(17)	3(7)	102(256)

PARTICULARS OF RESEARCH STATIONS AND SOIL ANALYSIS

HARYANA

1. Agricultural Farm, Ambala

A. General Information :

(i) In Ambala tehsil of Ambala district. (ii) Plain tract. (iii) Established in 1945, (iv) and (v) N.A.

B. Normal Rainfall in cm. :

Jan.	Feb.	March	April	May	June	
5	5	2	1	—	11	
July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
31	24	26	1	—	2	108

(Av. is based on monthly rainfall data for the period 1960—62).

C. Irrigation and Drainage Facilities and D. Soil type and Soil analysis :

Information :—N.A.

E. No. of Experiments :

Wheat—7, Barley—1 ; Total=8

2. Regional Research Station, Gurgaon.

A. to D. : Information N.A.

E. No. of Experiments :

Wheat—2, Barley—5, Tobacco—22, Castor—2, Sarson—7, Raya—5 ; Total=43

3. Govt. Agriculture Station, Hansi

A. General Information :

(i) In Hansi tehsil of Hissar district, 7kms from Hansi Rly. Stn. (ii) Clay loam. (iii) Established in 1939. (iv) Cotton-fallow-Cotton; Gram or Wheat-Cotton. (v) Improvement of Cotton for south eastern tract of State. Newly developed strains are tested in replicated trials. In addition to this genetic collection is maintained for use in crossing programme.

B. Normal Rainfall in cm. : N.A.

C. Irrigation and Drainage Facilities :

(i) (a) and (b) Irrigation facilities are available since the inception of the farm. (ii) Proper drainage system exists.

D. Soil type and Soil analysis :

(i) Clay loam, very deep, blackish in colour. (ii) Chemical analysis and (iii) Mechanical analysis : N.A.

E. No. of Experiments :

Paddy—1, Wheat—2, Cotton—11; Total=14

4. Punjab Agricultural University, Hissar.**A. General Information :**

(i) In Hissar Taluka of District Hissar, 2kms. from Hissar Rly. Stn., with Lat.—29.17°E Long—75.7° N and Alt.—215.2 meters above m.s.l. Even topography. (ii) Semi arid tract. (iii) Established in 1962. (iv) Double cropping; Bajra—Wheat or Bajra—Gram; Maize—Wheat or Cotton—Wheat. (v) Res. Expts. on different aspects are conducted by M. Sc. (Agri.) & Ph. D. students.

B. Normal Rainfall : N.A.

C. Irrigation and Drainage Facilities :

(i)(a) and (b): Yes canal, irrigation, since the beginning of the University and tube-well irrigation from 1969, (ii) No proper drainage system exists.

D. Soil type and Soil analysis :

(i) Sandy loam; Medium depth; (ii) Available N—265.2Kg/ha; Available P₂O₅—18.5Kg/ha; Available K₂O—462.5Kg/ha. (iii) Sand—62.2%; Salt—20% Clay—17.8%.

E. No. of Experiments :

Wheat—1, Bajra—3, Maize—1, Gram—1, Urd—1, Sugarcane—2 Cotton—27; Groundnut—1, Raya—1; Grass—1; Total=39.

5. Sugarcane Research Station, Jagadhari.**A. General Information :**

(i) In Ambala district; near Jagadhari Rly. Stn., with Long.—75.5° E, Lat.—30.5, Alt.—Apprx. 454 meters above m.s.l. Khadder area, levelled. (ii) Sub—mountaneous tract. (iii) Established in 1947. (1) Maize—Sainji—Sugarcane—Ratoon—Wheat; (2) Paddy—Sugarcane—Ratoon—Wheat. (v) (1) Development of improved sugarcane varieties for sub mountaneous tract. (2) Other agronomical experiments on Sugarcane. (3) Control of Sugarcane stalk borer.

B. Normal Rainfall in cm. :

3.86cm. based on 6 years (1960 to 1965) rainfall data. Maximum rains are received from July to September.

C. Irrigation and Drainage Facilities :

(i) (a) Available from 1947. (b) Tube well and canal. (ii) Drainage exists.

D. Soil type and Soil analysis :

(i) Clay and Loam;—23cm. deep; Grey in colour (ii) Chemical analysis : p.H. 7.6; E.C.—0.46; Organic carbon—0.64%; Av. N. 173.2Kg/ha.; Av. P 18.9Kg/ha. (iii) Mechanical analysis, N.A.

E. No. of Experiments :

Sugarcane—6, Sarson—2; Total=8

6. Agricultural Research Station, Karnal**A. General Information**

(i) In Karnal district, 4.8Kms. from Karnal Railway Station. (ii) N.A. (iii) Established in 1929. (iv) Sugarcane, Cotton, Barlev and Wheat are the major crops. (v) N.A.

B. Normal Rainfall in cm. :

Jan.	Feb.	March	April	May	June	
5	2	1	—	—	2	
July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
16	28	14	4	—	5	77

(Av. monthly rainfall is based on the data for period 1960—62).

C. Irrigation and Drainage Facilities :

(i) (a) and (b) Irrigation is done by canal. (ii) No proper drainage system exists.

D. Soil type and Soil analysis :

(i) Clay loam (ii) Chemical analysis and (iii) Mechanical analysis : N.A.

E. No. of Experiments :

Paddy—1; Total=1

7. Govt. Reclamation Farm, Nelokheri**A. General Information :**

(i) In Karnal Taluka of Karnal district 3 kms, from Nilokheri Rly. Stn. with Lat.—29.81° N, Long.—77.00 E'. (ii) N.A. (iii) Established in 1965. (iv) and (v) N.A.

B, C and D : —Information N.A.

E. No. of Experiments :

Paddy 10; Wheat—3, Barley—3; Total=16

8. Government Agricultural Farm, Rohtak.**A. General Information :**

(i) In Rohtak tehsil of Rohtak district, Lat.—28.870° N; Long.—76.64° E; Normal levelled fields, (ii) Arid brown soils. (iii) N.A. (iv) Bajra-Gram, Wheat-Fallow-Wheat, Jowar (*cheri*)—Gram-Wheat. (v) To conduct manurial and micronutrient trials.

B. Normal Rainfall in cm :

Jan.	Feb	March	April	May	June	July	
—	—	—	—	3	—	—	
Aug.	Sept.	Oct.	Nov.	Dec.		Total	
23	10	3	—	—		39	

(Figure based on monthly rainfall data for the year 1965—66.)

C. Irrigation and Drainage Facilities :

(i) (a) and (b) : Irrigation facilities are available since very long time. (ii) Natural surface drainage system exists.

D. Soil type and Soil analysis :

(i) Sandy loam, very deep soil, light brown in colour, angular to subangular blocky. (ii) Chemical analysis: pH—8.0; E.C.%—0.33; Organic carbon—0.27%; and available P₂O₅—16.8kg/ha. (iii) Mechanical analysis :—N.A.

E. No. of Experiments :

Wheat—6, Bajra—1, Gram—2, Sugarcane—8, Cotton—12; Total=29.

9. Fodder Research Station, Sirsa.*A. General Information:*

(i) In Sirsa tehsil of Hissar district, about 200m. away from Sirsa Rly. Stn. Area is divided into levelled fields of an acre each. (ii) Arid district of Punjab. (iii) Established in 1933. (iv) Fodder crops. (v) Evolution of improved varieties of fodder crop.

B. Normal Rainfall in cm. :

Jan.	Feb.	March	April	May	June	
12	14	12	3	6	22	
July	Aug.	Sept.	Oct.	Nov.	Déc.	Total
116	98	73	35	6	5	402

(Av. monthly rainfall is based on the data for the period 1951 to 60).

C. Irrigation and Drainage Facilities :

(i) (a) Irrigation facilities exist from the start. (b) Canal water—perennial but running by rotalie. (ii) Proper drainage system exists.

D. Soil type and Soil analysis :

(i) Medium loam soil, deep alluvial and grey in colour. (ii) Chemical analysis ; Iron available—7.98%; CaO—2.5%; P_2O_5 —0.227%; P_2O_5 (available)—0.067%; K_2O —0.725%; K_2O (available)—0.033%; Nitrogen—0.076%; (iii) Mechanical analysis: $CaCO_3$ —2.0%; Organic matter—0.68%; coarse sand—1.78%; fine sand—69.00%; silt—13.60%; clay—12.20%; and Olistre—6.74%.

E. No. of Experiments :

Oats—1, Gram—1, Grass—1, Berseem—4, Lucerne—3, Sweet Sudan—2, Teasinte—1; Mixed Crop—2; Total=15.

HIMACHAL PRADESH**1. Potato Development Station, Ahla***A. General Information:*

(i) In Bhatiyat taluka of Chamba District, 85km. from Pathankot Rly, Stn., situated at about 2286m. above m.s.l. The general topography of the Experimental area is Terraced field. (ii) It represents High hill areas of H.P. (iii) Established in 1950. (iv) Potato in rotation after green manuring or Barley. (v) Arranging varietal and agronomic trials on potato, raising of disease free nucleus foundation seed stock of approved varieties.

B. Normal Rainfall in cm. :

Jan.	Feb.	March	April	May	June	
—	3.3	13.7	34.3	14.7	2.5	
July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
45.2	36.1	5.1	0.5	4.3	—	159.7

(Monthly rainfall in cm. based on the rainfall data for the year 1965).

C. Irrigation and Drainage Facilities :

(i) (a) and (b) Irrigation facilities available. (ii) Natural drainage.

D. Soil type and Soil analysis :

(i) Soil is grey brown to dark grey brown : Clay loam in texture. (ii) Chemical analysis and (iii) Mechanical analysis. Latest analysis of soil is not available,

E. No. of Experiments :

Potato—5; Total=5

2. Maize Breeding Station, Bajama (Bhuuta).

A to D, Information N.A.

E. No. of Experiments :

Maize--1 ; Total=1

3. Vegetable Research Sub Station , Bhagot.

A. General Information

(i) In Chamba taluka of Chamba district, at a distance of 120km. from Pathankot Rly. Stn. is located at 900m. m.s.l. (ii) N.A. (iii) Established in 1960 (iv) Root vegetable and fruit vegetable (v) Varietal seed production of vegetables.

B. Normal Rainfall : N.A.

C. Irrigation and Drainage Facilities :

(i) and (ii) N.A.

D. Soil type and Soil analysis :

(i) Sandy loam, 61cm. to 76cm. depth, dark brown in colour. (ii) Chemical analysis ; N.A and (iii) Mechanical analysis : N.A.

E. No. of Experiments :

Bhindi—2, Brinjal—1, Tomato—5, Cauliflower—2, Beans--1, Chillies—1; Total=12

4. Seed Multiplication Farm, Bhanota

A. General Information :

(i) In Chamba taluka of Chamba district, 107km. from Pathankot Rly. Stn. at alt.—1067m Tarracing cultivation. (ii) Hilly tract. (iii) Established in 1948. (iv) Paddy—Berseem; Green manure—Wheat. (v) N.A.

B. Normal Rainfall in cm :

Jan.	Feb.	March	April	May	June	
2.6	8.8	17.0	3.3	3.3	14.7	
July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
18.2	10.5	20.5	3.4	0.3	4.4	107.0

(Monthly Av. in cm. based on the rainfall data for the period 1956 to 1967.)

C. Irrigation and Drainage Facilities:

(i) (a) and (b) Available since the start of farm. (ii) Natural drainage due to slanting elevation:

D. Soil type and Soil analysis :

(i) Broad soil type—Clay and sandy loam; Depth 0.61 to 1.52m; (ii) Chemical analysis: Organic carbon—332 to 456; Potash—100 to 200; Phosphorus—Low; pH.—6 to 7. (iii) Mechanical analysis N.A.

E. No of Experiments :

Wheat=1; Total—1.

5. Govt. Agriculture Farm, Bhangarota

A. General Information :

(i) In Sadar Mandi taluka of Mandi district, 69km. from Jogindernagar Rly. Stn. situated in Plan Balh—vall. (ii) Mid hill valley. (iii) Established in 1961. (iv) Berseem, Paddy—Wheat. (v) Breeding of Rice varieties for mid hill tract.

B. Normal Rainfall in cm. :

Jan.	Feb.	March	April	May	June	July
—	—	—	—	2.5	21.8	55.8
Aug.	Sept.	Oct.	Nov.	Dec.	Total	
26.4	1.2	—	—	—	107.7	

(The period is not available).

C. Irrigation and Drainage Facilities :

(i) (a) and (b) By tube well and channels. (ii) No drainage exists.

D. Soil type and Soil analysis :

(i) Broad soil types—Clay to clay loam; depth—1.22m. to 1.52m; (ii) Chemical analysis Nitrogen—Low; Phosphorus—Medium; pH.—Normal. (iii) Mechanical analysis N.A.

E. No. of Experiments :

Paddy—1; Total=1

6. Potato Development and Research Station, Bagpashog

A. General Information :

(i) In Sirmur district, near Kumarhatti Rly. Stn., situated at 1525m. above m.s.l. (ii) Mid. Hillzone tract. (iii) Established in 1953. (iv) Wheat-Maize-Peas/wheat. (v) N.A.

B. Normal Rainfall : —N.A.

Av. annual rainfall about 130cm to 150cm.

C. Irrigation and Drainage Facilities : N.A.

D. Soil type and Soil analysis :

(i) Soil type—Clay loam. (ii) and (iii) N.A.

E. No. of Experiments :

Wheat—3, Potato—10; Total=13

7. Agricultural Research Station, Auhar Farm, Bilaspur.

A. General Information :

(i) In Bilaspur district, near Kiratpur Sahib Rly. Stn., at alt. 550m. Terraced Land area. (ii) Sub-Mountaneous tract. (iii) Established in 1961 (iv) and (v) N.A.

B. Normal Rainfall in cm. :

9.52cm. (Average) yearly rainfall based on 10 years data i.e. from 1961—62 to 1970-71

C. Irrigation and Drainage Facilities :

(i) (a) and (b) Available from percanial sprins. (ii) There exists a proper drainage system.

D. Soil type and Soil analysis

(i) Rocky soil with high lime context. (ii) Chemical and (iii) Mechanical analysis N.A.

E. No. of experiments :

Wheat—1, Maize—1; Total=2

8. Vegetable Research sub-Station, Boach.

A. General Information :

(i) In Solan Tehsil, of Mahasu district, 13km, away from Solan Rly. Stn. Fields are very small in size with gentle slope. (ii) Mid hill elevation. 100cm. rainfall. (iii) Established in 1961. (iv) No cropping pattern has been adopted due to very small area. (v) Seed production and multiplication work.

B. Normal Rainfall :

Information : N.A.

C. Irrigation and Drainage Facilities : N.A.

D Soil type and Soil analysis:

N.A.

E. No. of Experiments :

Sugarbeet—1; Total=1.

9. Agricultural Research Station, Dhula Kuan

A. General Information :

(i) In Panota taluk of Sirmor district, 80km. away from Barora Rly. Stn, with alt. 555m., The general topography of the experimental area is almost flat flanked by forest (ever green) on one side and a seasonal rivulet and farms on the others. (ii) It represents submountain and

valley area (iii) Established in 1951 (iv) Various kinds and varieties of sub tropical fruits and plan varieties of peaches. And other crops. (v) To introduce varieties of fruits for low hills and valley, assessment of manurial and fertilizer requirements for the crops of the tract-

B. Normal Rainfall in cm. :

7.5 cm. (Av. yearly rainfall is based on the data for the period 1961-72).

C. Irrigation and Drainage Facilities:

(i) (a) and (b) Pumping sets and tube well (ii) Drainage exists.

D. Soil type and Soil analysis:

(i) Sandy loam (ii) pH. 6.5; low to medium in K_2O and medium in N and P_2O_5 (iii) N.A.

E. No. of Experiments :

Paddy—11, Wheat—7, Barley—1, Maize—8, Gram—1, Pea—1, Cauliflower—3, Carrot—1, Sugarbeet—2, Sugarcane—2, Sarson—2, Linseed—1, Chillies—1, Malta—5. Sweet orange—4, Orange—3; Total=53.

10. Crop Research Sub-Station, Gopalpur

A. to D. Information N.A.

E. No. of Experiments :

Wheat—5; Total=5.

11. Crop Research Station/Agricultural Farm, Haripura

A. to D. Information N.A.

E. No. of Experiments :

Paddy—1; Maize—2; Groundnut—1; Sesamum—1; Total=5.

12. Potato Development Station, Jhatingri

A. to D. Information N.A.

E. No. of Experiments :

Potato—3; Total=3.

13. Rice Research Station, Joginder Nagar

A. General Information :

(i) In Mandi district, near Joginder Nagar Rly. Station at alt. 1200m a.s.c. The topography of the area is small terracial fields (ii) Established in 1965-66 (iv) Double cropping (v) To evolve yielding varieties of short duration of both coarse and fine rice.

B. Normal Rainfall in cm. :

26.8cm. in July.

C. Irrigation and Drainage Facilities :

(i) Kuhe (ii) Drainage exists

D. Soil type and Soil analysis :

(i) Clay 30cms. deep brownish (ii) Chemical analysis and (iii) Mechanical analysis N.A.

E. No. of experiments :

Paddy—2, Wheat—1; Total=3.

14. Potato Development Station, Kheradhar.

A. General Information :

(i) In Kheradhar of Sirmaur district, near Solan Rly. Stn., at alt. 7000' m.s.l. General topography is slopy mountaneous terrain (ii) Mountainous-tract. (iii) Established in 1956 (iv) N.A. (v) Cultural and manurial trials and performa.

B. Normal Rainfall ; N.A.,

C. Irrigation and Drainage Facilities :

(i) N.A. (ii) Making open drains

D. Soil type and Soil analysis :

(i) Clay loam to sandy loam brownish colour

(ii) and (iii) N.A.

Wheat—2, Potato—5; Total=7

15. Vegetable Research Station, Kalpa

A. General Information :

(i) In Kalpa taluka of Kimaur district at 240km. from Simla Rly. Stn. situated at 9500m a.s.l. (ii) It represents dry zone (iii) Established in 1961 (iv) One crop in a year (v) Research on vegetable seed production.

B. Normal Rainfall : N.A.

C. Irrigation and Drainage Facilities : N.A.

D. Soil type and soil analysis : N.A.

E. No. of Experiments.

Radish—1, Cabbage—7, Turnip—4, Carrot—6; Total=18.

16. Soil Reclamation Farm, Kamma

A. to D. Information N.A.

E. No. of Experiments:

Paddy—6; Wheat—2; Barley—5; Total=13

17. Zira and Saffron Research Station, Kamboo (Sangla)

A. General Information :

(i) In Sangla Taluka of Kinnaur District, 14km. from NH 22 Karchham at alt 8500m.
(ii) Semidry-zone (iii) Established in 1961 (iv) Zira and Saffron (v) To standardise the agronomic practices for successful cultivation of Kala Zira and Saffron plants.

B. Normal Rainfall :

N.A.

C. Irrigation and Drainage Facilities :

(i) Natural *Kuha* (ii) No drainage facility exists.

D. Soil type and Soil analysis :

(i) Sandy 90cms deep, sand colour and sandy structures (ii) Chemical and Mechanical analysis N.A.

E. No. of Experiments :

Zira—2; Total=2

18. Potato Development Station Kamrah

A. General Information :

(i) In Kamrah taluk of Mandi district, near Ropur Rly. Stn., at alt. 8000-8500m, above m.s.l. Its topography is slopy. (ii) It represents Hilly tract. (iii) Established in 1954 (iv) Fallow-Potato-Fallow (v) Multiplication of nuclear seed Potatoes.

B. Average rainfall : N.A.

C. Irrigation and drainage facilities (i) and (ii) No

D. Soil type and Soil analysis :

(i) Black alluvial soil depth 23cm., black colour (ii) Chemical analysis and (iii) Mechanical analysis : N.A.

E. No. of Experiments :

Potato—1 ; Total=1

19. Regional Fruit Research Sub-Station, Kandoghat

A. to D. Information N.A.

E. No. of Experiments :

Apricot—2; Plum—2; Total=4

20. Oil Seeds Research Station, Kangra

A. General Information :

A. (i) In Kangra taluk of Kangra district, near Kangra Rly. Stn., at alt. 700m. above m.s.l. The general topography is medium hills. (ii) N.A. (iii) Established in 1959 (iv) Linseed Soyabean (v) Improvement in Linseed and Soyabean.

B. *Normal rainfall* : N.A.

C. *Irrigation and drainage facilities*

(i) Canal (ii) Drainage exists.

D. *Soil type and Soil analysis:*

(i) Clay Loam (ii) Chemical analysis and (iii) Mechanical analysis N.A.

E. *No. of Experiments:*

Linseed—6., Total=6.

21. Vegetable Research Station, Katrain

A. to D. Information N.A.

E. No. of Experiments :

Tomato—1; Cabbage—1; Turnip—1; Carrot—1; Vegetable Marrow—1; Chillies—1;
Total=6.

22. Kunihar Farm, Kunihar (Dist. Mahasu)

A. to D. Information N.A.

E. No. of Experiments :

Whcat—1; Total=1.

23. Regional Fruit Research Station, Mashobra

(i) In Mahasu district, near Simla Rly. Stn., with Lat. 31.01° N and Long. 77.1° E. Central topography is undulating. (ii) Mountaneous (iii) 1958 (iv) N.A. (v) Various aspects of temperate fruits.

B. *Normal Rainfall in cm. :*

Jan.	Feb.	March	April	May	June	
7.66	10.33	11.99	6.69	14.88	12.92	
July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
16.60	14.06	11.89	2.11	5.38	5.01	119.52

C. *Irrigation and Drainage Facilities :*

(i) No (ii) Natural drainage exists

D. *Soil type and Soil analysis :*

(i) Clay loam to clay, fairly deep with clay sub soils, slightly acidic. (ii) N—295kg/ha, P_2O_5 —134kg/ha; K_2O —38kg/ha.

E. *No. of Experiments:*

Apple—1, Total=1

24. Rice Breeding Sub-Station, Nagrota-Bagwan

A. to D. Information N.A.

E. No. of Experiments ;

Paddy—27; Wheat—1, Total=28

25. Govt. Tea Farm, Palampur.

A. to D. Information N.A.

E. No. of Experiments :

Tea—18; Total=18

26. Potato Development Station, Phula-Dhar.

A. to D. Information N.A.

E. No. of Experiments :

Wheat—4; Potato—2; Total=6.

27. Potato Development Station, Shilaroo.*A. General Information*

(i) In Mahasu district, near Simla Rly. Stn., with alt. 2450 m. above m.s.l., having general topography as slopy. (ii) N.A. (iii) Established in 1949, (iv) Potato—Green Manure—Patato, Potato—Barley—Peas. (v) Manurial, varietal and other experiments on Potato.

*B. Normal Rainfall in cms : 250 cms. (yearly)**C. Irrigation and Drainage Facilities :*

(i) Nil (ii) Yes but in bench tarraced field there is lack of proper drainage.

D. Soil type and Soil analysis :

(i) Clay (ii) and (iii) N.A.

E. No. of Experiments :

Wheat—1, Potato—6 ; Total =7.

28. Crop Research Station, Solan.

A. to D. Information N.A.

E. No. of Experiments :

Maize—1 ; Pea—2; Tomato—2; Sugarbeet—2 ; Total=7.

29. Crop Research Sub-Station, Sundernagar*A. General Information :*

(i) In Mandi district, 88km. away from Jogindernagar Rly. Stn. at the alt. 900m. above s.l., Field is divided into slopes and small terraces along the contours. (ii) Mid Hills (iii) In 1960 (iv) Maize, Wheat, Barley oilseed, pulses and others green manuring (v) Varietal and fertiliser trials on different crops, multi-plication of nucleus seeds.

B. Normal Rainfall in cm :

Jan.	Feb.	March	April	May	June	
50.0	68.4	104.4	30.6	37.1	194.9	
July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
378.9	284.2	255.9	39.0	47.4	45.7	1530.50

C. Irrigation and Drainage Facilities:

(i) No. (ii) Yes.

D. Soil type and Soil analysis :

(i) Clay loam (ii) pH 6.5 to 7.0, N=Low, P=High, K=Low—High, (iii) Nil.

E. No. of Experiments :

Wheat—1, Maize—1; Linsced—1; Total=3.

JAMMU & KASHMIR

1. Potato Res. Station, Gulmarg

A. General Information ::

(i) In Gulmarg. Baramulla district, near Jammu Rly. Stn., with alt 3000m. (ii) It represents Forest tract. (iii) Established in 1957-58. (iv) Potato—Potato. (v) Experiments for seed multiplication and produces virus free Potato seed.

B. Normal Rainfall :N.A.

C. Irrigation and Drainage Facilities :

(i) Rainfed (ii) Ordinary

D. Soil type and Soil analysis :

(i) N.A. (ii) Chemical analysis, P_2O_5 —4.9 to 25.3 kg/ha and K_2O —13.2 to 69.7 kg/ha
(iii) Sandy loam.

E. No. of Experiments :

Potato—15, Total=15.

2. Seed Multiplication Farm, Chogal (Hardwara)

A to D Information N.A.

E. No. of Experiments :

Paddy—1, Maize—2, Total=3

3. Jammu Pradesh Agri. Experimental Farm, Jammu.

A. General Information :

(i) In Jalal Tillo of Jammu district, Northern Railway out agenev at Jammu; Lat. 32.75° N; Long. 74.32° E and alt. 291m. (ii) It represents plain tract of Jammu (iii) Established about sixty years back (iv) Maize—Wheat now under M.A.E. scheme from Rabi 1968-69 (v) N.A.

B Normal Rainfall : N.A.

C. Irrigation and Drainage Facilities :

(i) (a) & (b) Canal (ii) Drainage exists.

D. Soil type and Soil analysis :

(i) Brown hill soil, Silty loams, (ii) Chemical Analysis : Carbon 0.33%; Av. P_2O_5 —8 kg/ha, Av. K_2O —205 kg/ha, pH—7.9, E.C. mm/cm—0.16, C.E.C.—14.1. (iii) Mechanical Analysis : Gravel : Nil, Sand : 37.40, Silt ; 50.40 Clay : 12.20

E. No. of Experiments :

Paddy—1; Potato—2; Total=3

4. Rice Research Station, Khudwani (Anantnag, Kashmir)

A. General Information :

(i) In Khudwani, of Anantnag district near Pathankot Rly. Stn. and with lat. 33°—N/Long. 75.0—E/alt. 1335 m. (ii) It represents plain tract. (iii) Established in 1954 (iv) Rice-oil seed-Rice (v) Rice Research.

B. Normal Rainfall :

Av. 86 cm. yearly.

C. Irrigation and Drainage Facilities :

(i) Canal (ii) No

D. Soil type and Soil analysis :

(i) Silty loam depth 30.42 cm. (ii) Chemical analysis and (iii) Mechanical analysis-N.A.

E. No. of Experiments :

Paddy—2; Total=2

5. Seed Multiplication Farm, Padgampura.

A. General Information ;

(i) In Padgampura of Anantnag district, Nearest Rly. Stn. Jammu. Altitude 5200m. (ii) It represents plain tract, (iii) Established in 1954. (iv) Paddy, Maize, Wheat. (v) Nil.

B. Normal Rainfall in cm. :

7.45 cm. (Av. Annual rainfall)

C. Irrigation and Drainage Facilities :

(i) (a) & (b) Light irrigation (ii) No

D. Soil type and Soil analysis :

(i) Clay light brown, slightly clay loam (ii) Av. Nitrogen falls in medium range, P_2O_5 falls in moderate medium range and Potash falls in low range (iii) N.A.

E. No. of Experiments :

Paddy—1, Total=1.

6. Seed Multiplication Farm, Pombay (Kulgaon)

A. to D. Information : N.A.

E. No. of Experiments :

Paddy—2, Total=2.

7. Regional Paddy Research Station, Ponnichak, (Jammu).*A. General Information :*

(i) In Ponnichak, of Jammu district, near Pathankot Rly. Stn., with Lat. 32. 75°, Long. 74.55° Alt. 290.6 meters. (ii) It represents Plain-tract (iii) Established in 1963 (iv) Paddy—Wheat (v) Evaluation of H.Y.V. of rice with resistance to pest and diseases. To introduce and acclimatise high yielding paddy varieties and to test the best cultural and management practices in the improved strains for making sound recommendations to the farmers. Testing Centre for ACRIP.

*B. Normal Rainfall : N.A.**C. Irrigation and Drainage Facilities :*

(i) (a) and (b) Canal (ii) Surface drainage (natural)

D. Soil type and Soil analysis :

(i) Loamy, Deep soil, Grey in colour (ii) Chemical analysis Carbon 0—43, P₂O₅ (available)—13kg/ha K₂O (available) 100 kg/ha. pH. 7—8 conductivity (1 : 2)—0.41. (iii) Sand 66.07, silt—18.4% and clay—15.67.

E. No. of Experiments :

Paddy—7 ; Total=7

8. Kashmir Pradesh Agri. Experimental Farm, Shalimar.*A. General Information :*

(i) In Shalimar Srinagar, District near Jammu Rly. Stn., at Lat. 34° N Long. 74°E, Alt. 5000m. (ii) It represent clay loam tract (iii) Established in 1890 (iv) One to two crops taken in case of food crops and two to three crops taken in case of vegetables' per year (v) To evolve and to select improved varieties of locally important vegetable crops. Cultural and to standardise control measures against insect pests and diseases of commercially important vegetable crops. Raising of genetically pure seed stocks of the improved varieties of different vegetable crops.

B. Normal Rainfall in cm. :

Jan.	Feb.	March	April	May	June	
15.3	49.6	4.4	106.3	17.6	82.8	
July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
18.9	30.7	8.0	0.3	22.5	5.0	361.3

(monthly rainfall for the year 1972 as supplied by Srinagar observatory).

C. Irrigation and Drainage Facilities :

(i) (a) and (b) Natural perennial stream (ii) Yes. Drainage exists.

D. Soil type and Soil analysis :

(i) Clay loam, depth 22—30 cm. (ii) Carbon 1.45% P₂O₅—70kg/ha, K—700kg/ha p.H. 6.9 to 7.5 (iii) N.A.

B. Normal Rainfall in cm :

Paddy—13; Wheat—4; Maize—2; Peas—4; Potato—5; Raddish—1; Tomato—2; Cabbage—2; Cauliflower—6; Turnip—2; Khol—Knol—4; Onion—9; Apple—1; Saffron—7, Total—62.

9. Damodar Kuwa Farm, Srinagar

A. to D. Information : N.A.

E. No. of Experiments :

Maize—12; Total=12

PUNJAB**1. Cotton Research Station, Abohar.****A. General Information :**

(i) In Abohar of Ferozepur district, 3.2 kms. from Abohar Rly. Stn. with Lat.—30.2°N, Long—74.2°E. (ii) It represents Plain. (iii) Established in 1949. (iv) N.A. (v) Breeding, Agronomy etc.

B. Normal Rainfall : N.A.

C. Irrigation and Drainage Facilities :

(i) (a) & (b) Irrigation by Canal. (ii) Yes, proper drainage system exists.

D. Soil type and Soil analysis :

(i) Broad soil types—sandy loam to loam. (ii) & (iii) N.A.

E. No. of Experiments :

Wheat—2; Cotton—31; Total=33

2. Uppal Farm, Amritsar.

(A) to (D) Information N.A.

E. No of Experiments :

Paddy—1, Total=1.

3. Fruit Research Station, Attari.**A. General Information :**

(i) In Amrisar Taluka of Amritsar District; 3.2 Kms. from Attari Rly. Stn., with Lat.-31.6°N|Long. 74.6°E. (ii) Plain tract. (iii) N.A. (iv) Nil (v) Breeding work is mainly done

B. Normal Rainfall in cm. :

Jan.	Feb.	March	April	May	June	
5	2	3	1	—	8	
July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
19	18	22	1	—	2	76

(Av. based on the rainfall data for the period 1960—62.)

C. Irrigation and Drainage Facilities :

(i) (a) & (b) Irrigation by Canal and Tube well. (ii) Yes, proper drainage system exists.

D. Soil type and Soil analysis :

(i) Soil type—Clay loam. (ii) & (iii) : N.A.

E. No. of Experiments:

Sweet Lime—3; Grape Fruit—2; Sweet Orange—3; Total=8.

4. Fruit Research Station, Bahadurgarh.**A. General Information :**

(i) In Patiala taluka of Patiala district, 5 kms. from Patiala Rly. Stn. (Opposite Punjabi University) with Lat.—31.4°N/Long—76.3°E. The general topography is the Plain Area. (ii) Central Punjab tract. (iii) Established in 1960. (iv) Nil. (v) On Citrus, Ber, Pea, Peung peas, Breeding, Agronomical experiments and extension work.

B. Normal Rainfall : N.A.**C. Irrigation and Drainage Facilities :**

(i) (a) & (b) Irrigation facilities are available. (ii) Yes, proper drainage system exists,

D. Soil type and Soil analysis :

(i) Broad soil types—Clay loam. (ii) & (iii) : N.A.

E. No. of Experiments :

Sweet Orange—2, Total=2.

5. Soil Conservation & Training Centre, Chandigarh.**A. General Information :**

(i) In Chandigarh taluka of Chandigarh district with Lat.—30.7°N and Long—76.3°E. (ii) Sub-mountain tract. (iii) Established in 1956. (iv) Wheat—Maize. (v) Agronomic Breeding and water requirement experiments.

B. Normal Rainfall in cm. :

Jan.	Feb.	March	April	May	June	
6	5	3	1	—	9	
July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
29	22	28	2	1	3	109

(Average rainfall is based on the data for the period 1960-62).

C. Irrigation and Drainage Facilities :

(i) (a) & (b) Tube-well irrigation. (ii) Yes, proper drainage system exists.

D. Soil type and Soil analysis :

(i) Broad soil types—Sandy loam. (ii) & (iii) : N.A.

E. No. of Experiments :

Grass—21, Total=21.

6. Oil Seed Research Station, Farid Kot,*A. General Information:*

(i) In Farid Kot taluka of Bhatinda district, 1.6 km. from Farid Kot Rly. Stn. with Lat.—30.7°N, Long—74.8°E. (ii) Plain tract. (iii) Established in 1910. (iv) N.A. (v) Breeding and Agronomic experiments on Oilseeds.

*B. Normal Rainfall : N.A.**C. Irrigation and Drainage Facilities :*

(i) (a) & (b) Tube-well and canal irrigation. (ii) Yes, proper drainage system exists.

D. Soil type and Soil analysis :

(i) Broad soil type—Sandy loam. (ii) & (iii) N.A.

E. No. of Experiments :

Castor—2, Toria—1, Total=3.

7. Agricultural Research Station (Millets Sub. Stn.) Ferozpur.*A. General Information:*

(i) In Ferozpur taluka of Ferozpur district, 5.6 Kms. from Ferozpur Cantt. Rly. Stn. with Lat.—30.8°N, Long.—74.6°E, Alt. 198 m. above m.s.l. (ii) It represents, Central Zone of the state. (iii) Established in 1927. (iv) Gram—Fellow—Gram Barani, Bajra—Wheat—Fellow; Bajra—Tobacco—Fodder. Evolution of varieties of Gram and Bajra for irrigated borani area of Punjab.

B. Normal Rainfall in cm. :

Jan.	Feb.	March	April	May	June	
2	1	1	1	1	3	
July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
10	10	15	—	—	1	45

(Average rainfall is based on the data for the period 1951—1962).

C. Irrigation and Drainage Facilities :

(i) (a) & (b) Irrigation by Pertain wheel, Tube-well and Canal since inception. (ii) Yes, proper drainage system exists.

D. Soil type and Soil analysis :

(i) Soil types—Varies from clay loam to sandy loam; Depth—61 cm. deep; Colour—light brown. (ii) & (iii) N.A.

E. No. of Experiments :

Bajra—23, Gram—21, Tobacco—35, Mixed—9, Total=86.

8. Agriculture Research Station, Gurdaspur.*A. General Information :*

(i) In Gurdaspur taluka of Gurdaspur district, about 400 Meters from Gurdaspur Rly. Stn. with Lat.—32.0°N, Long.—75°E, Alt.—400 m. Fairly level land, well drained. (ii) Sub-mountain, Cool humid during winter and hot humid during summer. (iii) Established in 1941. (iv) N.A. (v) Breeding work on various crop plants on comprehensive scale viz. Wheat, Paddy, Sugarcane and on a minor scale viz. Maize, Fodder crops etc.

B. Normal Rainfall in cm. :

Jan.	Feb.	March	April	May	June	
4.2	5.0	7.4	2.4	4.1	9.4	
July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
31.9	14.7	18.1	1.9	0.3	6.1	115.4

(Average rainfall is based on the data for the period 1964—68).

C. Irrigation and Drainage Facilities :

(i) (a) & (b) : Yes, by tube wells since 1941. No. of tube wells increased in 1965. (ii) Except some fields, remaining area, due to its topography, is well drained.

D. Soil type and Soil analysis :

(i) Soil types—Single grain sub angular blocky soil; 91 cms. deep; Colour—Brown; Structure—Sandy to clay loam. (ii) Chemical analysis : Conductivity—0.1 to 0.2; organic matter—0.2 to 0.8 and pH—7.0 to 7.6 (iii) Mechanical analysis : N.A.

E. No. of Experiments.

Paddy—9; Wheat—52; Maize—12; Mash—1; Masoor—2; Pea—1; Sugarcane—17; Cotton—21, Sesamum—3; Mixed crops—1, Total=115

9. Sugarcane Research Station, Jullundur

(i) In Jullundur district near Jullundur Rly. Stn., with Lat.—31°0 N, Long.—75. E, Alt.—238m, above m.s.l. The general topography of the experimental area is flat. (ii) Alluvial belt (Doab). (iii) Established in 1934. (iv) Sugarcane, Wheat, Maize, Senji, Cotton and Berseem. (v) (a) Research on evolution and selection of Sugarcane varieties. Cultural and manurial aspects of cane culture as well as control measures of Sugarcane pests and diseases. (b) Varietal, cultural and manurial aspects of sugarcane.

B. Normal Rainfall in cm. :

Jan.		Feb.		March		April		May		June		
1	2	1	2	1	2	1		1	2	1	2	
0.1	1.2	2.1	0.4	0.4	2.8	0.3	0.2	0.3	1.2	0.3	6.9	
July		Aug.		Sept.		Oct.		Nov.		Dec.		Total
1	2	1	2	1	2	1	2	1	2	1	2	
9.6	9.5	13.9	9.8	5.6	0.6	0.5	0.5	0.9	0.0	0.6	1.2	68.9

(The average fortnight, rainfall is based on the data for the period 1967—71).

C. Irrigation and Drainage Facilities :

(i) (a) & (b) : Ycs; since 1950 by Tube well. (ii) Yes, proper drainage system exists.

D. Soil type and Soil analysis :

(i) Alluvial soil, sandy loam texture, depth beyond 180cm., yellowish grey to brownish grey, single grain to crumb structure with iron mottling. (ii) Chemical analysis : N—0.08%; K₂O%. Carbon—0.5%, CaCO₃—0.2%. (iii) Mechanical analysis :—Clay—3.8%, Sand—75.9%.

E. No. of Experiments :

Sugarcane—20, Total=20

10. Agricultural Res. Station, Jullundur**A. General Information :**

(i) In Jullundur Taluka of Jullundur district, 8 Kms, from Jullundur Rly, Stn., with Lat. 31.3°N, Long 75.6.E (ii) Plain trail (iii) N.A. (iv) Fallow—Green Manure, Potato Wheat—(green manure) (v) Breeding, Agronomy, seed multiplication etc.

B. Normal Rainfall in cm. : N.A.**C. Irrigation and Drainage Facilities :**

(i) Yes by Tube well (ii) Yes, drainage exists.

D. Soil type and Soil analysis :

(i) Sandy loam to clay loam (ii) and (iii) N.A.

E. No. of Experiments :

Wheat—16, Maize—10, Potato—2, Cotton—15, Total=43.

11. Reg. Research Station, Kapurthala**A. General Information :**

(i) In Kapurthala taluka of Kapurthala district, 1.5km. from Kapurthala Rty. Stn., with Lat.—31.4° N, Long.—75.4 E, Alt.—239 above m.s.l. The general topography of the experimental area is Flat topography. (ii) It represents—Sub-tropical tract. (iii) Established in 1962. (iv) Paddy—Wheat, (v) Agronomical, Pathological, Entomological and Breeding on Rice crop.

B. *Normal Rainfall in cm. :- Not Available.*

C. *Irrigation and Drainage Facilities :*

- (i) (a) & (b) Irrigation facilities were made available since 1962 by Tube well.
(ii) Yes, proper drainage system exists.

D. *Soil type and Soil analysis :*

- (i) Soil types, Depth, Colour, Structure N.A. (ii) Chemical analysis : Soil pH—9.2, E. Conductivity—0.200m. Carbon—0.2560%, Available P—35kg/ha, Available K—250Kg/ha.
(iii) Mechanical analysis : N.A.

E: *No. of Experiments :*

Paddy—16, Groundnut—1, Toria—2, Citrus—2, Total=21

12. **Sugarcane Sub-Station, Kheri**

A. *General Information :*

- (i) In Kheri taluka of Sangroor district, about 7kms. from Sangroor Rly. Stn., (ii) It represents :—Plain tract. (iii) N.A. (iv) Fallow—Sugarcane. (v) Breeding, Agronomy etc.

B. to D.—Information N.A.

E. *No. of Experiment :*

Sugarcane—24, Total=24

13. **Punjab Agricultural University, Ludhiana**

A. *General Information :*

- (i) In Ludhiana Taluka of Ludhiana district, at 5 Kms. from the Ludhiana Rly. Stn. with Latitude 30.9° N, Longitude 75.9°E, and alt. 247m. (ii) Plain Tract (iii) 1962 (iv) According to crops (v) Breeding, Agronomy and Pathological expts. on different crops.

B. *Normal Rainfall :* N.A.

C. *Irrigation and Drainage Facilities :*

- (i) (a) and (b) Yes Tube well and Canal irrigation (ii) Yes, drainage system exists,

D. *Soil Type and Soil analysis :*

- (i) Sand to loamy sand, Raddish grey, loose single grain (ii) O.C. 0.2 to 0.3% available P—5 to 15%, available K—150 to 200. (iii) Clay 5.0% 7.0%, silt 10% to 12% and 80% to 85%.

E. *No. of Experiments:*

Paddy-3, Wheat—25, Barley—4, Bajra—1. Gram—2, Mash—2, Peas—1, Cotton—24, Groundnut—17, Mixed crops—2, Total=81.

14. **M.A.E. Centre, Nasirpur**

A. to D. *Information N.A.*

E. *No. of Experiments:*

Cotton—4, Total=4

EXPERIMENTAL DATA

Crop :- Paddy (Kharif).

Ref :- Hr. 61(151).

Site :- Govt. Agri. Stn., Hansi.

Type :- 'M'.

Object :- To study the effect of G.M. and levels of N on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) G.M. crops as per treatments. (c) N.A. (ii) Sandy loam. (iii) 5.8.61. (iv) (a) 4 to 5 ploughings. (b) Transplanting. (c) —. (d) and (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 3rd week of Oct., 61.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 4 G.M. treatments with P_2O_5 as Super : $G_0 = \text{No G.M.}$, $G_1 = \text{Jantar}$, $G_2 = G_1 + \text{Super}$ applied to G_1 and $G_3 = G_1 + 34 \text{ Kg/ha. of } P_2O_5$ applied to Paddy only.

(2) 3 levels of N applied to paddy crop : $N_0 = 0$, $N_1 = 23$ and $N_2 = 45 \text{ Kg/ha.}$
In treatment G_3 level of P_2O_5 —N.A.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) and (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/244.6 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1961—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 2478 Kg/ha. (ii) 513.2 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	G_0	G_1	G_2	G_3	Mean
N_0	2525	2410	2522	2455	2478
N_1	2185	2766	2566	2494	2503
N_2	2396	2659	2659	2092	2452
Mean	2369	2612	2582	2347	2478

Crop :- Paddy (Kharif).

Ref :- Hr. 60(106), 61(156).

Site :- Govt. Recl. Farm, Nilokheri.

Type :- 'M'.

Object :- To study the effect of leaching on the yield of Paddy.

1. BASAL CONDITIONS :

(i) N.A. (ii) N.A.; highly saline soil. (iii) 14.7.60; 27.7.61. (iv) (a) 4 to 5 ploughings. (b) N.A.; transplanted. (c) to (e) N.A. (v) 28 Kg/ha. of K_2O ; N.A. (vi) N.A. (vii) Irrigated. (viii) N.A.; 2 weedings. (ix) N.A. (x) 17.10.60; 16.10.61.

2. TREATMENTS :

Main-plot treatments :

All combinations of (1) and (2)

(1) 2 levels of gypsum : $G_0 = 0$ and $G_1 = 101.6 \text{ Q/ha.}$

(2) 3 levels of leaching : $L_0 = 0$, $L_1 = 1$ and $L_2 = 3$ leachings.

Sub-plot treatments :

2 levels of manure : $M_0 = \text{Control}$ and $M_1 = 56 \text{ Kg/ha. of N as C/A/N} + 28 \text{ Kg/ha. of } P_2O_5 \text{ as Super.}$

3. DESIGN:

(i) Split-plot. (ii) (a) 6 main-plots/replication; 2 sub-plots/main-plot. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 1/840'96 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960-61. (b) No. (c) Nil. (v) and (vi) N.A. (vii) Main-plot error variances are heterogeneous and main-plot Treatments \times Years interaction is absent. Hence individual years results are presented under 5. Results.

5. RESULTS:

60(106)

(i) 1612 Kg/ha. (ii) (a) 456.0 Kg/ha. (b) 392.0 Kg/ha. (iii) Main effect of L alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	L ₀	L ₁	L ₂	M ₀	M ₁	Mean
G ₀	1068	1666	1633	1287	1625	1456
G ₁	1321	2372	1915	1680	1859	1769
Mean	1194	1869	1774	1483	1742	1612
M ₀	1036	1739	1673			
M ₁	1353	1999	1875			

C.D. for L marginal means=414.8 Kg/ha.

61(156)

(i) 3593 Kg/ha. (ii) (a) 1114.3 Kg/ha. (b) 605.0 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	L ₀	L ₁	L ₂	M ₀	M ₁	Mean
G ₀	3308	4274	3518	3719	3681	3700
G ₁	3392	3546	3518	3289	3681	3485
Mean	3350	3910	3518	3504	3681	3593
M ₀	3448	3784	3280			
M ₁	3252	4036	3756			

Crop :- Paddy (Kharif).

Ref :- Hr. 60(152), 61(148).

Site :- Govt. Recl. Farm, Nilokheri.

Type :- 'M'.

Object :-To study the effect of high doses of N on the yield of Paddy.

1. BASAL CONDITIONS:

(i) (a) N.A.; *Dhaincha*-Paddy-Barley or Wheat. (b) N.A.; *Dhaincha*. (c) N.A. (ii) High saline soil. (iii) 4.8.60; 18.7.61. (iv) (a) 4 to 5 ploughings. (b) to (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 24.10.60; 20.10.61.

2. TREATMENTS:

Main-plot treatments:

5 manurial treatments: T₀=Control, T₁=224 Kg/ha. of N as A/C+224 Kg/ha. of P₂O₅ as Super, T₂=224 Kg/ha. of N as A/S+224 Kg/ha. of P₂O₅ as Super, T₃=152.4 Q/ha. of Gypsum and T₄=T₁+152.4 Q/ha. of press-mud.

Sub-plot treatments :

2 levels of fertilizers : $F_0=0$ and $F_1=56$ Kg/ha. of N+28 Kg/ha. of P_2O_5 .

3. DESIGN :

(i) Split-plot. (ii) (a) 5 main-plots/replication ; 2 sub-plots/main-plot. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 1/4305.6 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960 -61. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) Kama. (vi) Nil. (vii) Both the main-plot and sub-plot error variances are homogeneous and main-plot Treatments \times Years and sub-plot Treatments \times Years interactions are present.

5. RESULTS :**Pooled results**

(i) 2065 Kg/ha. (ii) (a) 555.6 Kg/ha. (based on 4 d.f. made up of Treatments \times Years interaction). (b) 406.3 Kg/ha. (based on 5 d.f. made up of Treatments \times Years interaction). (iii) Main effect of F alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	T ₀	T ₁	T ₂	T ₃	T ₄	Mean
F ₀	1096	1604	1658	1661	1906	1585
F ₁	1924	2613	2402	2629	3150	2545
Mean	1510	2111	2030	2145	2528	2065

C.D. for F marginal means = 269.9 Kg/ha.

Individual results

Treatments	T ₀	T ₁	T ₂	T ₃	T ₄	Sig.	F ₀	F ₁	Sig.
Years									
1960	1442	2070	2052	2424	2760	N.S.	1707	2592	**
1961	1578	2153	2009	1866	2296	N.S.	1464	2497	**
Pooled	1510	2111	2030	2145	2528	N.S.	1585	2545	**

G.M.	S.E./plot	
	Main	Sub
2150	909.8	594.6
1980	1075.5	710.6
2065	555.6	406.3

Crop :- Paddy (Kharif).

Ref : Hr. 60(154), 61(155).

Site :- Govt. Recl. Farm, Nilokheri.

Type :- 'M'.

Object :-To study the effect of different soil amendments on the yield of Paddy.

1. BASAL CONDITIONS :

(i) N.A. (ii) Highly saline soil. (iii) 16.8.60 ; 13.7.61. (iv) (a) 4 to 5 ploughings. (b) to (e) N.A. (v) Nil. (vi) N.A. (vii) Irrigated. (viii) 2 weedings ; 2 to 3 hoeings. (ix) N.A. (x) 17.10.60 ; 11.10.61.

2. TREATMENTS:

11 manurial treatments: T_0 =Control, T_1 =Gypsum at 101.6 Q/ha., T_2 =Sulphur at 900 Kg/ha., T_3 = H_2SO_4 at 3153 litres/ha., T_4 = HNO_3 at 5219 litres/ha., T_5 =HCl at 3865 litres/ha., T_6 =A/S at 6160 Kg/ha., T_7 =F.Y.M. at 375.9 Q/ha., T_8 = T_7 +Press-mud at 101.6 Q/ha., T_9 = T_7 +Mollases at 101.6 Q/ha. and T_{10} =Mollases at 101.6 Q/ha., +Press-mud at 101.6 Q/ha.

3. DESIGN:

(i) R.B.D. (ii) (a) 11. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 1/747 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960-61. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) No. (vi) Nil. (vii) Error variances are homogeneous and Treatments \times Years interaction is absent.

5. RESULTS:

Pooled results

(i) 1074 Kg/ha. (ii) 757.9 Kg/ha. (based on 50 d.f. made up of pooled error and Treatments \times Years interaction). (iii) Treatment differences are not significant. (iv) Av. yield of grain in Q/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}
Av. yield	641	937	1335	782	1195	900	1260	520	1040	1544	1662

Individual results

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}
Year 1960	784	927	1175	1017	1119	1002	1249	842	1032	1294	1656
1961	498	947	1495	548	1271	797	1271	199	1047	1794	1669
Pooled	641	937	1335	782	1195	900	1260	520	1040	1544	1662

Sig.	G.M.	S.E./plot
N.S.	1100	842.7
N.S.	1048	801.8
N.S.	1074	757.9

Crop :- Paddy (Kharif).

Ref :- Hr. 60(165), 61(154).

Site :- Govt. Recl. Farm, Nilokheri.

Type :- 'M'.

Object :- To study the effect of Gypsum requirement of Paddy with different combination of N, P and K on highly saline soil.

1. BASAL CONDITIONS:

(i) N.A. (ii) Highly saline alkaline soil. (iii) 22.7.60; 15.7.61. (iv) (a) 4 to 5 ploughings. (b) to (c) N.A. (v) N.A.; 56 Kg/ha. of N as C/A/N applied on 8.8.61 and 5.9.61 and 28 Kg/ha. of each of P and K on 15.7.61. (vi) N.A. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) 24.10.60; 18.10.61.

2. TREATMENTS:

Main-plot treatments:

4 doses of Gypsum: $C_1=33\%$, $C_2=50\%$, $C_3=75\%$ and $C_4=10\%$ of requirement.

Sub-plot treatments :

5 levels of manures : $M_0=0$, $M_1=56$ Kg/ha. of N, $M_2=M_1+28$ Kg/ha. of P_2O_5 , $M_3=M_2+28$ Kg/ha. of K_2O and $M_4=M_3+\text{micronutrients (Mn+Zn)}$.

Doses of Mn and Zn are N.A.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication ; 5 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/700.8 /ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960—61. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Nil. (vii) Error variances are homogeneous and main-plot Treatments \times Years and Sub-plot Treatments \times Years interaction are absent.

5. RESULTS :**Pooled results**

(i) 138 Kg/ha. (ii) (a) 254.1 Kg/ha. (based on 21 d.f. made up of pooled error and Treatments \times Years interaction). (b) 137.6 Kg/ha. (based on 121 d.f. made up of pooled error and Treatments \times Years interaction). (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	M_0	M_1	M_2	M_3	M_4	Mean
C_1	58	82	50	174	88	90
C_2	76	105	146	117	210	131
C_3	71	130	147	204	60	122
C_4	134	200	330	216	169	210
Mean	85	129	168	178	132	138

Individual results

Treatments	C_1	C_2	C_3	C_4	Sig.	M_0	M_1	M_2	M_3	M_4	Sig.
Years											
1960	75	175	141	156	N.S.	56	116	175	198	140	N.S.
1961	105	84	104	264	N.S.	111	143	161	158	124	N.S.
Pooled	90	131	122	210	N.S.	85	129	168	178	132	N.S.

G.M.	S.E./plot	
	Main	Sub
137	182.2	137.4
139	209.1	142.2
138	254.1	137.6

Crop :- Paddy (Kharif).

Ref :- Hr. 60(146).

Site :- Village Kachhwa Karnal.

Type :- 'M'.

Object :-To study the effect of different combination of N, P and K on the yield of Paddy.

1. BASAL CONDITIONS :

(i) N.A. (ii) Saline soil. (iii) and (iv) N.A. (v) (a) 4 to 5 ploughings. (b) to (e) N.A. (vi) 14.7.60. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) 23.10.60.

2. TREATMENTS:

All combinations of (1), (2) and (3)

- (1) 2 levels of N as C/A/N: $N_0=0$ and $N_1=22.5$ Kg/ha.
- (2) 2 levels of P_2O_5 as Super: $P_0=0$ and $P_1=22.5$ Kg/ha.
- (3) 2 levels of K_2O as Mur. Pot.: $K_0=0$ and $K_1=22.5$ Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D., 8, 4. (ii) and (iii) N.A. (iv) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 544 Kg/ha. (ii) 126.0 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	P_0	P_1	K_0	K_1	Mean
N_0	517	583	520	580	550
N_1	569	507	526	550	538
Mean	543	545	523	565	544
K_0	517	529			
K_1	569	561			

Crop :- Paddy (Kharif).

Ref :- Hr. 60 and 61(SFT).

Site :- District : Ambala and Karnal.

Type :- 'M'.

Object :- Type A : To study the response of Paddy to levels of N, P and K applied individually and in combination.

1. BASAL CONDITIONS:

(i) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

N=22.4 Kg/ha. of N,

P=22.4 Kg/ha. of P_2O_5 ,

K=22.4 Kg/ha. of K_2O ,

NP=22.4 Kg/ha. of N+22.4 Kg/ha. of P_2O_5 ,

NK=22.4 Kg/ha. of N+22.4 Kg/ha. of K_2O ,

PK=22.4 Kg/ha. of P_2O_5 +22.4 Kg/ha. of K_2O and

NPK=22.4 Kg/ha. of N+22.4 Kg/ha. of P_2O_5 +22.4 Kg/ha. of K_2O .

3. DESIGN :

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle/thana is changed once in two years within the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on *kharif* cereal, 8 on a *rabi* cereal, 8 on cash crop, 4 on an oilseed crop and 3 on a leguminous crop. Half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. The three trials on legumes are of Type C. Residual effect of phosphate application are studied on Type C trials in two out of the four zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98.8 ha. (b) 1/197.7 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-61. (b) and (c) N.A. (v) Nil. (vi) and (vii) N.A.

5. RESULTS :

60(SFT)

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.								
			N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Ambala	2	2100	220	700	390	119.0	120	-30	360	-70	42.0
Karnal	17	2310	420	250	180	30.0	-150	-160	-40	40	32.0

61(SFT)

Ambala	2	2050	550	210	50	77.0	30	30	-50	-50	58.0
Karnal	10	2330	450	360	200	53.0	0	-30	50	-	45.0

Crop :- Paddy (Kharif).

Ref :- Hr. 60(SFT) for Ambala and Karnal and 61(SFT) for Ambala.

Site :- District : Ambala and Karnal.

Type :- 'M'.

Object :- Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS:

(i) N.A. (ii) Alluvial. (iii) to (x) N.A.

2. TREATMENTS :

7 manurial treatments:

- O=Control (no manure),
- $n_1=22.4$ Kg/ha. of N as A/S,
- $n_2=44.8$ Kg/ha. of N as A/S,
- $n_1'=22.4$ Kg/ha. of N as Urea,
- $n_2'=44.8$ Kg/ha. of N as Urea,
- $n_1''=22.4$ Kg/ha. of N as C/A/N,
- $n_2''=44.8$ Kg/ha. of N as C/A/N,

3. DESIGN :

Same as in type A conducted on Paddy crop on page No. 6.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) to (vii) N.A.

5. RESULTS :

60(SFT)

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			n_1	n_2	n_1'	n_2'	n_1''	n_2''	
Ambala	2	3380	600	140	330	-50	500	-210	115.0
Karnal	14	2310	570	910	650	890	830	990	131.0

61(SFT)

Ambala	1	2490	570	780	530	780	830	920	-
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Crop :- Paddy (Kharif).

Ref :- Hr. 61(SFT).

Site :- District : Karnal.

Type :- 'M'.

Object :—Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) N.A. (ii) Alluvial. (iii) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (no manure),
 $n_1=22.4$ Kg/ha. of N as A/S,
 $n_2=44.8$ Kg/ha. of N as A/S,
 $n_1'=22.4$ Kg/ha. of N as Urea,
 $n_2'=44.8$ Kg/ha. of N as Urea,
 $n_1''=22.4$ Kg/ha. of N as A/S/N,
 $n_2''=44.8$ Kg/ha. of N as A/S/N.

3. DESIGN :

Same as in type A conducted on Paddy crop on page No. 6.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1961—only. (b) and (c) Nil. (v) Nil. (vi) and (vii) N.A.

5. RESULTS :

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			n_1	n_2	n_1'	n_2'	n_1''	n_2''	
Karnal	10	2670	410	620	580	730	580	740	59.0

Crop :- Paddy (Kharif).

Ref :- Hr. 62 to 64(SFT).

Site :- District : Ambala.

Type :- 'M'.

Object :—Type A₁ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments:

O=Control (no manure),
 $N_1=35$ Kg/ha. of N,
 $N_2=75$ Kg/ha. of N,
 $P_1=35$ Kg/ha. of P_2O_5 ,
 $N_1P_1=35$ Kg/ha. of N+35 Kg/ha. of P_2O_5 ,
 $N_2P_1=70$ Kg/ha. of N+35 Kg/ha. of P_2O_5 ,
 $N_2P_2=70$ Kg/ha. of N+70 Kg/ha. of P_2O_5 and
 $N_2P_2K_1=70$ Kg/ha. of N+70 Kg/ha. of P_2O_5 +35 Kg/ha. of K_2O .

N applied as A/S, P_2O_5 as Super and K_2O as Mur. Pot.

3. DESIGN:

(i) and (ii) A selected district is divided into four agriculturally homogenous zones based on climate, soil, cropping pattern etc. In each zone one block is selected at random. A block normally consists of a group of 50 - 100 villages. In each block 36 experiments are conducted in a year of which 11 are of type A₁, 11 of type A₂, 11 of type A₃ and 3 are of type C. The eleven experiments under type A₁, A₂ and A₃ are distributed as 3 on a *kharif* cereal, 3 on a *rabi* cereal, 3 on a cash crop and 2 on oil seed. All the three type—C experiments are conducted on a legume crop. For the purpose of conducting the A₁, A₂ and A₃ experiments 11 villages are randomly selected in each block and in each village 3 experiments one each of type A₁, A₂ and A₃ are laid out. For conducting the three type—C trials three villages are randomly selected in each block. (iii) (a) 1/100 ha. (b) 1/200 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—66 (1965 N.A.). (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS:

62(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	548	238	487	271	790	620	927	434.5

Control yield=1903 Kg/ha. ; No. of trials=4

63(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	810	1329	845	1191	1186	1174	815	0.00

Control yield=1339 Kg/ha. ; No. of trials=2

64(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	87	328	202	445	544	691	858	198.4

Control yield=2071 Kg/ha. ; No. of trials=7

Crop :- Paddy (Kharif).

Ref :- Hr. 63, 65(SFT) for Ambala and 62 to 65(SFT) for Karnal.

Site :- District : Ambala and Karnal. Type :- 'M'.

Object :—Type A₁ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS and 3. DESIGN :

Same as in type A₁ conducted on Paddy crop under unirrigated conditions on page No. 8.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—66 for Ambala (1962 and 64 N.A.) and 62 to 66 for Karnal. (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS:

Ambala

63(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	356	844	131	1304	1739	1963	1822	385.8

Control yield=2016 Kg/ha. ; No. of trials=3

65(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	225	464	99	421	688	862	1022	55.6

Control yield=1021 Kg/ha. ; No. of trials=7

Karnal

62(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	362	714	298	349	719	708	846	129.5

Control yield=1835 Kg/ha. ; No. of trials=10

63(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	512	789	41	659	887	994	1284	234.6

Control yield=2300 Kg/ha. ; No. of trials=13

64(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	771	1028	219	944	1247	1590	1842	123.6

Control yield=2371 Kg/ha. ; No. of trials=12

65(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	341	796	14	596	1096	1233	1477	133.8

Control yield=2603 Kg/ha. ; No. of trials=6

Crop :- Paddy (Kharif).**Ref :- Hr. 65(SFT) for Ambala and 62 to 65(SFT) for Karnal.****Site :- District : Ambala and Karnal.****Type :- 'M'.****Object :- Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.**

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS:

8 manurial treatments:

O=Control (no manure),

 $N_1=35$ Kg/ha. of N, $P_1=35$ Kg/ha. of P_2O_5 , $P_2=70$ Kg/ha. of P_2O_5 , $N_1P_1=35$ Kg/ha. of N+35 Kg/ha. of P_2O_5 , $N_1P_2=35$ Kg/ha. of N+70 Kg/ha. of P_2O_5 , $N_2P_2=70$ Kg/ha. of N+70 Kg/ha. of P_2O_5 and $N_2P_2K_2=70$ Kg/ha. of N+70 Kg/ha. of P_2O_5 +70 Kg/ha. of K_2O .N applied as A/S, P_2O_5 as Super and K_2O as Mur. Pot.

3. DESIGN:

Same as in type A₁ conducted under unirrigated conditions on Paddy crop on page No. 2.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—66 for Ambala (62 to 64 N.A.) and 1962—65 for Karnal. (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS:

Ambala

65(SFT)

Treatment	N_1	P_1	P_2	N_1P_1	N_1P_2	N_2P_2	$N_2P_2K_2$	S.E.
Av. response of grain in Kg/ha.	361	116	255	489	644	1033	1195	47.8

Control yield=1080 Kg/ha. ; No. of trials=7

Karnal

62(SFT)

Treatment	N_1	P_1	P_2	N_1P_1	N_1P_2	N_2P_2	$N_2P_2K_2$	S.E.
Av. response of grain in Kg/ha.	456	235	421	540	428	802	925	109.8

Control yield=1774 Kg/ha. ; No. of trials=11

63(SFT)

Treatment	N_1	P_1	P_2	N_1P_1	N_1P_2	N_2P_2	$N_2P_2K_2$	S.E.
response of grain in Kg/ha.	353	156	261	565	598	1006	1200	157.0

Control yield=1904 Kg/ha. ; No. of trials=11

64(SFT)

Treatment	N_1	P_1	P_2	N_1P_1	N_1P_2	N_2P_2	$N_2P_2K_2$	S.E.
Av. response of grain in Kg/ha.	668	289	370	938	1144	1655	2009	107.5

Control yield=2355 Kg/ha. ; No. of trials=12

65(SFT)

Treatment	N_1	P_1	P_2	N_1P_1	N_1P_2	N_2P_2	$N_2P_2K_2$	S.E.
Av. response of grain in Kg/ha.	331	21	-31	530	580	920	1184	245.1

Control yield=2506 Kg/ha. ; No. of trials=7

Crop :- Paddy (Kharif).

Ref :- Hr. 62, 64(SFT).

Site :- District : Ambala.

Type :- 'M'.

Object :- Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

Same as in type A₂ conducted on paddy crop under irrigated conditions on page No. 10.

3. DESIGN:

Same as in type A₁ conducted under unirrigated conditions on Paddy crop on page No. 8.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—56 for Ambala (1963 and 65 N.A.). (b) and (c) Nil. (v) to (vii) Nil.

5. RESULTS:

Ambala

62(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₁	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	397	303	60	506	317	550	336	220.6

Control yield=1824 Kg/ha. ; No. of trials=3

64(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₁	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	258	185	265	809	868	1102	1231	172.5

Control yield=2045 Kg/ha. ; No. of trials=8

Crop :- Paddy (Kharif).

Ref :- Hr. 62, 64(SFT).

Site :- District : Ambala.

Type :- 'M'.

Object :- Type A₃ : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

N₁=35 Kg/ha. of N,

K₁=35 Kg/ha. of K₂O,

K₂=70 Kg/ha. of K₂O,

N₁K₁=35 Kg/ha. of N+35 Kg/ha. of K₂O,

N₁K₂=35 Kg/ha. of N+70 Kg/ha. of K₂O,

K₂K₂=70 Kg/ha. of N+70 Kg/ha. of K₂O and

N₁P₁K₁=35 Kg/ha. of N+35 Kg/ha. of P₂O₅+35 Kg/ha. of K₂O.

N applied as A/S, P₂O₅ as Super and K₂O as Mur. Pot.

3. DESIGN :

Same as in type A₁ conducted under unirrigated condition on Paddy crop on page No. 8.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—66 for Ambala (63 and 65 N.A.); (b) and (c) N.A. (v) to (vii) Nil.

RESULTS :

62(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	252	195	73	669	280	876	—2	215.8

Control yield=2056 Kg/ha. ; No. of trials=3

64(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	599	428	471	701	625	945	942	160.4

Control yield=1634 Kg/ha. ; No. of trials=6

Crop :- Paddy (Kharif).

Ref :- Hr. 63, 65(SFT) for Ambala and 62 to 65(SFT) for Karnal.

Site :- District : Ambala and Karnal. Type :- 'M'.

Object :-Type A₂ : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

Same as in type A₃ on paddy crop conducted under irrigated conditions on page No. 12.

3. DESIGN :

Same as in type A₁ conducted under unirrigated conditions on paddy crop on page No. 8.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—65 for Ambala (1962 and 65 N.A.) and 1962—65 for Karnal. (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS :

Ambala

63(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	148	143	306	869	142	1052	588	268.1

Control yield=1858 Kg/ha. ; No. of trials=2

65(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	307	186	320	457	678	922	1005	35.2

Control yield=989 Kg/ha. ; No. of trials=8.

Karnal

62(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	304	306	281	355	547	793	573	155.2

Control yield=2490 Kg/ha. ; No. of trials=11

63(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	483	214	357	622	522	956	1140	108.4

Control yield=2050 Kg/ha. ; No. of trials=14 Kg/ha.

64(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	486	205	310	669	761	1008	1099	89.9

Control yield=2733 Kg/ha. ; No. of trials=10

65(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	817	510	307	630	745	1517	1390	224.7

Control yield=2477 Kg/ha. ; No. of trials=5

Crop :- Paddy (*Kharif*).

Ref :- Hr. 60(168), 61(147).

Site :- Govt. Recl. Farm, Nilokheri.

Type :- 'CM'.

Object :—To study the effect of different depths of ploughings on the yield of Paddy.

1. BASAL CONDITIONS:

(i) N.A. (ii) Highly saline soil. (iii) 3.8.60; 18.7.61. (iv) (a) 4 to 5 ploughings. (b) to (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 5.11.60; 23.10.61.

2. TREATMENTS:

Main-plot treatments:

3 depths of ploughings: P₁=Shallow ploughing 10 cm. to 15 cm. depth, P₂=Deep ploughing 23 cm. to 30 cm. depth and P₃=Sub soil ploughing 30 cm. to 46 cm. depth.

Sub-plot treatments:

2 levels of fertilizers: F₀=0 and F₁=56 Kg/ha. of N+28 Kg/ha. of P₂O₅.

3. DESIGN:

(i) Split-plot. (ii) (a) 3 main-plots/replication; 2 sub-plots/main-plot. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 1/1977 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960—61. (b) and (c) No. (v) Kama. (vi) Nil. (vii) As sub-plot error variances are heterogeneous, results of individual years are given under 5. Results.

5. RESULTS:

60(168)

(i) 104 Kg/ha. (ii) (a) 76.3 Kg/ha. (b) 94.6 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	P ₁	P ₂	P ₃	Mean
F ₀	65	133	6	68
F ₁	207	123	92	141
Mean	136	128	49	104

61(147)

(i) 760 Kg/ha. (ii) (a) 246.9 Kg/ha. (b) 631.8 Kg/ha. (iii) Main effect of P and F are highly significant. (iv) Av. yield of grain in Kg/ha.

	P ₁	P ₂	P ₃	Mean
F ₀	442	138	59	213
F ₁	1476	1628	817	1307
Mean	959	883	438	760

C.D. for P marginal means=395.9 Kg/ha.

C.D. for F marginal means=728.7 Kg/ha.

Crop :- Wheat (Rabi).**Ref :- Hr. 61(152).****Site :- Agri. Farm, Ambala.****Type :- 'M'.**

Object :- To study the effect of different soil amendments on structure of the soil and yield of Wheat.

1. BASAL CONDITIONS :

(i) N.A. (ii) Clay loam. (iii) 14.11.61. (iv) 4 to 5 ploughings. (b) Kera. (c) to (e) N.A. (v) —. (vi) Local. (vii) Irrigated. (viii) Weeding. (ix) N.A. (x) 25.4.62.

2. TREATMENTS:

8 manurial treatments: T₀=Control, T₁=Saw dust, T₂=Gypsum, T₃=Sand, T₄=F.Y.M., T₅=Press-mud, T₆=Rice Husk and T₇=Gypsum+F.Y.M. (doses are N.A.).

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/537.46 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1961—62 (Treatments modified in 62). (b) and (c) No. (v) to (vii) N.A.

5. RESULTS :

(i) 2796 Kg/ha. (ii) 283.7 Kg/ha. (iii) Treatment differences are significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇
Av. yield	2650	2468	2586	2875	2923	2939	2947	2978

C.D.=417.1 Kg/ha.

Crop :- Wheat (Rabi).**Ref :- Hr. 61(111), 62(203).****Site :- Agri. Farm, Ambala.****Type :- 'M'.**

Object :- To study the effect of N, P and K with F.Y.M. at different depths on equal nutrients content basis.

1. BASAL CONDITIONS :

(i) N.A. (ii) Clay loam. (iii) 18.11.61 ; 25.11.62. (iv) (a) 4 to 5 ploughings. (b) to (e) N.A. (v) N.A. ; 44.8 Kg/ha. of N+22.4 Kg/ha. of P_2O_5 ; (vi) C-273. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 24.3.62 ; 3.5.63.

2. TREATMENTS :

Main-plot treatments :

3 depths of fertilizer applications : D_1 =Surface application, D_2 =15 cm. depth and D_3 =30 cm. depth.

Sub-plot treatments :

2 types of fertilizers : F_1 =247 Q/ha. of F.Y.M. and F_2 =44.8 Kg/ha. of N+22.4 Kg/ha. of P_2O_5 + 22.4 Kg/ha. of K_2O .

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication ; 2 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/598 ha. ; N.A. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961-62. (b) and (c) No. (v) N.A. (vi) Nil. (vii) As sub-plot error variances are heterogeneous, results of individual years are presented under 5. Results.

5. RESULTS :

61(111)

(i) 2519 Kg/ha. (ii) (a) 119.6 Kg/ha. (b) 304.4 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	D_1	D_2	D_3	Mean
F_1	2397	2512	2389	2433
F_2	2689	2546	2581	2605
Mean	2543	2528	2581	2519

62(203)

(i) 1609 Kg/ha. (ii) (a) 130.6 Kg/ha. (b) 100.7 Kg/ha. (iii) Main effect of D is significant and that of F is highly significant. (iv) Av. yield of grain is Kg/ha.

	D_1	D_2	D_3	Mean
F_1	1328	1568	1513	1470
F_2	1585	1714	1945	1748
Mean	1456	1641	1729	1609

C.D. for D marginal means=159.8 Kg/ha.

C.D. for F marginal means=93.0 Kg/ha.

Crop :- Wheat (Rabi).

Site :- Agri. Farm, Ambala.

Ref :- Hr. 62(201).

Type :- 'M'.

Object :- To study the comparative effect of different amend ments on soil structure and yield of Wheat crop.

1. BASAL CONDITIONS :

(i) N.A. (ii) Clay loam. (iii) 26.11.62. (iv) (a) 4 to 5 ploughings. (b) to (e) N.A. (v) 44.8 Kg/ha. of N+22.4 Kg/ha. of P_2O_5 ; (vi) C-273. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 4.5.65.

2. TREATMENTS :

9 manures : T_0 —Control (no manure), T_1 —Gypsum, T_2 —F.Y.M., T_3 — T_1+T_2 , T_4 —Press-mud, T_5 —Sugarcane bagasse, T_6 —Rice Husk, T_7 —Saw dust and T_8 —Sand.

3. DESIGN:

(i) R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) and (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961—62 (Treatments modified in 62). (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 1821 Kg/ha. (ii) 1829 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8
Av. yield	1595	1929	1927	1895	1913	1687	1937	1769	1830

Crop :- Wheat (*Rabi*).

Ref :- Hr. 60(104), 61(99).

Site :- Govt. Agr. Stn., Hansi.

Type :- 'M'.

Object :- To study the effect of different sources of N on the yield of Wheat.

1. BASAL CONDITIONS :

(i) (a) Wheat—Maize. (b) Maize. (c) N.A. (ii) Sandy loam. (iii) 21.10.60 ; 10.11.61. (iv) (a) and (b) N.A. (c) 83 Kg/ha. (d) and (e) N.A. (v) N.A. (vi) C—591. (vii) Irrigated. (viii) and (ix) N.A. (x) May 61 ; 13.4.62.

2. TREATMENTS :

3 sources of 44.8 Kg/ha. of N : S_0 —Control (no manure), S_1 —A/S and S_2 —C/N.

3. DESIGN :

(i) R.B.D. (ii) (a) 3. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/24.7 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—61. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) and (vi) Nil. (vii) Error variances are heterogeneous and Treatments \times Years interaction is present.

5. RESULTS :

Pooled results :

(i) 1471 Kg/ha. (ii) 978.9 Kg/ha. (based on 2 d.f. made up of Treatments \times Years interaction). (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	S_0	S_1	S_2
Av. yield	1092	1744	1576

Individual results :

Treatment	S_0	S_1	S_2	Sig.	G.M.	S.E./plot
Year						
1960	870	2028	2016	N.S.	1638	124.1
1961	1314	1460	1136	N.S.	1304	446.8
Pooled	1092	1744	1576	N.S.	1471	978.9

Crop :- Wheat (Rabi).**Ref :- Hr. 60(153).****Site :- Govt. Recl. Farm, Nilokheri.****Type :- 'M'.****Object:—**To study the residual effects of N, P and K in different combinations on the yield of Wheat.**1. BASAL CONDITIONS :**(i) (a) to (c) N.A. (ii) Highly saline sodic soil. (iii) 7.11.60. (iv) (a) 4 to 5 ploughings. (b) *Kera*. (c) to (e) N.A. (v) N.A. (vi) C-273. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 19.4.61.**2. TREATMENTS :****Main-plot treatments :**5 manurial treatments : T_0 =Control, T_1 =224 Kg/ha. of N as A/S+224 Kg/ha. of P_2O_5 as Super, T_2 =224 Kg/ha. of N as A/C+224 Kg/ha. of P_2O_5 as Super, T_3 =224 Kg/ha. of N as A/C+Gypsum at 152.4 Q/ha. and T_4 =224 Kg/ha. of N as A/C+Pressmud at 152.4 Q/ha.

(Treatments applied to previous crop).

Sub-plot treatments :2 levels of fertilizers applied to wheat : F_0 =0 and F_1 =56 Kg/ha. of N+28 Kg/ha. of P_2O_5 +28 Kg/ha. of K_2O .**3. DESIGN :**

(i) Split-plot. (ii) (a) 5 main-plots/replication ; 2 sub-plots/main-plot. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 1/4305.63 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Poor. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) No. (vi) and (vii) Nil.

5. RESULTS :

(i) 220 Kg/ha. (ii) (a) 238.7 Kg/ha. (b) 184.7 Kg/ha. (iii) Main effect of F alone is significant. (iv) Av. yield of grain in Kg/ha.

	T_0	T_1	T_2	T_3	T_4	Mean
F_0	0	172	144	172	129	123
F_1	431	172	201	531	244	316
Mean	216	172	172	352	186	220

C.D. for F marginal means=143.7 Kg/ha.

Crop :- Wheat (Rabi).**Ref :- Hr. 60(17).****Site :- Agri. Farm, Rohtak.****Type :- 'M'.****Object:—**To study the effects of different levels of N, P and K on the yield of Wheat.**1. BASAL CONDITIONS :**

(i) (a) Nil. (b) and (c) N.A. (ii) Sandy loam. (iii) 26.10.60. (iv) (a) to (e) N.A. (v) Nil. (vi) C-518. (vii) Irrigated. (viii) and (ix) N.A. (x) End of April, 61.

2. TREATMENTS :8 manurial treatments : T_0 =Control (no manure), T_1 =44.8 Kg/ha. of N, T_2 = T_1 +22.4 Kg/ha. of P_2O_5 , T_3 = T_1 +44.8 Kg/ha. of P_2O_5 , T_4 = T_3 +44.8 Kg/ha. of K_2O as Mur. pot., T_5 = T_1 +89.6 Kg/ha. of P_2O_5 +44.8 Kg/ha. of K_2O as Mur. Pot., T_6 =89.6 Kg/ha. of P_2O_5 +44.8 Kg/ha. of P_2O_5 and T_7 =89.6 Kg/ha. of N+89.6 Kg/ha. of P_2O_5 +89.6 Kg/ha. of K_2O .

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 3. (iv) (a) and (b) 1/39.5 ha. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1958—60. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 2947 Kg/ha. (ii) 362.5 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	C.D.=635.1 Kg/ha.
Av. yield	2051	2464	3182	3189	2877	3225	3234	3303	

Crop :- Wheat (Rabi).**Ref :- Hr. 60(18), 61(12).****Site :- Govt. Agri. Farm, Rohtak.****Type :- 'M'.**

Object:—To study the effect of different sources of N on the yield of Wheat.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) and (c) N.A. (ii) Sandy loam. (iii) 25.10.60 ; 6.12.61. (iv) (a) and (b) N.A. (c) 92 Kg/ha. (d) and (e) N.A. (v) Nil. (vi) C-518, C-281. (vii) Irrigated. (viii) and (ix) N.A. (x) End of April.

2. TREATMENTS :

6 sources of 44.8 Kg/ha. of N : S₀=Control, S₁=C/A/N, S₂=A/S, S₃=Urea, S₄=Ammo. liquor and S₅=A/C.

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) and (b) 1/39.5 ha. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1959—61 (modified in 60). (b) No. (c) Results of combined analysis are presented under 5. Results. (v) and (vi) No. (vii) Error variances are homogeneous and Treatments × Years interaction is absent.

5. RESULTS :

Pooled results

(i) 2061 Kg/ha. (ii) 415.8 Kg/ha. (based on 35 d.f. made up of pooled error and Treatments × Years interaction). (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	S ₀	S ₁	S ₂	S ₃	S ₄	S ₅	C.D.=487.7 Kg/ha.
Av. yield	1570	2248	2418	2083	1682	2366	

Individual results

Treatment	S ₀	S ₁	S ₂	S ₃	S ₄	S ₅	Sig.	G.M.	S.E./plot
Year 1960	2326	2812	3046	2846	2458	3028	N.S.	2753	517.1
1961	813	1685	1789	1320	907	1705	**	1370	340.4
Pooled	1570	2248	2418	2083	1682	2366	**	2061	415.8

Crop :- Wheat (Rabi).**Ref :- Hr. 60(90), 61(20).****Site :- Govt. Agri. Farm, Rohtak.****Type :- 'M'.**

Object :- To study the effect of different times and methods of application of N on the yield of Wheat.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) Wheat. (c) N.A. (ii) Sandy loam. (iii) 27.10.60 ; 7.12.61. (iv) (a) and (b) N.A. (c) 92 Kg/ha. (d) and (e) N.A. (v) Nil. (vi) C-281. (vii) Irrigated. (viii) and (ix) N.A. (x) Mid. of April.

2. TREATMENTS :7 methods and times of application of 44.8 Kg/ha. of N as C/A/N : T₀=Control (no manure), T₁=Drilled before sowing, T₂=Mixed with the seed, T₃=Broadcast before sowing, T₄=Broadcast with 1st irrigation, T₅=Drilled at sowing and T₆=Band placement.**3. DESIGN :**

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 1/51.9 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1959-61 (modified in 60). (b) No. (c) Results of combined analysis are presented under 5. Results. (v) and (vi) Nil. (vii) Error variances are heterogeneous and Treatments × Years interaction is present.

5. RESULTS :**Pooled results**

(i) 1935 Kg/ha. (ii) 452.6 Kg/ha. (based on 6 d.f. made up of Treatments × Years interaction). (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	1496	2004	1926	1876	2213	1961	2069

Individual results

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	Sig.	G.M.	S.E./plot
Year										
1960	1604	2586	2417	2370	2417	2478	2327	**	2314	124.0
1961	1388	1422	1434	1382	2009	1444	1811	N.S.	1556	288.0
Pooled	1496	2004	1926	1876	2213	1961	2069	N.S.	1935	452.6

Crop :- Wheat (Rabi).**Ref :- Hr. 61(88).****Site :- Govt. Agri. Stn., Rohtak.****Type :- 'M.'**

Object :- To study the effect of methods of application of fertilizers on the yield of Wheat.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) Wheat. (c) N.A. (ii) Sandy loam. (iii) 26.10.61. (iv) (a) N.A. (b) Kera. (c) 92 Kg/ha. (d) and (e) N.A. (v) N.A. (vi) C-281. (vii) Irrigated. (viii) and (ix) N.A. (x) April, 62.

2. TREATMENTS :

All combinations of (1) and (2)+one control

(1) 2 methods of application of fertilizers : M_1 =Broadcasting and M_2 =Drilling.

(2) 2 levels of fertilizers : F_1 =98.8 Kg/ha. of N+49.4 Kg/ha. of P_2O_5 and F_2 =98.8 Kg/ha. of N+98.8 Kg/ha. of P_2O_5 .

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/20.2 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 1953 Kg/ha. (ii) 198 Kg/ha. (iii) Main effect of M is highly significant and that of F is significant. Control vs. others is highly significant. (iv) Av. yield of grain in Kg/ha.

	M_1	M_2	Mean
F_1	1726	2298	1972
F_2	1997	2505	2251
Mean	1862	2361	2112

C.D. for M or F marginal means = 215.7 Kg/ha.

C.D. for control vs. others = 771.8 Kg/ha.

Crop :- Wheat (Rabi).

Ref :- Hr. 60 and 61(SFT).

Site :- District : Ambala and Rohtak.

Type :- 'M'.

Object:—Type A: To study the response of Wheat to levels of N, P and K applied individually and in combination.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS:

8 manurial treatments :

O=Control (no manure),

N=22.4 Kg/ha. of N,

P=22.4 Kg/ha. of P_2O_5 ,

K=22.4 Kg/ha. of K_2O ,

NP=22.4 Kg/ha. of N+22.4 Kg/ha. of P_2O_5 ,

NK=22.4 Kg/ha. of N+22.4 Kg/ha. of K_2O ,

PK=22.4 Kg/ha. of P_2O_5 +22.4 Kg/ha. of K_2O and

NPK=22.4 Kg/ha. of N+22.4 Kg/ha. of P_2O_5 +22.4 Kg/ha. of K_2O .

3. DESIGN :

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle/thana is changed once in two years within the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on *Kharif* cereal, 8 on a *Rabi* cereal, 8 on cash crop, 4 on an oilseed crop and 3 on a leguminous crop. Half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. The three trials on legumes are of type C. Residual effects of phosphate application are studied on Type C trials in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98.8 ha. (b) 1/197.7 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960 and 61. (b) and (c) Nil. (v) Nil. (vi) and (vii) N.A.

5. RESULTS:

60(SFT)

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.								
			N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Ambala	9	1290	180	180	20	71.0	30	70	100	120	61.0
Rohtak	2	1090	550	100	300	326.0	-40	10	-160	180	187.0

61(SFT)

Ambala	4	1910	530	260	20	154.0	-60	0	40	30	154.0
Rohtak	4	2800	130	60	0	41.0	-40	-40	-20	-10	29.0

Crop :- Wheat (*Rabi*).

Ref :- Hr. 60 and 61(SFT).

Site :- District · Karnal, Rohtak and Hissar.

Type 'M'.

Object:—Type A ; To study the response of Wheat to levels of N, P and K applied individually and in combination.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS and 3. DESIGN :

Same as in type A conducted under unirrigated condition on Wheat crop on page No. 21.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of Wheat. (iv) (a) 1960 to 61. (b) and (c) Nil. (v) Nil. (vi) and (vii) N.A.

5. RESULTS :

60(SFT)

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.								
			N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Karnal	16	1470	300	220	130	32.0	-20	-10	10	60	23.0
Rohtak	12	1590	470	180	110	60.0	-60	50	60	70	53.0
Hissar	9	1870	220	150	40	50.0	-40	-50	40	20	29.0

61(SFT)

Karnal	7	1350	620	360	340	32.0	50	0	140	90	37.0
Rohtak	10	2030	290	190	100	87.0	-40	-20	-50	110	71.0
Hissar	15	1520	330	120	80	34.0	-20	-10	-10	10	26.0

Crop :- Wheat (*Rabi*).

Ref :- Hr. 60(SFT).

Site :- Ambala and Rohtak.

Type :- 'M'.

Object:—Type B: To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

Control=No manure,

 $n_1=22.4$ Kg/ha. of N as A/S, $n_2=44.8$ Kg/ha. of N as A/S, $n_1'=22.4$ Kg/ha. of N as Urea, $n_2'=44.8$ Kg/ha. of N as Urea, $n_1''=22.4$ Kg/ha. of N as C/A/N, $n_2''=44.8$ Kg/ha. of N as C/A/N.

3. DESIGN :

Same as in type A conducted under unirrigated condition on Wheat crop on page No. 21.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—only. (b) and (c) Nil. (v) Nil. (vi) and (vii) Nil.

5. RESULTS :

60(SFT)

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			n_1	n_2	n_1'	n_2'	n_1''	n_2''	
Ambala	10	1360	240	530	390	440	420	550	95.0
Rohtak	2	650	120	270	140	250	150	210	75.0

Crop :- Wheat (Rabi).**Ref :- Hr. 61(SFT).****Site :- District : Ambala****Type :- 'M'.**

Object:—Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (no manure),

 $n_1=22.4$ Kg/ha. of N as A/S, $n_2=44.8$ Kg/ha. of N as A/S, $n_1'=22.4$ Kg/ha. of N as Urea, $n_2'=44.8$ Kg/ha. of N as Urea, $n_1''=22.4$ Kg/ha. of N as A/S/N, $n_2''=44.8$ Kg/ha. of N as A/S/N.

3. DESIGN :

Same as in type A conducted under unirrigated condition on Wheat crop on page No. 21.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1961—only. (b) and (c) No. (v) No. (vi) and (vii) N.A.

5. RESULTS :

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			n_1	n_2	n_1'	n_2'	n_1''	n_2''	
Ambala	7	910	360	610	350	550	540	750	138.0

Crop :- Wheat (Rabi).

Ref :- Hr. 60 and 61(SFT).

Site :- District : Hissar and Rohtak.

Type :- 'M'.

Object :-Type B: To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (no manure),

n_1 =22.4 Kg/ha. of N as A/S,

n_2 =44.8 Kg/ha. of N as A/S,

n_1' =22.4 Kg/ha. of N as Urea,

n_2' =44.8 Kg/ha. of N as Urea,

n_1'' =22.4 Kg/ha. of N as A/S/N,

n_2'' =44.8 Kg/ha. of N as A/S/N.

3. DESIGN :

Same as in type A conducted under unirrigated condition on Wheat crop on page No. 21.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960 and 61. (b) and (c) N.A. (v) No. (vi) and (vii) N.A.

5. RESULTS :

60(SFT)

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			n_1	n_2	n_1'	n_2'	n_1''	n_2''	
Hissar	10	1560	300	550	410	440	290	490	88.0
Rohtak	10	2090	50	90	250	310	230	570	133.0

61(SFT)

Hissar	19	1250	280	500	130	490	350	590	59.0
Rohtak	13	2230	330	530	290	480	450	620	104.0

Crop :- Wheat (Rabi).

Ref.:- Hr. 62 to 65(SFT) for Hissar and Rohtak, 62, 63(SFT) for Ambala and 62 to 64(SFT) for Karnal.

Site :- District : Hissar, Rohtak, Ambala and Karnal.

Type :- 'M'.

Object: -Type A₁ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments:

O=Control (no manure).

N₁=35 Kg/ha. of N,

N₂=70 Kg/ha. of N,

P₁=35 Kg/ha. of P₂O₅,

N₁P₁=35 Kg/ha. of N+35 Kg/ha. of P₂O₅,

N₂P₁=70 Kg/ha. of N+35 Kg/ha. of P₂O₅,

N₂P₂=70 Kg/ha. of N+70 Kg/ha. of P₂O₅ and

N₂P₂K₁=70 Kg/ha. of N+70 Kg/ha. of P₂O₅+35 Kg/ha. of K₂O.

3. DESIGN :

(i) and (ii) A selected district is divided into four agriculturally homogeneous zones based on climate, soil cropping pattern etc. In each zone one block is selected at random. A block normally consists of a group of 50-100 villages. In each block 36 experiments are conducted in a year of which 11 are of type A₁, 11 of type A₂, 11 of type A₃ and 3 are of type C. The eleven experiments under type A₁, A₂ and A₃ are distributed as 3 on a *Kharif* cereal, 3 on a *Rabi* cereal, 3 on a cash crop and 2 on oil seed. All the three type-C experiments are conducted on a legume crop. For the purpose of conducting the A₁, A₂ and A₃ experiments 11 villages are randomly selected in each block and in each village 3 experiments one each of type A₁, A₂ and A₃ are laid out. For conducting the three villages are randomly selected in each block. (iii) (a) 1/100 ha. (b) 1/200 ha. (iv) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-66 for Hissar and Rohtak, 1962-66 for Ambala (64, 65 N.A.) and 1962-66 for Karnal (65 N.A.). (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS :

Hissar

62(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	492	678	237	517	843	1027	1117	70.1

Control yield=1606 Kg/ha. ; No. of trials=13

63(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	368	642	94	540	770	850	831	60.2

Control yield=1417 Kg/ha. ; No. of trials=12

64(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	689	1192	153	826	1214	1594	1187	83.0

Control yield=1230 Kg/ha. ; No. of trials=14

65(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	313	579	70	93	802	1295	1161	186.0

Control yield=1443 Kg/ha. ; No. of trials=10

Rohtak

62(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	381	303	124	405	513	637	653	60.0

Control yield=1837 Kg/ha. ; No. of trials=15

63(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	729	958	147	820	997	1126	1235	101.3

Control yield=1242 Kg/ha. ; No. of trials=15

64(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	606	836	62	718	861	1192	1237	79.5

Control yield=1617 Kg/ha. ; No. of trials=9

65(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	611	924	206	613	1027	1200	1380	104.9

Control yield=1579 Kg/ha. ; No. of trials=11.

Ambala

62(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	586	495	283	696	765	907	940	168.4

Control yield=1769 Kg/ha. ; No. of trials=4

63(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	681	459	296	649	687	647	724	150.5

Control yield=1131 Kg/ha. ; No. of trials=4

Karnal

62(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	273	235	141	439	437	398	635	114.3

Control yield=1210 Kg/ha. ; No. of trials=14

63(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	445	764	79	591	814	1019	1292	104.8

Control yield=2019 Kg/ha. ; No. of trials=11

64(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	390	924	128	707	788	1587	2400	505.2

Control yield=1680 Kg/ha. ; No. of trials=7

Crop :- Wheat (Rabi).**Ref :- Hr. 62 to 65(SFT) for Ambala and 62(SFT) for Karnal.****Site :- District : Ambala and Karnal. Type :- 'M'.**Object :—Type A₁: To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS and 3. DESIGN :

Same as in type A₁ conducted on Wheat crop under irrigated condition on page No. 25.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—66 for Ambala and 62 for Karnal. (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS :

Ambala

62(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	367	527	31	556	705	665	965	180.4

Control yield=1109 Kg/ha. ; No. of trials=5

63(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	154	334	136	563	515	569	793	99.5

Control yield=1060 Kg/ha. ; No. of trials=12

64(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	337	679	324	619	750	929	1154	107.2

Control yield=1672 Kg/ha. ; No. of trials=16

65(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	332	494	107	428	783	799	842	80.9

Control yield=1138 Kg/ha. ; No. of trials=15

Karnal

62(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	233	266	19	459	301	583	578	105.5

Control yield=1472 Kg/ha. ; No. of trials=3

Crop :- Wheat (*Rabi*).

Ref :- Hr. 62 to 64(SFT) for Ambala, 62 to 65(SFT) for Karnal, Hissar and Rohtak and 62(SFT) for Gurgaon.

Site :- District : Ambala, Karnal, Hissar, Rohtak and Gurgaon.

Type :- 'M'.

Object :—Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

N₁=35 Kg/ha. of N,P₁=35 Kg/ha. of P₂O₅,P₂=70 Kg/ha. of P₂O₅,N₁P₁=35 Kg/ha. of N+35 Kg/ha. of P₂O₅,N₁P₂=35 Kg/ha. of N+70 Kg/ha. of P₂O₅,N₂P₁=70 Kg/ha. of N+70 Kg/ha. of P₂O₅,N₂P₂K₂=70 Kg/ha. of N+70 Kg/ha. of P₂O₅+70 Kg/ha. of K₂O,

3. DESIGN :

Same as in type A₁ conducted under irrigated conditions on Wheat crop on page No. 25.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—66 (65 N.A. for Ambala and only 62 is available for Gurgaon). (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS :

Ambala

62(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	125	92	207	253	596	304	606	190.8

Control yield= 1482 Kg/ha. ; No. of trials=4

63(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	-190	27	-121	397	281	701	639	212.9

Control yield=2174 Kg/ha. ; No. of trials=3

64(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	386	257	283	672	734	939	968	68.4

Control yield=1411 Kg/ha. ; No. of trials=16

Karnal

62(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	113	79	141	276	239	246	608	118.6

Control yield=1537 Kg/ha. ; No. of trials=13

63(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	404	-70	286	480	653	988	1051	155.2

Control yield=2120 Kg/ha. ; No. of trials=11

64(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	348	240	423	609	662	1183	1292	84.8

Control yield=1391 Kg/ha. ; No. of trials=8

65(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	524	487	261	883	705	1350	1448	171.4

Control yield=1760 Kg/ha. ; No. of trials=12

Hissar

62(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	779	712	401	669	1061	1303	1474	138.8

Control yield=1255 Kg/ha. ; No. of trials=13

63(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	475	112	171	590	630	844	962	70.2

Control yield=1066 Kg/ha. ; No. of trials=12

64(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	803	104	272	1013	1050	1450	1550	104.4

Control yield=1510 Kg/ha. ; No. of trials=15

65(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	468	270	290	574	795	1011	952	148.0

Control yield=1546 Kg/ha. ; No. of trials=9

Rohtak

62(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	332	143	231	434	435	644	714	51.0

Control yield=1984 Kg/ha. ; No. of trials=15

63(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	705	228	295	731	934	1131	1366	106.5

Control yield=1349 Kg/ha. ; No. of trials=15

64(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	248	98	228	505	584	980	1124	75.7

Control yield=1940 Kg/ha. ; No. of trials=10

65(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	683	354	550	649	628	1168	1330	103.0

Control yield=1888 Kg/ha. ; No. of trials=13

Gurgaon

62(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	340	240	385	540	546	891	899	121.8

Control yield=1031 Kg/ha. ; No. of trials=7

Crop :- Wheat (Rabi).

Ref :- Hr. 62(SFT) for Karnal and 62,
63, 65(SFT) for Ambala.Site :- District : Karnal and
Ambala.

Type :- 'M'.

Object :- Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

Same as in type A₂ conducted under irrigated condition on Wheat crop on page No. 28.

3. DESIGN:

Same as in type A₁ conducted under irrigated condition on Wheat crop on page No. 25.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962 for Karnal and 1962-66 for Ambala (64 N.A.), (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS :

Karnal

62(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	65	72	16	191	200	336	494	44.5

Control yield=1452 Kg/ha. ; No. of trials=4

Ambala

62(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	385	-17	44	254	137	510	477	135.9

Control yield=941 Kg/ha. ; No. of trials=7

63(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	287	219	313	389	675	593	814	109.3

Control yield=975 Kg/ha. ; No. of trials=13

65(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	355	101	186	495	535	732	767	99.1

Control yield=984 Kg/ha. ; No. of trials=14

Crop :- Wheat (*Rabi*).

Ref :- Hr- 62 to 65 (SFT) for Hissar, Rohtak and Karnal, 62(SFT) for Gurgaon and 62, 63(SFT) for Ambala.

Site :- District : Hissar, Rohtak, Karnal, Gurgaon and Ambala.

Type :- 'M'.

Object :—Type A₂ : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS:

8 manurial treatments :

O=Control (no manure),

 $N_1=35$ Kg/ha. of N, $K_1=35$ Kg/ha. of K_2O , $K_2=70$ Kg/ha. of K_2O , $N_1K_1=35$ Kg/ha. of N+35 Kg/ha. of K_2O , $N_1K_2=35$ Kg/ha. of N+70 Kg/ha. of K_2O , $N_2K_2=70$ Kg/ha. of N+70 Kg/ha. of K_2O and $N_1P_1K_1=35$ Kg/ha. of N+35 Kg/ha. of P_2O_5 +35 Kg/ha. of K_2O .

3. DESIGN:

Same as in Type A₁ conducted under irrigated condition on Wheat crop on page No. 25.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-66 for Hissar, Rohtak and Karnal, 1962 only for Gurgaon and 62 to 63 for Ambala. (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS:

Hissar

62(SFT)

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of grain in Kg/ha.	566	102	285	510	541	709	652	119.2

Control yield=1471 Kg/ha ; No. of trials=11

63(SFT)

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of grain in Kg/ha.	439	44	185	523	508	660	636	77.0

Control yield=1261 Kg/ha. ; No. of trials=10

64(SFT)

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of grain in Kg/ha.	723	4	107	663	827	1154	841	90.2

Control yield =1284 Kg/ha. ; No. of trials=12

65(SFT)

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of grain in Kg/ha.	703	299	206	489	673	864	922	134.6

Control yield=1249 Kg/ha. ; No. of trials=9

Rohtak

62(SFT)

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of grain in Kg/ha.	270	79	130	311	352	449	452	32.4

Control yield=1749 Kg/ha. ; No. of trials=14

Rohtak

62(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	589	119	189	617	743	1094	1205	96.0

Control yield=1301 Kg/ha. ; No. of trials=13

63(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	429	107	240	596	597	965	952	64.5

Control yield=1561 Kg/ha. ; No. of trials=9

64(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	576	153	255	786	645	930	823	101.2

Control yield=1532 Kg/ha. ; No. of trials=12

Karnal

62(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	214	91	113	250	498	500	460	131.1

Control yield=1523 Kg/ha. ; No. of trials=11

63(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	499	136	348	444	576	769	1034	111.7

Control yield=1275 Kg/ha. ; No. of trials=11

64(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	543	134	248	520	465	943	895	107.0

Control yield=1401 Kg/ha. ; No. of trials=8

65(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	538	-16	76	420	508	924	971	123.3

Control yield=1839 Kg/ha. ; No. of trials=11

Gurgaon

62(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	226	200	25	317	572	711	910	103.6

Control yield=961 Kg/ha. ; No. of trials=6

Ambala

62(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	486	-153	164	65	236	463	538	153.3

Control yield=1411 Kg/ha. ; No. of trials=5

63(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	300	18	374	375	577	343	560	200.1

Control yield=1750 Kg/ha. ; No. of trials=4

Crop :- Wheat (*Rabi*).

Ref :- Hr. 62 to 65(SFT) for Ambala.

Site :- District : Ambala.

Type :- 'M'.

Object:—Type A₃: To study the response curves of important cereal, cash and oilseed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

Same as in type A₃ conducted under irrigated condition on Wheat crop on page No. 32.

3. DESIGN:

Same as in type A₁ conducted under irrigated condition on Wheat crop on page No. 25.

4. GENERAL :

(i) to (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—66. (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS :

62(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	364	-100	9	358	239	314	554	190.8

Control yield=1127 Kg/ha. ; No. of trials=7

63(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	281	96	143	314	525	708	810	87.9

Control yield=909 Kg/ha. ; No. of trials=12

64(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	458	85	206	524	554	702	845	93.5

Control yield=1388 Kg/ha. ; No. of trials=14

65(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	328	44	59	376	425	494	588	83.7

Control yield=1038 Kg/ha. ; No. of trials=15

Crop :- Wheat (Rabi).

Ref :- Hr. 61(105), 62(151).

Site :- Agri. Farm, Ambala.

Type :- 'C'.

Object :- To study the effect of deep cultivation on the yield of Wheat.

1. BASAL CONDITIONS:

(i) N.A. (ii) Clay loam. ; Sandy loam. (iii) 18.11.61 ; 25.11.62. (iv) (a) As per treatments. (b) to (e) N.A. (v) 44.8 Kg/ha. of N + 22.4 Kg/ha. of P₂O₅ as Super. (vi) C-273. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) 24.3.62 ; 3.5.63.

2. TREATMENTS:

3 depths of ploughings: D₁=Shallow ploughing 10 cm. to 15 cm. deep, D₂=Deep ploughing 20 cm. to 25 cm. depth and D₃=Deep ploughing (Ripping up to 46 cm. deep).

3. DESIGN:

(i) R.B.D. (ii) (a) 3. (b) N.A. (iii) 4 ; 8. (iv) (a) N.A. (b) 1/448 ha. ; N.A. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1961-62. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) and (vi) Nil. (vii) Error variances are homogeneous and Treatments × Years interaction is present.

5. RESULTS:

Pooled results

(i) 2260 Kg/ha. (ii) 442.6 Kg/ha. (based on 2 d.f. made up of Treatments × Years interaction). (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	D ₁	D ₂	D ₃
Av. yield	2078	2250	2451

Individual results

Treatment	D ₁	D ₂	D ₃	Sig.	G.M.	S.E./plot
Year						
1961	2674	2693	2687	N.S.	2685	167.1
1962	1780	2028	2333	**	2047	135.2
Pooled	2078	2250	2451	N.S.	2260	192.5

Crop :- Wheat (Rabi).

Ref :- Hr. 62(205).

Site :- Agri. Farm, Ambala.

Type :- 'C'.

Object :- To study the residual effect of different crop rotations on the yield of Wheat.

1. BASAL CONDITIONS:

(i) N.A. (ii) Clay loam. (iii) 27.11.62. (iv) (a) 5 ploughings. (b) to (e) N.A. (v) 44.8 Kg/ha. of N+22.4 Kg/ha. of P_2O_5 . (vi) N.A. (vii) Irrigated. (viii) 2 weedings and hoeings. (ix) N.A. (x) 3.5.63.

2. TREATMENTS:

5 crop rotations: T_1 =Guara (G.M.)—Wheat, T_2 =Guara (fodder)—Wheat, T_3 =Chari Moth (fodder)—Wheat, T_4 =Chari fodder—Wheat and T_5 =Maize (Grain)—Wheat.

3. DESIGN:

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 6. (iv) and (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) No. (c) Nil. (v) and (vi) N.A. (vii) Yield for treatment T_5 is not available.

RESULTS:

5. (i) 1974 Kg/ha. (ii) 196.0 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T_1	T_2	T_3	T_4
Av. yield	1946	1901	1975	2074

Crop :- Wheat (Rabi).

Ref :- Hr. 62(84).

Site :- Reg. Res. Stn., Gurgaon.

Type :- 'CV'.

Object :- To study the effect of different seed rates on the different varieties of Wheat.

1. BASAL CONDITIONS:

(i) to (iii) N.A. (iv) (a) 6 to 8 ploughings. (b) Behind the plough. (c) As per treatments. (d) and (e) N.A. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 weedings. (ix) and (x) N.A.

2. TREATMENTS:

Main-plot treatments:

3 varieties: V_1 =C-281, V_2 =C-273 and V_3 =C-286.

Sub-plot treatments:

4 seed rates: S_1 =49.4, S_2 =86.5, S_3 =123.6 and S_4 =148.3 Kg/ha.

3. DESIGN:

(i) Split-plot. (ii) (a) 3 main-plots/block and 4 sub-plots/main-plot. (iii) 6. (iv) (a) N.A. (b) 1/395 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 3188 Kg/ha. (ii) (a) 1640.5 Kg/ha. (b) 453.8 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	S_1	S_2	S_3	S_4	Mean
V_1	2876	3311	3558	3321	3267
V_2	2896	3025	2965	3232	3029
V_3	3153	3341	3262	3311	3267
Mean	2975	3226	3262	3288	3188

Crop :- Wheat (Rabi).**Ref :- Hr. 60(150).****Site :- Govt. Recl. Farm, Nilokheri.****Type :- 'CM'.**

Object:—To study the residual effect of different depths of ploughing.

1. BASAL CONDITIONS :

(i) N.A. (ii) Highly saline sodic soil. (iii) 23.11.60. (iv) (a) 4 to 5 ploughings. (b) to (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 19.4.61.

2. TREATMENTS :**Main-plot treatments :**3 depths of ploughing : P_1 =Deep ploughing up to 23 cm., P_2 =Shallow ploughing upto 10 cm. and P_3 =Sub soil ploughing upto 45 cm.**Sub-plot treatments :**2 levels of manures : F_0 =No manure and F_1 =56 Kg/ha. of N+28 Kg/ha. of P_2O_5 as Super.**3. DESIGN :**

(i) Split-plot. (ii) (a) 3 main-plots/replication ; 2 sub-plots/main-plot. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 1/197'69 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Fair. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 95 Kg/ha. (ii) (a) 118.2 Kg/ha. (b) 49.1 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	P_1	P_2	P_3	Mean
F_0	72	94	64	77
F_1	70	186	84	113
Mean	71	140	74	95

Crop :- Wheat (Rabi).**Ref :- Hr. 60(166).****Site :- Govt. Recl. Farm, Nilokheri.****Type :- 'CM'.**

Object:—To study the residual effect of different crop rotations on the yield of Wheat crop.

1. BASAL CONDITIONS :(i) (a) As per treatments. (b) and (c) N.A. (ii) Highly saline sodic soil. (iii) 15.11.60. (iv) (a) 4 to 5 ploughings. (b) to (e) N.A. (v) 45 Kg/ha. of N as C/A/N+22.5 Kg/ha. of P_2O_5 as Super+22.5 Kg/ha. of K_2O as Pot. Sul. (vi) N.A. (vii) Irrigated. (viii) 2 to 3 hoeings. (ix) N.A. (x) 19.4.61.**2. TREATMENTS :****Main-plot treatments :**6 rotations : T_1 =*Dhanca* (G.M.) Rice—Berseem (G.M.) Wheat, T_2 =*Dhanca* (G.M.) Rice—Berseem (G.M.)—Wheat, T_3 =*Dhanca* (G.M.) Rice—Berseem (G.M.)—Wheat, T_4 =*Dhanca* (G.M.) Rice—Berseem—Wheat, T_5 =*Dhanca* (G.M.) Rice—Berseem—Barley—Wheat and T_6 =*Dhanca* (G.M.) Rice—Berseem—Sugarcane—Wheat.**Sub-plot treatments :**2 levels of manures : F_0 =0 (no manure) and F_1 =56 Kg/ha. of N+28 Kg/ha. of P_2O_5 +28 Kg/ha. of K_2O .

3. DESIGN :

(i) Split-plot. (ii) (a) 6 main-plots/replication ; 2 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/790.75 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 225 Kg/ha. (ii) (a) 212.6 Kg/ha. (b) 117.0 Kg/ha. (iii) Main effect of F alone is highly significant. (iv) Av. yield grain in Kg/ha.

	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	Mean
F ₀	121	162	221	300	65	156	171
F ₁	305	212	340	380	281	162	280
Mean	213	187	280	340	173	159	225

C.D. for F marginal means=70.9 Kg/ha.

Crop :- Wheat (Rabi).

Ref :- Hr. 63(214).

Site :- Agri. Res. Stn., Gurgaon.

Type :- 'P'.

Object :-To study the effect of different intervals and depths of irrigation.

1. BASAL CONDITIONS :

(i) N.A. (ii) Sandy loam. (iii) Nov., 63. (iv) (a) 4 to 5 ploughings. (b) to (e) N.A. (v) N.A. (vi) C-281. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) April, 64.

2. TREATMENTS :

Main-plot treatments :

3 intervals of irrigation : W₁=2, W₂=3 and W₃=4 weeks.

Sub-plot treatments :

3 depths of irrigation : D₀=0, D₁=3.7 and D₂=7.5 cm.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication ; 3 sub-plots/main-plot. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/432.44 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1963—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 2425 Kg/ha. (ii) (a) 276.0 Kg/ha. (b) 327.0 Kg/ha. (iii) Main effect of D alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	D ₀	D ₁	D ₂	Mean
W ₁	1995	2356	2946	2432
W ₂	2213	2551	2789	2518
W ₃	2083	2422	2472	2326
Mean	2097	2443	2736	2425

C.D. for D marginal means=222.6 Kg/ha.

Crop :- Wheat (Rabi).

Ref :- Hr. 65(38).

Site :- Punjab Agri. University, (Hissar campus), Hissar. Type :- 'IM'.

Object :-To determine the irrigation requirement and its interaction with manures for Wheat crop.

1. BASAL CONDITIONS :

(i) (a) Cotton—Wheat. (b) Cotton. (c) N.A. (ii) **Loam.** (iii) Nov., 65. (iv) (a) 4 ploughings. (b) to (e) N.A. (v) 40 Kg/ha. of P_2O_5 +40 Kg/ha. of K_2O . (vi) H-14. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) April, 66.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 8 irrigational treatments : $T_1=AI_1+BI_1$, $T_2=AI_2+BI_1$, $T_3=AI_3+BI_1$, $T_4=AI_1+BI_2$, $T_5=AI_2+BI_2$, $T_6=AI_3+BI_2$, $T_7=AI_1+BI_3$ and $T_8=Local$ practices of irrigation.

Where I_1 =Irrigation at 25 % of available soil moisture, I_2 =Irrigation at 50 % available soil moisture, I_3 =Irrigation at 75 % of available soil moisture and A=Irrigation at preflowering stage, B=Irrigation at post flowering stage.

(2) 2 levels of N : $N_1=60$ and $N_2=120$ Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 16. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/370 ha. (v) —. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) 3 times Endrin spray. (iii) Yield of grain. (iv) (a) 1965—contd. (b) No. (c) Nil. (v) No. (vi) and (vii) Nil.

5. RESULTS :

(i) 1690 Kg/ha. (ii) 355 Kg/ha. (iii) Main effects of T and interaction $T \times N$ are significant. (iv) Av. yield of grain in Kg/ha.

	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	Mean
N_1	1498	1598	1480	1950	1647	1635	2305	1406	1690
N_2	1598	1858	1695	1110	1610	1661	1961	2035	1691
Mean	1548	1728	1588	1530	1628	1648	2133	1720	1690

C.D. for T marginal means=356.9 Kg/ha.

C.D. for the body of $T \times N$ table=504.7 Kg/ha.

Crop :- Barley (Rabi).

Ref :- Hr. 64(209).

Site :- Agri. Res. Stn., Gurgaon.

Type :- 'M'.

Object :-To study the effects of N and P_2O_5 on the yield of Barley.

1. BASAL CONDITIONS :

(i) N.A. (ii) Sandy loam. (iii) 25.11.64. (iv) (a) 4 to 5 ploughings. (b) N.A. (c) 87 Kg/ha. (d) 22 cm. row to row. (e) N.A. (v) N.A. (vi) C-164. (vii) Irrigated. (viii) 1 hoeing. (ix) N.A. (x) May, 65.

2. TREATMENTS:

Main-plot treatments :

3 levels of N : $N_0=0$, $N_1=33.6$ and $N_2=67.2$ Kg/ha.

Sub-plot treatments :

3 levels of P_2O_5 : $P_0=0$, $P_1=28$ and $P_2=56$ Kg/ha.

(Time and kind is N.A.)

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication ; 3 sub-plots/main-plot. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/988.44 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1964—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 3719 Kg/ha. (ii) (a) 676.0 Kg/ha. (b) 345.5 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	P ₂	Mean
N ₀	2543	2570	2372	2495
N ₁	3553	3534	3558	3548
N ₂	5078	4868	5392	5113
Mean	3725	3657	3774	3719

C.D. for N marginal means=502.0 Kg/ha.

Crop :- Barley (Rabi).

Ref :- Hr. 60(155).

Site :- Govt. Recl. Farm, Nilokheri.

Type :- 'M'.

Object :- To study the residual effect of different soil amendments on the yield of Barley.

1. BASAL CONDITIONS :

(i) N.A. (ii) Highly saline sodic soil. (iii) 15.11.60. (iv) (a) 4 to 5 ploughings. (b) to (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 5.4.61.

2. TREATMENTS :

11 manurial treatments : T₀=Control, T₁=Gypsum 101.6 Q/ha., T₂=Sulphur 900 Kg/ha., T₃=H₂SO₄ 3153 litre/ha., T₄=HNO₃ 5219 litre/ha., T₅=HCl 3865 litre/ha., T₆=Al. sulphate 6160 Kg/ha., T₇=F.Y.M. 375.9 Q/ha., T₈=F.Y.M. 375.9 Q/ha.+Press-mud 101.6 Q/ha., T₉=F.Y.M. 375.9 Q/ha.+Mollases 101.6 Q/ha. and T₁₀=Press-mud 101.6 Q/ha.+Mollases 101.6 Q/ha.

All applied in 1958—59.

3. DESIGN :

(i) R.B.D. (ii) (a) 11. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 1/747.5 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 114.5 Kg/ha. (ii) 156.4 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀
Av. yield	49.8	162.0	119.6	49.8	87.2	17.4	107.1	25.0	75.0	416.1	150.0

Crop :- Barley (Rabi).

Ref :- Hr. 60(138).

Site :- Agri. Farm, Ambala.

Type :- 'C'.

Object :-To study the effect of different depths of ploughing on the yield of Barley.

1. BASAL CONDITIONS :

(i) N.A. (ii) Clay loam. (iii) 24.12.60. (iv) (a) 3 ploughings. (b) Kera method. (c) to (e) N.A. (v) Nil. (vi) Local. (vii) Irrigated. (viii) 2 hoeings and 2 weedings. (ix) N.A. (x) 2.5.61.

2. TREATMENTS :

3 cultivation practices : P₁=Shallow ploughing (3 to 10 cm. deep), P₂=Deep ploughing (10 to 25 cm. deep) and P₃=Ripping (25 to 45 cm. deep).

3. DESIGN :

(i) R.B.D. (ii) (a) 3. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/448.58 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 1201 Kg/ha. (ii) 370.5 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	P ₁	P ₂	P ₃
Av. yield	1155	1287	1162

Crop :- Barley (Rabi).

Ref :- Hr. 62(93).

Site :- Agri. Res. Sta., Gurgaon.

Type 'C'.

Object :-To study the effect of topping on the yield of Barley.

1. BASAL CONDITIONS :

(i) N.A. (ii) Sandy loam. (iii) 15.11.62. (iv) N.A. (v) N.A. (vi) C—138. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

2 topping treatments : T₁=Topping on 20.1.63 and T₂=No topping.

3. DESIGN :

(i) R.B.D. (ii) (a) 2. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/1482.87 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 3037 Kg/ha. (ii) 121.5 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₁	T ₂
Av. yield	3165	2909

Crop :- Barley (Rabi).**Ref :- Hr. 64(210).****Site :- Agri. Res. Stn., Gurgaon.****Type :- 'C'.****Object :-**To study the effect of different seed rates and spacings on the yield of Barley crop.**1. BASAL CONDITIONS :**

(i) N.A. (ii) Sandy loam. (iii) 5.11.64. (iv) (a) 3 ploughings. (b) Pora method. (c) As per treatments. (d) and (e) N.A. (v) N.A. (vi) C-164. (vii) Irrigated. (viii) 2 hoeings and 2 weedings. (ix) N.A. (x) May, 65.

2. TREATMENTS :**Main-plot treatments :**3 spacings : $S_1=15$, $S_2=22$ and $S_3=30$ cm.**Sub-plot treatments :**3 seeds rates : $R_1=62$, $R_2=87$ and $R_3=112$ Kg/ha.**3. DESIGN :**

(i) Split-plot. (ii) (a) 3 main-plots/replication ; 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/988.44 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1964—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 3011 Kg/ha. (ii) (a) 341.9 Kg/ha. (b) 536.4 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	S_1	S_2	S_3	Mean
R_1	2842	2990	3151	2994
R_2	3076	2743	3034	2953
R_3	2891	3002	3361	3085
Mean	2936	2912	3184	3111

Crop :- Barley (Rabi).**Ref :- Hr. 60(164).****Site :- Govt. Recl. Farm, Nilokheri.****Type :- 'CM'.****Object :-**To study the effect of different levels of leaching on the yield of Barley.**1. BASAL CONDITIONS :**(i) N.A. (ii) Highly saline sodic soil. (iii) 9.11.60. (iv) (a) 4-5 ploughings. (b) to (e) N.A. (v) 45 Kg/ha. of $N+22.5$ Kg/ha. of P_2O_5 . (vi) N.A. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) 5.4.61.**2. TREATMENTS :****Main-plot treatments :**

All combinations of (1) and (2)

(1) 2 levels of Gypsum : G_0 =No gypsum and G_1 =Gypsum at 101.6 Q/ha.(2) 3 levels of leaching : T_1 =No leaching, T_2 =30 cm. leaching and T_3 =91 cm. leaching.**Sub-plot treatments :**2 levels of fertilizer : F_0 =No fertilizer and F_1 =45 Kg/ha. of $N+22.5$ Kg/ha. of P_2O_5 .

3. DESIGN :

(i) Split-plot. (ii) (a) 6 main-plots/replication, 2 sub-plots/main-plot. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 1/840-96 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) No. (vi) and (vii) Nil.

5. RESULTS :

(i) 420 Kg/ha. (ii) (a) 196.4 Kg/ha. (b) 221.4 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	T ₁	T ₂	T ₃	F ₀	F ₁	Mean
G ₀	470	348	337	389	380	385
G ₁	346	588	429	553	356	454
Mean	408	468	383	471	368	420
F ₀	423	350	331			
F ₁	393	586	435			

Crop :- Barley (Rabi).

Ref :- Hr. 60(167).

Site :- Govt. Recl. Farm, Nilokheri.

Type :- 'CM'.

Object:—To study the effect of different depths of ploughing on the yield of Barley.

1. BASAL CONDITIONS :

(i) N.A. (ii) Highly saline sodic soil. (iii) 24.11.60. (iv) (a) 4 to 5 ploughings. (b) to (e) N.A. (v) Nil. (vi) N.A. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) 10.5.61.

2. TREATMENTS :

Main-plot treatments :

3 depths of ploughing : P₁=15 to 23 cm., P₂=23 to 30 cm. and P₃=30 to 46 cm.

Sub-plot treatments :

2 levels of N as C/A/N : N₀=0 and N₁=45 Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication ; 2 sub-plots/main-plot. (iii) 3. (iv) (a) N.A. (b) 1/197-69 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) No. (vi) and (vii) Nil.

5. RESULTS :

(i) 638 Kg/ha. (ii) (a) 178.4 Kg/ha. (b) 85.3 Kg/ha. (iii) Main effect of P is significant and that of N is highly significant. Interaction P×N is significant. (iv) Av. yield of grain in Kg/ha.

	P ₁	P ₂	P ₃	Mean
N ₀	458	576	252	429
N ₁	1080	1062	402	848
Mean	769	819	327	638

C.D. for N marginal means=98.4 Kg/ha.

C.D. for P marginal means=327.8 Kg/ha.

C.D. for N means at the same level of P=170.4 Kg/ha.

C.D. for P means at the same level of N=310.1 Kg/ha.

Crop :- Barley (Rabi).

Ref :- Hr. 64(211).

Site :- Agri Res. Stn. Gurgaon.

Type :- 'CMV'.

Object :- To study the effects of different levels of fertilizers and spacings on varieties of Barley.

1. BASAL CONDITIONS :

(i) N.A. (ii) Sandy loam. (iii) 26.11.64. (iv) (a) 3 ploughings. (b) Pora. (c) N.A. (d) As per treatments. (e) Nil. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) May, 65.

2. TREATMENTS :

Main-Plot treatments :

2 varieties : V₁=C-164 and V₂=BJ. 56-32.

Sub-plot treatments :

2 levels of N : N₀=0 and N₁=56 Kg/ha.

Sub-sub-plot treatments :

2 spacings : S₁=15 and S₂=22 cm. between rows.

3. DESIGN :

(i) Split-plot. (ii) (a) 2 main-plots/replication ; 2 sub-plots/main-plot ; 2 sub-sub-plots/sub-plot. (b) N.A. (iii) 6. (iv) (a) 1/988.44 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1964-only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 2520 Kg/ha. (ii) (a) 856.0 Kg/ha. (b) 550.6 Kg/ha. (c) 380.1 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	S ₁	S ₂	Mean
V ₁	2339	3179	2957	2561	2759
V ₂	1943	2619	2413	2149	2281
Mean	2141	2899	2685	2355	2520
S ₁	2240	3130			
S ₂	2042	2668			

C.D. for N marginal means=354.1 Kg/ha.

Crop :- Barley (Rabi).

Ref :- Hr. 62(94).

Site :- Agri. Res Stn., Gurgaon.

Type :- 'I'.

Object :-To study the effect of different irrigations on the yield of Barley.

1. BASAL CONDITIONS :

(i) N.A. (ii) Sandy loam. (iii) 15.11.62. (iv) and (v) N.A. (vi) C-138. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

2 irrigational treatments : T_1 =Liberal irrigation at one week's interval and T_2 =Normal irrigation at one week's interval.

3. DESIGN :

(i) R.B.D. (ii) (a) 2. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/247.1 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 580 Kg/ha. (ii) 24.71 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T_1	T_2
Av. yield	593	568

Crop :- Oats (Fodder) (Rabi).

Ref :- Hr. 62(77).

Site :- Fodder Res. Stn., Sirsa.

Type :- 'CV'.

Object :-To study the effect of dates of sowing on the yield of Oats.

1. BASAL CONDITIONS :

(i) N.A. (ii) Loam. (iii) As per treatments. (iv) (a) and (b) N.A. (c) 63 Kg/ha. (d) and (e) N.A. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 5 varieties : V_1 =Fulgham 109, V_2 =CI-94988, V_3 =Marotax Bond, V_4 =37/14 and V_5 =Weston-11.

(2) 3 dates of sowing : D_1 =10.10.62, D_2 =25.10.62 and D_3 =10.11.62.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 15. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/208.8 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 440 Q/ha. (ii) 60.6 Q/ha. (iii) Main effect of D is highly significant and interaction $V \times D$ is significant. (iv) Av. yield of fodder in Q/ha.

	V_1	V_2	V_3	V_4	V_5	Mean
D_1	515	480	507	436	471	482
D_2	434	424	375	502	512	449
D_3	387	325	417	404	414	389
Mean	445	410	433	447	466	440

C.D. for D marginal means=38.6 Q/ha.

C.D. for the body of the $V \times D$ table=86.4 Q/ha.

Crop :- Bajra (Kharif).

Ref :- Hr. 60(15).

Site :- Agri. Farm, Rohtak.

Type :- 'M'.

Object :-To study the effect of different doses of fertilizers on the yield of Bajra.

1. BASAL CONDITIONS:

(i) N.A. (ii) Sandy loam. (iii) 29.7.60. (iv) (a) and (b) N.A. (c) 5.8 Kg/ha. (d) and (e) N.A. (v) Nil. (vi) T-55. (vii) Irrigated. (viii) and (ix) N.A. (x) 15.10.60.

2. TREATMENTS :

4 manurial treatments : M_0 =Control (no manure), M_1 =44.8 Kg/ha. of N as C/A/N, M_2 = M_1 +22.4 Kg/ha. of P_2O_5 as Super and M_3 = M_2 +22.4 Kg/ha. of K_2O as Mur. Pot.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 4. (iv) (a) and (b) 1/42 ha. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 2992 Kg/ha. (ii) 850.6 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	M_0	M_1	M_2	M_3
Av. yield	2801	3418	3222	2526

Crop :- Bajra (Kharif).

Ref :- Hr. 62, 63(SFT) for Hissar and 62(SFT) for Rohtak.

Site :- District : Hissar and Rohtak.

Type :- 'M'.

Object :-Type A_1 : To study the response curves to important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O =Control (no manure),

N_1 =35 Kg/ha. of N,

N_2 =70 Kg/ha. of N,

P_1 =35 Kg/ha. of P_2O_5 ,

N_1P_1 =35 Kg/ha. of N+35 Kg/ha. of P_2O_5 ,

N_2P_1 =70 Kg/ha. of N+35 Kg/ha. of P_2O_5 ,

N_2P_2 =70 Kg/ha. of N+70 Kg/ha. of P_2O_5 and

$N_2P_2K_1$ =70 Kg/ha. of N+70 Kg/ha. of P_2O_5 +35 Kg/ha. of K_2O .

3. DESIGN :

(i) and (ii) A selected district is divided into four agriculturally homogeneous zones based on climate, soil, cropping pattern etc. In each zone one block is selected at random. A block normally consists of a group of 50-100 villages. In each block 36 experiments are conducted in a year of which 11 are of type A_1 , 11 of type A_2 , 11 of type A_3 and 3 are of type C. The eleven experiments under type A_1 , A_2 and A_3 are distributed as 3 on a Kharif cereal, 3 on a Rabi cereal, 3 on a cash crop and 2 on oil seed. All the three type-C experiments are conducted on a legume crop. For the purpose of conducting the A_1 , A_2

and A_2 experiments 11 villages are randomly selected in each block and in each village 3 experiments one each of type A_1 , A_2 and A_3 are laid out. For conducting the three type—C trials three villages are randomly selected in each block. (iii) (a) 1/100 ha. (b) 1/200 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962–66 for Hissar (64 and 65 N.A.) and 1962 only for Rohtak. (b) and (c) NA. (v) to (vii) Nil.

5. RESULTS :

Hissar

62(SFT)

Treatment	N_1	N_2	P_1	N_1P_1	N_2P_1	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of grain in Kg/ha.	467	706	297	386	550	439	613	31.8

Control yield=404 Kg/ha. ; No. of trials=6

63(SFT)

Treatment	N_1	N_2	P_1	N_1P_1	N_2P_1	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of grain in Kg/ha.	121	233	26	151	209	332	324	23.0

Control yield=349 Kg/ha. ; No. of trials=4

Rohtak

62(SFT)

Treatment	N_1	N_2	P_1	N_1P_1	N_2P_1	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of grain in Kg/ha.	99	139	51	145	156	214	254	26.8

Control yield=1398 Kg/ha. ; No. of trials=7

Crop :- Bajra (Kharif).

Ref :- Hr. 60 and 61(SFT).

Site :- District : Hissar and Rohtak.

Type :- 'M'.

Object :-Type A: To study the response of Bajra to levels of N, P and K applied individually and in combination.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

N=22.4 Kg/ha. of N,

P=22.4 Kg/ha. of P_2O_5 ,

K=22.4 Kg/ha. of K_2O ,

NP=22.4 Kg/ha. of N+22.4 Kg/ha. of P_2O_5 ,

NK=22.4 Kg/ha. of N+22.4 Kg/ha. of K_2O ,

PK=22.4 Kg/ha. of P_2O_5 +22.4 Kg/ha. of K_2O and

NPK=22.4 Kg/ha. of N+22.4 Kg/ha. of P_2O_5 +22.4 Kg/ha. of K_2O .

3. DESIGN :

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle/thana is changed once in two years within the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on Kharif cereal, 8 on a rabi cereal, 8 on a cash crop, 4 on an oilseed crop and 3 on a leguminous crop. Half the number of trials conducted are of type-A and other half of type B on crops other than the legumes. The three trials on legumes are of type C. Residual effects of phosphate application are studied on type C trials in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98.8 ha. (b) 1/197.7 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—61. (b) and (c) Nil. (v) Nil. (vi) and (vii) N.A.

5. RESULTS :

60(SFT)

District	No. of trials	Control yield in Kg/ha.	N	P	Av. response in Kg/ha.						
					K	S.E.	NP	NK	PK	NPK	S.E.
Hissar	7	510	130	60	20	11.0	-10	-20	-10	30	20.0
Rohtak	7	700	170	100	50	13.0	20	10	20	-30	17.0

61(SFT)

Hissar	12	440	170	70	10	20.0	0	10	-50	0	18.0
Rohtak	7	700	150	70	50	22.0	10	10	20	-20	18.0

Crop :- Bajra (Kharif).

Ref :- Hr. 60(SFT).

Site :- District : Rohtak and Hissar.

Type :- 'M'.

Object:—Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (no manure),

$n_1=22.4$ Kg/ha. of N as A/S,

$n_2=44.8$ Kg/ha. of N as A/S,

$n_1'=22.4$ Kg/ha. of N as Urea,

$n_2'=44.8$ Kg/ha. of N as Urea,

$n_1''=22.4$ Kg/ha. of N as C/A/N and

$n_2''=44.8$ Kg/ha. of N as C/A/N.

3. DESIGN :

Same as in type A conducted on Bajra crop on page No. 47.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—only. (b) and (c) Nil. (v) Nil. (vi) and (vii) N.A.

5. RESULTS :

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			n_1	n_2	n_1'	n_2'	n_1''	n_2''	
Rohtak	5	840	240	410	180	370	170	350	133.0
Hissar	8	400	130	110	130	200	90	160	110.0

Crop :- Bajra (Kharif).

Ref :- Hr. 64(SFT).

Site :- District : Hissar and Rohtak.

Type :- 'M'.

Object :- Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (no manure),

n_1 =22.4 Kg/ha. of N as A/S,

n_2 =44.8 Kg/ha. of N as A/S,

n_1' =22.4 Kg/ha. of N as Urea,

n_2' =44.8 Kg/ha. of N as Urea,

n_1'' =22.4 Kg/ha. of N as A/S/N and

n_2'' =44.8 Kg/ha. of N as A/S/N.

3. DESIGN :

Same as in type A conducted on Bajra crop on page No. 48.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1961—only. (b) and (c) Nil. (v) Nil. (vi) and (vii) N.A.

5. RESULTS :

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			n_1	n_2	n_1'	n_2'	n_1''	n_2''	
Hissar	11	450	160	390	190	300	220	340	43.0
Rohtak	7	740	100	130	20	110	220	210	39.0

Crop :- Bajra (Kharif).

Ref :- Hr. 63, 64(SFT) for Hissar and 62(SFT) for Rohtak.

Site :- District : Hissar and Rohtak.

Type :- 'M'.

Object :- Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

- O=Control (no manure),
 $N_1=35$ Kg/ha. of N,
 $P_1=35$ Kg/ha. of P_2O_5 ,
 $P_2=70$ Kg/ha. of P_2O_5 ,
 $N_1P_1=35$ Kg/ha. of N + 35 Kg/ha. of P_2O_5 ,
 $N_1P_2=35$ Kg/ha. of N + 70 Kg/ha. of P_2O_5 ,
 $N_2P_2=70$ Kg/ha. of N + 70 Kg/ha. of P_2O_5 and
 $N_2P_2K_2=70$ Kg/ha. of N + 70 Kg/ha. of P_2O_5 + 70 Kg/ha. of K_2O .

3. DESIGN :

Same as in type A_1 conducted under irrigated condition on Bajra crop on page No. 46.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-66 for Hissar (64, 65 N.A.) and 1962-66 for Rohtak (63, 64, 65 N.A.). (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS :

Hissar

62(SFT)

Treatment	N_1	P_1	P_2	N_1P_1	N_1P_2	N_2P_2	$N_2P_2K_2$	S.E.
Av. response of grain in Kg/ha.	269	122	207	310	307	481	387	29.1

Control yield=482 Kg/ha. ; No. of trials=5

63(SFT)

Treatment	N_1	P_1	P_2	N_1P_1	N_1P_2	N_2P_2	$N_2P_2K_2$	S.E.
Av. response of grain in Kg/ha.	148	29	88	192	230	349	364	30.0

Control yield=425 Kg/ha. ; No. of trials=4

Rohtak

62(SFT)

Treatment	N_1	P_1	P_2	N_1P_1	N_1P_2	N_2P_2	$N_2P_2K_2$	S.E.
Av. response of grain in Kg/ha.	150	113	172	49	84	248	270	66.2

Control yield=1517 Kg/ha. ; No. of trials=5

Crop :- Bajra (Kharif).

Ref :- 64(SFT) for Hissar, 62 to 65(SFT) for Rohtak and 62(SFT) for Gurgaon.

Site :- District : Hissar, Rohtak and Gurgaon.

Type :- 'M'.

Object :- Type A_1 : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS and 3. DESIGN :

Same as in type A_1 conducted under irrigated condition on Bajra crop on page No. 46.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1964 for Hissar, 62 to 66 for Rohtak and 1962 for Gurgaon.
(b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS :

Hissar

64(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	247	464	32	315	382	472	479	63.9

Control yield = 764 Kg/ha. ; No. of trials = 5

Rohtak

62(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.F.
Av. response of grain in Kg/ha.	160	216	76	167	209	238	321	40.0

Control yield = 560 Kg/ha. ; No. of trials = 8

63(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	143	255	44	181	327	332	459	600.0

Control yield = 947 Kg/ha; No. of trials = 4

64(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	79	113	4	128	153	187	182	26.8

Control yield = 543 Kg/ha. ; No. of trials = 4

65(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	146	208	72	176	250	305	329	25.0

Control yield = 792 Kg/ha. ; No. of trials = 16

Gurgaon

62(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	-26	227	-100	153	222	286	583	246.6

Control yield = 1037 Kg/ha. ; No. of trials = 3

Crop :- Bajra (Kharif).

Ref :- Hr. 62 to 65(SFT) for Rohtak
and 64(SFT) for Hissar.

Site :- District : Rohtak and Hissar.

Type :- 'M'.

Object :- Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

Same as in type A₂ conducted under irrigated condition on Bajra crop on page No. 50.

3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Bajra crop on page No. 46.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-66 for Rohtak and 1964 for Hissar. (b) and (c) Nil. (v) to (vii) Nil.

5. RESULTS :

Rohtak

62(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	96	46	148	147	204	241	333	39.9

Control yield=662 Kg/ha. ; No. of trials=9

63(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	60	22	67	92	143	213	288	13.0

Control yield=1000 Kg/ha. ; No. of trials=3

64(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	74	19	69	79	103	153	207	13.9

Control yield=597 Kg/ha. ; No. of trials=4

65(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	242	61	161	220	237	323	396	28.5

Control yield=702 Kg/ha. ; No. of trials=16

Hissar

64(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	224	91	122	275	332	463	447	41.3

Control yield=730 Kg/ha. ; No. of trials=5

Crop :- Bajra (Kharif).

Ref :- Hr. 62 to 64(SFT) for Hissar and 62(SFT) for Rohtak.

Site :- District : Hissar and Rohtak. Type :- 'M'.

Object :- Type A₃ : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

 $N_1=35$ Kg/ha. of N, $K_1=35$ Kg/ha. of K_2O , $K_2=70$ Kg/ha. of K_2O , $N_1K_1=35$ Kg/ha. of N+35 Kg/ha. of K_2O , $N_1K_2=35$ Kg/ha. of N+70 Kg/ha. of K_2O , $N_2K_2=70$ Kg/ha. of N+70 Kg/ha. of K_2O and $N_1P_1K_1=35$ Kg/ha. of N+35 Kg/ha. of P_2O_5 +35 Kg/ha. of K_2O .

3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Bajra crop on page No. 46.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962--64 for Hissar and 62 only for Rohtak. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Hissar

62(SFT)

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of grain in Kg/ha.	250	119	161	347	314	333	366	99.5

Control yield=389 Kg/ha. ; No. of trials=4

63(SFT)

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of grain in Kg/ha.	163	29	60	148	202	306	202	18.0

Control yield=390 Kg/ha. ; No. of trials=3

64(SFT)

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of grain in Kg/ha.	228	-23	32	296	373	472	327	89.4

Control yield=617 Kg/ha. ; No. trials=5

Rohtak

62(SFT)

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of grain in Kg/ha.	117	40	85	154	61	146	274	68.4

Control yield=1246 Kg/ha. ; No. of trials=7

Crop :- Bajra (Kharif).

Ref :- Hr. 62 to 65(SFT).

Site :- District : Rohtak.

Type :- 'M'.

Object :—Type A₂: To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

Same as in type A₂ conducted under irrigated condition on Bajra crop on page No. 53.

3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Bajra crop on page No. 46.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—66. (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS :

62(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	91	67	346	136	164	215	248	30.9

Control yield=577 Kg/ha. ; No. of trials=8

63(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	77	15	35	74	119	232	264	48.0

Control yield=936 Kg/ha. ; No. of trials=3

64(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	47	23	27	79	86	173	201	23.4

Control yield=557 Kg/ha. ; No. of trials=5

65(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	198	23	81	115	204	296	284	31.8

Control yield=785 Kg/ha. ; No. of trials=12

Crop :- Bajra (*Kharif*).

Ref :- Hr. 64(207).

Site :- Punjab Agri. University (Hissar Campus), Hissar. Type :- '1'.

Object :- To study the effect of different times of irrigation.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 4.8.64. (iv) (a) N.A. (b) Line sowing behind the plough. (c) 3 Kg/ha. (d) 30 cm. apart. (e) 1 seed/hole. (v) N.A. (vi) T - 53. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

4 times of irrigation : I₀=No irrigation, I₁=One irrigation at full flowering stage, I₂=One irrigation at peak flowering stage and I₃=Two irrigations at pre and peak flowering stage.

3. DESIGN:

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 6'00 m. x 9'00 m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1964—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 935 Kg/ha. (ii) 115.2 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	I ₀	I ₁	I ₂	I ₃	
Av. yield	596	1067	846	1232	C.D.=199.3 Kg/ha.

Crop :- Bajra (Kharif).

Ref :- Hr. 65(101).

Site :- Punjab Agri. University (Hissar Campus), Hissar. Type :- 'D'.

Object :- To see the effect of different times of weed removal on the yield of Bajra.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) N.A. (iv) (a) N.A. (b) Dibbling. (c) 5 Kg/ha. (d) 45 cm. x 30 cm. (e) N.A. (v) 22.4 Kg/ha. of C/A/N with weed, 22.4 Kg/ha. of C/A/N top-dressed at flowering. (vi) T-55. (vii) Irrigated. (viii) As per treatments. (ix) 32.0 cm. (x) N.A.

2. TREATMENTS:

7 times of weed removal: W₀=Through out the season weeds are not allowed to grow, W₁=Full weed removal 3 weeks after sowing, W₂=Full weed removal 5 weeks after sowing, W₃=Full weed removal 7 weeks after sowing, W₄=Full weed removal 9 weeks after sowing, W₅=Full weed removal 11 weeks after sowing and W₆=Weeds not removed, allowed to grow.

3. DESIGN:

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 4. (iv) and (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1965—contd. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 2080 Kg/ha. (ii) 825.9 Kg/ha. (iii) Treatment differences are significant. (iv) Av. yield of grain in Kg/ha.

Treatment	W ₀	W ₁	W ₂	W ₃	W ₄	W ₅	W ₆	
Av. yield	3102	2988	2555	1778	1416	1338	1329	C.D.=1227 Kg/ha.

Crop :- Bajra (Kharif).

Ref :- Hr. 65(104).

Site :- Punjab Agri. University (Hissar Campus), Hissar. Type :- 'D'.

Object :- To study the effect of weed control methods on Bajra.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 15.7.65. (iv) (a) 2 ploughings. (b) Pora. (c) 5 Kg/ha. (d) 30 cm. row to row. (e) Nil. (v) 45 Kg/ha. of C/A/N. (vi) T-55. (vii) Irrigated. (viii) As per treatments. (ix) N.A. (x) Mid. of Oct., 65.

2. TREATMENTS :

10 weeding treatments: T_0 = No weed check (control), T_1 = One hand weeding 4 weeks after sowing, T_2 = One weeding by bullock drawn implement, 4 weeks after sowing, $T_3 = T_1 + 2$, 4-D sodium salt spray at 2.24 Kg/ha., $T_4 = T_1 + 2$, 4-D sodium salt spray at 2.80 Kg/ha., $T_5 = T_1 + 2$, 4-D sodium salt spray at 3.36 Kg/ha., $T_6 = T_2 + 2$, 4-D sodium salt spray at 2.24 Kg/ha., $T_7 = T_2 + 2$, 4-D sodium salt spray at 2.80 Kg/ha., $T_8 = T_2 + 2$, 4-D sodium salt spray at 3.36 Kg/ha. and $T_9 = 3$ hand weedings at 3, 6, 9 weeks after sowing.

3. DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) and (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1965—contd. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 987 Kg/ha. (ii) and (iii) N.A. (iv) Av. yield of grain in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9
Av. yield	683	888	854	1522	919	719	752	829	700	1965

Crop :- Maize (Kharif).

Ref :- Hr. 60 and 61(SFT).

Site :- District : Ambala.

Type :- 'M'.

Object :- Type A : To study the response of Maize to levels of N, P and K applied individually and in combination.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Alluvial. (iii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O = Control (no manure),

N = 22.4 Kg/ha. of N,

P = 22.4 Kg/ha. of P_2O_5 ,

K = 22.4 Kg/ha. of K_2O ,

NP = 22.4 Kg/ha. of N + 22.4 Kg/ha. of P_2O_5 ,

NK = 22.4 Kg/ha. of N + 22.4 Kg/ha. of K_2O ,

PK = 22.4 Kg/ha. of P_2O_5 + 22.4 Kg/ha. of K_2O and

NPK = 22.4 Kg/ha. of N + 22.4 Kg/ha. of P_2O_5 + 22.4 Kg/ha. of K_2O .

3. DESIGN :

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle/thana is changed once in two years within the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on Kharif cereal, 8 on a Rabi cereal, 8 on cash crop, 4 on an oilseed crop and 3 on a leguminous crop. Half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. The three trials on legumes are of type C. Residual effects of phosphate application are studied on type C trials in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98.8 ha. (b) 1/197.7 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—61. (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS :

60(SFT)

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.								
			N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Ambala	10	1310	300	80	70	54.0	100	-20	60	20	57.0

61(SFT)

Ambala	4	440	180	0	80	13.0	60	40	-20	20	24.0
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Crop :- Maize (Kharif).

Ref :- Hr. 63 to 65(SFT) for Karnal.

Site :- District : Karnal.

Type :- 'M'.

Object :-Type A₁ : To study the response curves of important cereal, cash and oilseed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments:

O=Control (no manure),

N₁=60 Kg/ha. of N,

N₂=120 Kg/ha. of N,

P₁=35 Kg/ha. of P₂O₅,

N₁P₁=60 Kg/ha. of N+35 Kg/ha. of P₂O₅,

N₂P₁=120 Kg/ha. of N+35 Kg/ha. of P₂O₅,

N₂P₂=120 Kg/ha. of N+70 Kg/ha. of P₂O₅ and

N₂P₂K₁=120 Kg/ha. of N+70 Kg/ha. of P₂O₅+35 Kg/ha. of K₂O.

3. DESIGN :

(i) and (ii) A selected district is divided into four agriculturally homogeneous zones based on climate, soil, cropping pattern etc. In each zone one block is selected at random. A block normally consists of a group of 50-100 villages. In each block 36 experiments are conducted in a year of which 11 are of type A₁, 11 of type A₂, 11 of type A₃ and 3 are of type C. The eleven experiments under type A₁, A₂ and A₃ are distributed as 3 on a Kharif cereal, 3 on a Rabi cereal, 3 on a cash crop and 2 on oil seed. All the three type -C experiments are conducted on a legume crop. For the purpose of conducting the A₁, A₂ and A₃ experiments 11 villages are randomly selected in each block and in each village 3 experiments one each of type A₁, A₂ and A₃ are laid out. For conducting the three villages are randomly selected in each block.

(iii) (a) 1/100 ha. (b) 1/200 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1963-66. (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS :

63(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	456	540	162	714	589	1005	1227	94.0

Control yield=1245 Kg/ha. ; No. of trials=6

64(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	343	642	170	336	332	799	913	106.9

Control yield=2037 Kg/ha. ; no. of trials=5

65(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	415	523	270	508	623	738	808	66.0

Control yield=1886 Kg/ha. ; No. of trials=7

Crop :- Maize (*Kharif*).

Ref :- Hr. 62 to 65(SFT).

Site :- District : Ambala.

Type :- 'M'.

Object :—Type A₁ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Un-irrigated. (viii) to (x) N.A.

2. TREATMENTS and 3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Maize crop on page No. 57.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—66. (b) and (c) N.A. (v) Nil. (vi) and (vii) N.A.

5. RESULTS :

62(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	511	799	238	926	989	1128	1415	303.1

Control yield=820 Kg/ha. ; No. of trials=4

63(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	449	742	95	664	879	1122	1108	159.0

Control yield=1232 Kg/ha. ; No. of trials=7

64(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	477	756	182	664	872	950	1114	185.1

Control yield=1125 Kg/ha. ; No of trials=10

65(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	390	644	150	336	846	900	919	173.1

Control yield=1142 Kg/ha. ; No. of trials=10

Crop :- Maize (Kharif).
Site :- District : Karnal.

Ref :- Hr. 63 to 65(SFT).
Type :- 'M'.

Object :- Type A₂: To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

N₁=60 Kg/ha. of N,

P₁=35 Kg/ha. of P₂O₅,

P₂=70 Kg/ha. of P₂O₅,

N₁P₁=60 Kg/ha. of N+35 Kg/ha. of P₂O₅,

N₁P₂=60 Kg/ha. of N+70 Kg/ha. of P₂O₅,

N₂P₂=120 Kg/ha. of N+70 Kg/ha. of P₂O₅ and

N₂P₂K₂=120 Kg/ha. of N+70 Kg/ha. of P₂O₅+70 Kg/ha. of K₂O.

3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Maize crop on page No. 57.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1963-66. (b) and (c) N.A. (v) Nil. (vi) and (vii) N.A.

5. RESULTS:

63(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	448	263	425	527	551	876	1105	101.0

Control yield=1057 Kg/ha. ; No. of trials=6

64(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	552	139	265	767	713	946	1459	89.7

Control yield=1724 Kg/ha. ; No. of trials=5

65(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	418	406	128	375	491	726	1008	112.4

Control yield=2216 Kg/ha. ; No. of trials=6

Crop :- Maize (Kharif).

Ref :- Hr. 62 to 65(SFT).

Site :- District : Ambala.

Type :- 'M'.

Object :- Type A₂: To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

Same as in type A₁ conducted under Irrigated condition on Maize crop on page No. 59.

3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Maize crop on page No. 57.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-66. (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS :

62(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	388	232	353	580	635	956	940	126.6

Control yield=1255 Kg/ha. ; No. of trials=5

63(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	578	128	146	742	741	1145	1310	181.0

Control yield=1140 Kg/ha. ; No. of trials=7

64(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	330	-32	47	662	547	645	849	202.6

Control yield=1288 Kg/ha. ; No. of trials=9

65(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	304	-4	96	619	548	1048	1078	107.2

Control yield=1299 Kg/ha. ; No. of trials=9

Crop :- Maize (*Kharif*).

Ref :- Hr. 63, 65(SFT).

Site :- District : Karnal.

Type :- 'M'.

Object :- Type A₂: To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

N₁=60 Kg/ha. of N,K₁=35 Kg/ha. of K₂O,K₂=70 Kg/ha. of K₂O,N₁K₁=60 Kg/ha. of N+35 Kg/ha. of K₂O,N₁K₂=60 Kg/ha. of N+70 Kg/ha. of K₂O,N₂K₂=120 Kg/ha. of N+70 Kg/ha. of K₂O andN₁P₁K₁=60 Kg/ha. of N+35 Kg/ha. of P₂O₅+35 Kg/ha. of K₂O,

3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Maize crop on page No. 57.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-66 (1962, 64 N.A.). (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS :

63(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	273	197	513	345	703	805	1087	82.0

Control yield=1107 Kg/ha ; No. of trials=7

65(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	247	243	244	332	441	606	688	102.6

Control yield=1956 Kg/ha ; No. of trials=5

Crop :- Maize (Kharif).

Ref :- Hr. 62 to 65 (SFT) for Ambala and 64 (SFT) for Karnal.

Site :- District : Ambala and Karnal.

Type :- 'M'.

Object :- Type A₂ : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

Same as in type A₂ conducted under irrigated condition on Maize crop on page No. 60.

3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Maize crop on page No. 57.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-66 for Ambala and 64 for Karnal only. (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS :

Ambala

62(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	139	-228	-21	-170	400	233	472	-

Control yield=1585 Kg/ha. ; No. of trials=5

63(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	491	45	53	545	760	1060	806	207.0

Control yield=1144 Kg/ha. ; No. of trials=7

64(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	296	87	107	334	419	771	749	105.7

Control yield=1018 Kg/ha. ; No. of trials=9

65(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₂	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	499	158	308	530	691	999	829	86.7

Control yield=957 Kg/ha. ; No. of trials=9

Karnal

64(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	943	293	215	725	800	1199	932	85.0

Control yield=1225 Kg/ha. ; No. of trials=5

Crop :- Maize (Kharif).**Ref :- Hr. 65(89).****Site :- Punjab Agri. University (Hissar Campus), Hissar. Type :- 'ICM'.**

Object :—To study the effect of nitrogen, irrigation and plant density on the yield of Maize.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 30.6 65 and 1.7.65. (iv) (a) 2 ploughings. (b) By hand dibbling. (c) 16 to 18 Kg/ha. (d) 90 cm. x 60 cm. (e) N.A. (v) N.A. (vi) Ganga—101. (vii) Irrigated. (viii) 3 hoeings. (ix) 311 cm. (x) 15.10.65.

2. TREATMENTS:

All combinations of (1), (2) and (3)

(1) Three types of irrigation : I₁=2 irrigations (20 cm. water), I₂=3 irrigation (25 cm. water) and I₃=5 irrigations (40 cm. water).

(2) 3 levels of N : N₀=0, N₁=80 and N₂=160 Kg/ha.

(3) 3 plant density : D₁=72500 plants/ha. (60 cm. x 22.5 cm. spacing), D₂=54500 plants/ha. (60 cm. x 30 cm.) and D₃=43500 plants/ha. (60 cm. x 37.5 cm.).

3. DESIGN :

(i) 3³ confounded. (ii) (a) 9 plots/block ; 3 blocks/replication. (b) N.A. (iii) 2. (iv) (a) N.A. (b) 6 00 m. x 7 00 m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Stem borer, Endrine 20 cc at 0.2 % in 3 sprays. (iii) Yield of grain. (iv) (a) 905—only. (b) and (c) No. (v) and (vi) Nil. (vii) Only following results are supplied by research station.

5. RESULTS:

(i) 2615 Kg/ha. (ii) 484.6 Kg/ha. (iii) Main effect of N is highly significant and that of N is significant. (iv) Av. yield of grain in Kg/ha.

Treatment	I ₁	I ₂	I ₃	N ₀	N ₁	N ₂	D ₁	D ₂	D ₃
Av. yield	2405	2592	2848	2172	2719	2954	2570	2735	2340

C.D. for I or N marginal means=335 Kg/ha.

Crop :- Jowar (Kharif).

Ref :- Hr. 62(SFT).

Site :- District : Gurgaon.

Type :- 'M'.

Object :- Type A₁ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

N₁=35 Kg/ha. of N,

N₂=70 Kg/ha. of N,

P₁=35 Kg/ha. of P₂O₅,

N₁P₁=35 Kg/ha. of N+35 Kg/ha. of P₂O₅,

N₂P₁=70 Kg/ha. of N+35 Kg/ha. of P₂O₅,

N₂P₂=70 Kg/ha. of N+70 Kg/ha. of P₂O₅ and

N₂P₂K₁=70 Kg/ha. of N+70 Kg/ha. of P₂O₅+35 Kg/ha. of K₂O.

3. DESIGN :

(i) and (ii) A selected district is divided in to four agriculturally homogeneous zones based on climate, soil, cropping pattern etc. In each zone one block is selected at random. A block normally consists of a group of 50--100 villages. In each block 30 experiments are conducted in a year of which 11 are of type A₁, 11 of type A₂, 11 of type A₃ and 3 are of type C. The eleven experiments under type A₁, A₂ and A₃ are distributed as 3 on a kharif cereal, 3 on a rabi cereal, 3 on a cash crop and 2 on oil seed. All the three type-C experiments are a conducted on a legume crop. For the purpose of conducting the A₂, A₃ and A₃ experiments 11 villages are randomly selected in each block and in each village 3 experiments one each of type A₁, A₂ and A₃ are laid out. For conducting the three villages are randomly selected in each block.

(iii) (a) 1/100 ha. (b) 1/200 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS:

Gurgaon

62(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	88	237	-14	266	336	454	711	57.6

Control yield=247 Kg/ha. ; No. of trials=2

Crop :- Jowar (Kharif).

Ref :- Hr. 62(SFT).

Site :- District : Gurgaon.

Type :- 'M'.

Object :- Type A₁ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS and 3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Jowar crop above.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

62(SFT)

Gurgaon

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	281	448	46	511	597	743	878	70.6

Control yield=696 Kg/ha. ; No. of trials=3

Crop :- Jowar (Kharif).**Ref :- Hr. 62(SFT).****Site :- District : Gurgaon.****Type :- 'M'.**Object :—Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

N₁=35 Kg/ha. of N,P₁=35 Kg/ha. of P₂O₅,P₂=70 Kg/ha. of P₂O₅,N₁P₁=35 Kg/ha. of N+35 Kg/ha. of P₂O₅,N₁P₂=35 Kg/ha. of N+70 Kg/ha. of P₂O₅,N₂P₂=70 Kg/ha. of N+70 Kg/ha. of P₂O₅ andN₂P₂K₂=70 Kg/ha. of N+70 Kg/ha. of P₂O₅+70 Kg/ha. of K₂O.

3. DESIGN :

Same as in type A₁ conducted under irrigated condition on *Jowar* crop on page No. 63.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	187	19	34	286	301	484	612	45.8

Crop :- Jowar (Kharif).**Ref :- Hr. 62(SFT).****Site :- District : Gurgaon.****Type :- 'M'.**Object :—Type A₁ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

Same as in type A₂ conducted under irrigated condition on *Jowar* crop above.

3. DESIGN:

Same as in type A₁ conducted under irrigated condition on *Jowar* crop on page No. 63.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of *Jowar*. (iv) (a) 1962—only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

62(SFT)

Gurgaon

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	345	69	172	625	647	854	948	189.6

Control yield=148 Kg/ha. ; No. of trials=2

Crop :- *Jowar* (*Kharif*).

Ref :- Hr. 62(SFT).

Site :- District : Gurgaon.

Type :- 'M'.

Object :- Type A₂ : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS:

8 manurial treatments :

O=Control (no manure),

N₁=35 Kg/ha. of N,

K₁=35 Kg/ha of K₂O,

K₂=70 Kg/ha. of K₂O,

N₁K₁=35 Kg/ha. of N+35 Kg/ha. of K₂O,

N₁K₂=35 Kg/ha. of N+70 Kg/ha. of K₂O,

N₂K₂=70 Kg/ha. of N+70 Kg/ha. of K₂O and

N₁P₁K₁=35 Kg/ha. of N+35 Kg/ha. of P₂O₅+35 Kg/ha. of K₂O,

N applied as A/S, P₂O₅ as Super and K₂O as Mur. Pot.

3. DESIGN:

Same as in type A₁ conducted under irrigated condition on *Jowar* crop on page No. 63.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS:

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	314	21	145	303	405	501	733	80.4

Control yield=200 Kg/ha. ; No. of trials=2

Crop :- Gram (Rabi).

Ref :- Hr. 60(16), 63(80).

Site :- Govt. Agri. Farm, Rohtak.

Type :- 'M'.

Object :-To study the effect of N, P and K on the yield of Gram.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 14.10.60 ; 15.10.63. (iv) (a) 2 ploughings. (b) Line sowing kera (c) 45-50 Kg/ha. (d) 22 cm. between rows. (e) —. (v) Nil. (vi) 2673. (vii) Irrigated. (viii) and (ix) N.A. (x) March and April, 61 ; April, 64.

2. TREATMENTS :

5 manurial treatments: M_0 =Control, M_1 =16.8 Kg/ha. of N as A/S/N, M_2 =33.6 Kg/ha. of P_2O_5 as Super, M_3 =(M_1 + M_2), M_4 =(M_3 +33.6 Kg/ha. of K_2O).

3. DESIGN:

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 3 ; 2. (iv) (a) and (b) 1/39.5 ha. ; 1/24.7 ha. (v) No. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-63 (Expts. for 61, 62—N.A.) (b) No. (c) Nil. (v) and (vi) Nil. (vii) Error variances are heterogeneous and Treatments \times Years interaction is absent, hence results of individual years are presented under 5. Results.

5. RESULTS :

60(16)

(i) 322 Kg/ha. (ii) 146.4 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	M_0	M_1	M_2	M_3	M_4
Av. yield	257	280	382	402	290

63(80)

(i) 3539 Kg/ha. (ii) 1645.2 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	M_0	M_1	M_2	M_3	M_4
Av. yield	3163	3163	4646	2496	4226

Crop :- Bengal Gram.

Ref :- Hr. 61(SFT).

Site :- District : Hissar, Rohtak and Karnal.

Type :- 'M'.

Object :-Type C: To compare the relative responses to alternative sources of Phosphatic fertilizers each at two levels.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Alluvial. (iii) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (no manure),
 P_1 =33.6 Kg/ha. of P_2O_5 as Super,
 P_2 =33.6 Kg/ha. of P_2O_5 as mono Ammo. Phos.
 P_3 = P_1 +7.7 Kg/ha. of N,
 P_1' =67.2 Kg/ha. of P_2O_5 as Super,
 P_2' =67.2 Kg/ha. of P_2O_5 as mono Ammo. Phos. and
 P_3' = P_1' +15.4 Kg/ha. of N.

3. DESIGN :

(i) and (ii) The district has been divided into four agricultural homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle/thana is changed once in two years within the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on Kharif cereal, 8 on a Rabi cereal, 8 on cash crop, 4 on an oilseed crop and 3 on a legumeneous crop. Half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. The three trials on legumes are of type C, residual effects of phosphates application are studied on Type C in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98.8 ha. (b) 1/197.7 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) to (vii) N.A.

5. RESULTS :

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			P ₁	P ₂	P ₃	P ₁ '	P ₂ '	P ₃ '	
Hissar	14	1050	120	280	260	380	450	480	59.0
Rohtak	9	1380	100	130	220	170	180	280	33.0
Karnal	5	950	540	500	510	840	710	920	179.0

Crop :- Gram (Rabi).

Ref :- Hr. 64(54).

Site :- Punjab Agri. University (Hissar Campus), Hissar. Type :- 'C'.

Object :—To study the effects of different rates of seed sown at different dates with three different spacings.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) As per treatments. (iv) (a) 2 ploughings. (b) Line sowing kera. (c) and (d) As per treatments. (e) N.A. (v) N.A. (vi) G-24. (vii) Irrigated. (viii) and (ix) N.A. (x) April 65.

2. TREATMENTS :

All combinations of (1), (2) and (3)

(1) 3 dates of sowing : D₁=5th Oct., D₂=15th Oct. and D₃=25th Oct., 64

(2) 3 spacings between rows : S₁=22, S₂=30 and S₃=38 cm.

(3) 3 seed rates : R₁=40, R₂=50 and R₃=60 Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 27. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/196.56 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1964—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 2106 Kg/ha. (ii) 348.5 Kg/ha. (iii) Main effect of D alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	S ₁	S ₂	S ₃	R ₁	R ₂	R ₃	Mean
D ₁	1979	1836	1945	1991	1862	1907	1920
D ₂	2357	2147	2290	2233	2252	2309	2265
D ₃	2214	2039	2148	2033	2159	2209	2134
Mean	2183	2007	2128	2086	2091	2142	2106
R ₁	2146	1953	2158				
R ₂	2205	2019	2049				
R ₃	2198	2050	2177				

C.D. for D marginal means=163.8 Kg/ha.

Crop :- Urad (Kharif).

Ref :- Hr. 65(78).

Site :- Punjab Agri. University (Hissar Campus), Hissar.

Type :- 'M'.

Object :-To see the effect of application of different Phosphorus levels to Urad crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 4.8.65. (iv) (a) 2 ploughings. (b) By kera. (c) 20 Kg/ha. (d) 30 cm. row to row. (e) Nil. (v) 11 Kg/ha. of N as C/A/N. (vi) March 1-1 (late), (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) Oct. 65.

2. TREATMENTS :

5 levels of PO_4 , $P_0=0$, $P_1=17$, $P_2=34$, $P_3=51$ and $P_4=68$ Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 5. (iv) (a) and (b) N.A. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Endrine was sprayed against Jassid attack (0.2 %). (iii) Yield of grain. (iv) (a) 1965-contd. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 659 Kg/ha. (ii) 117.8 Kg/ha. (iii) Treatment differences are significant. (iv) Av. yield of Urad in Kg/ha.

Treatment	P_0	P_1	P_2	P_3	P_4
Av. yield	530	664	760	643	696

C.D.—157.9 Kg/ha.

Crop :- Sugarcane.

Ref :- Hr. 65(119).

Site :- Punjab Agri. University (Hissar Campus), Hissar.

Type 'M'.

Object :-To study the effect of N, P and K levels on, cane yield.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) Fallow. (c) Nil. (ii) Sandy loam. (iii) 1st week of April, 65. (iv) (a) 4 to 5 ploughings (b) Flat sowing. (c) 75000 two budded sets/ha. (d) N.A. (e) —. (v) N.A. (vi) Col—1148. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

Main-plot treatments :

4 levels of N: $N_0=0$, $N_1=56$, $N_2=112$ and $N_3=168$ Kg/ha.

Sub-plot treatments :

All combinations of (1) and (2)

(1) 2 levels of P_2O_5 : $P_0=0$ and $P_1=56$ Kg/ha.

(2) 2 levels of K: $K_0=0$ and $K_1=56$ Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication; 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 2.44 m. x 13.96 m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Good. (ii) N.A. (iii) Yield of cane. (iv) (a) 1965—contd. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 1042.8 Q/ha. (ii) (a) 234.6 Q/ha. (b) 171.6 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of cane in Q/ha.

	N ₀	N ₁	N ₂	N ₃	K ₀	K ₁	Mean
P ₀	958.2	1086.3	1171.8	862.6	1017.9	1021.6	1019.7
P ₁	1001.8	1132.5	1096.1	1033.5	1038.3	1093.6	1066.0
Mean	980.0	1109.4	1134.0	948.0	1028.1	1057.6	1042.8
K ₀	966.5	1032.2	1113.0	1000.7			
K ₁	993.6	1186.6	1155.0	895.3			

Crop :- Sugarcane.

Ref :- Hr. 60(51).

Site :- Sugarcane Res. Stn., Jagadhari.

Type :- 'M'.

Object: -To study the effect of different levels of N on the yield of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 1st week of March 60. (iv) (a) 4 to 5 ploughings. (b) to (e) N.A. (v) N.A. (vi) CoJ -39. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) Mid. of Feb. 61.

2. TREATMENTS :

6 levels of N as C/A/N: N₀=0, N₁=56, N₂=112, N₃=168, N₄=224 and N₅=280 Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/98.8 ha. (v) N.A. (vi) Yes.

4. GENERAL

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1960 -only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 909.8 Q/ha. (ii) 58.3 Q/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of cane in Q/ha.

Treatment	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅
Av. yield	656.4	1026.1	1001.8	844.0	1049.0	871.5

C.D.=87.8 Q/ha.

Crop :- Sugarcane.

Ref :- Hr. 60(121).

Site :- Govt. Agri. Farm, Rohtak.

Type :- 'M'.

Object: -To study the effect of different times of application of N on the yield of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Cotton. (c) N.A. (ii) Sandy loam. (iii) 26.3.60. (iv) and (v) N.A. (vi) Col-9.2 (vii) Irrigated. (viii) and (ix) N.A. (x) March, 61.

2. TREATMENTS :

Main-plot treatments :

2 times of application : T₁= $\frac{1}{2}$ dose at sowing + $\frac{1}{2}$ dose in July and T₂=Full dose at sowing.

Sub-plot treatments :

4 sources of N: S₀=N₀ Nitrogen, S₁=112 Kg/ha. of N as A/S, S₂=112 Kg/ha. of N as C/A/N and S₃=112Kg/ha. of N as Urea.

3. DESIGN :

(i) Split-plot. (ii) (a) 2 main-plots/replication ; 4 Sub-plots/main-plot. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 1/74.3 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1960—only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 462.2 Q/ha. (ii) (a) 50.6 Q/ha. (b) 41.05 Q/ha. (iii) Main effect of S is highly significant and interaction T×S is significant. (iv) Av. yield of cane in Q/ha.

	S ₀	S ₁	S ₂	S ₃	Mean /
T ₁	494.2	542.5	605.6	428.5	517.7
T ₂	368.3	444.9	433.6	380.2	406.8
Mean	431.2	493.7	519.6	404.3	462.2

C.D. for S marginal means=51.6 Q/ha.

C.D. for S means at the same level of T=73.0 Q/ha.

C.D. for T means at the same level of S=89.8 Q/ha.

Crop :- Sugarcane.

Ref :- Hr. 60(89), 61(96).

Site :- Govt. Agri. Farm, Rohtak.

Type :- 'M'.

Object :- To study the effect of B.H.C. and N, P, K on the yield of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Cotton. (c) N.A. (ii) Sandy loam. (iii) 24.3.60 ; 23.3.61. (iv) and (v) N.A. (vi) Col-29. (vii) Irrigated. (viii) and (ix) N.A. (x) Month of March.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 2 levels of B.H.C. : B₀=0 and B₁=5.6 Kg/ha.

(2) 3 levels of fertilizers : M₀=0, M₁=112 Kg/ha. of N+56.0 Kg/ha. of P₂O₅ and M₂=112 Kg/ha. of N+56.0 Kg/ha. of P₂O₅+56 Kg/ha. of K₂O.

N, P and K applied by drilling at sowing, B.H.C. applied at the time of sowing at cane setts.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/69.2 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1960—61. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) and (vi) Nil. (vii) Error variances are heterogeneous and Treatments × Years interaction is present.

5. RESULTS :

Pooled results

(i) 486.1 Q/ha. (ii) 264.9 Q/ha. (based on 5 d.f. made up of Treatments × years interaction). (iii) None of the effects is significant. (iv) Av. yield of cane in Q/ha.

	M ₀	M ₁	M ₂	Mean
B ₀	341.7	475.0	435.4	417.4
B ₁	497.5	597.6	569.3	554.8
Mean	419.6	536.3	502.4	486.1

Individual results

Treatment	M ₀	M ₁	M ₂	Sig.	B ₀	B ₁	Sig.	G.M.	S.E./plot
Year									
1962	555.0	684.2	642.2	N.S.	474.0	780.3	**	627.1	114.4
1963	284.2	388.4	362.6	**	360.8	329.3	N.S.	345.1	57.0
Pooled	419.6	536.3	502.4	N.S.	417.4	554.8	N.S.	486.1	264.9

Crop :- Sugarcane.**Ref :- Hr. 60(91), 61(104).****Site :- Govt. Agri., Stn., Rohtak.****Type :- M².**

Object :—To study the effect of fertilizers and micronutrients on the yield of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Cotton. (c) N.A. (ii) Sandy loam. (iii) 23.3.60 ; 22.3.61. (iv) and (v) N.A. (vi) Col—29. (vii) Irrigated. (viii) and (ix) N.A. (x) Month of March.

2. TREATMENTS:

All combinations of (1) and (2) + a control.

(i) 2 levels of fertilizers : F₁ = 112 Kg/ha. of N as A/S and F₂ = 112 Kg/ha. of N as A/S + 56.0 Kg/ha. of P₂O₅ as Super + 56 Kg/ha. of K₂O as Mur. Pot.(2) 3 sources of micronutrients : S₀ = 0, S₁ = FeSO₄ and S₂ = Mn SO₄

N, P and K drilled at sowing and micronutrients at 0.5% solution were sprayed in June and July.

3. DESIGN :

(i) R B.D. (ii) (a) 7. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/74.1 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1960-61. (b) and (c) No. (v) N.A. (vi) Nil (vii) Error variances are heterogeneous and Treatments × Years interaction is absent. Hence the results of individual years are presented under 5. Results.

5. RESULTS :**60(91)**

(i) 263.8 Q/ha. (ii) 40.6 Q/ha. (iii) Main effect of F and control vs. others are highly significant. (iv) Av. yield of cane in Q/ha.

Control=189.8 Q/ha.

	S ₀	S ₁	S ₂	Mean
F ₁	266.8	216.4	228.9	237.4
F ₂	329.5	276.0	338.9	314.8
Mean	298.2	246.2	283.9	276.1

C.D. for F marginal means=34.8 Q/ha.

C.D. for control vs. others=46.1 Q/ha.

61(104)

(i) 453.8 Q/ha. (ii) 66.2 Q/ha. (iii) Control vs. others alone is highly significant. (iv) Av. yield of cane in Q/ha.

Control=303.9 Q/ha.

	S ₀	S ₁	S ₂	Mean
F ₁	457.1	410.9	510.6	459.5
F ₂	519.1	504.5	470.6	498.1
Mean	488.1	457.7	490.6	478.8

C.D. for control vs. others=75.1 Q/ha.

Crop :- Sugarcane.**Ref :- Hr. 61(14).****Site :- Govt. Agri, Farm, Rohtak.****Type :- 'M'.**

Object:—To study the effect of micronutrients with N, P and K on the yield of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) and (c) N A. (ii) Sandy loam. (iii) Ratooned. (iv) and (v) N.A. (vi) CL—9. (vii) Irrigated. (viii) and (ix) N.A. (x) Jan., 62.

2. TREATMENTS:7 manurial treatments: M₀=Control, M₁=112 Kg/ha. of N as C/A/N, M₂=M₁+Fe SO₄, M₃=M₁+Mn SO₄, M₄=M₁+56 Kg/ha. of K₂O+56 Kg/ha. of P₂O₅, M₅=M₁+56 Kg/ha. of K₂O+56 Kg/ha. of P₂O₅+Fe SO₄ and M₆=M₁+56 Kg/ha. of P₂O₅+Mn SO₄.**3. DESIGN :**

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 4. (iv) (a) and (b) 1/74.1 ha. (v) Nil. (vi) Yes.

4. GENERAL :(i) Normal. (ii) FeSO₄+MnSO₄ and 2 % were sprayed on 19.6.61 and 20.7.61. (iii) Yield of cane. (iv) (a) 1961—only. (b) No. (c) Nil. (v) to (vii) Nil.**5. RESULTS :**

(i) 458.8 Q/ha. (ii) 59.30 Q/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of cane in Q/ha.

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆	C.D.=88.1 Q/ha.
Av. yield	303.9	456.6	427.7	510.8	518.9	522.6	470.7	

Crop :- Sugarcane.

Ref :- Hr. 61(16).

Site :- Govt. Agri. Farm, Rohtak.

Type :- 'M'.

Object :-To study the effect of different fertilizers on the yield of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) and (c) N.A. (ii) Sandy loam. (iii) Ratooned. (iv) (a) to (e) N.A. (v) Nil. (vi) CL—9. (vii) Irrigated. (viii) and (ix) N.A. (x) Jan. 62.

2. TREATMENTS:

Same as in expt. No. 60(89), 61(96) on page No. 70.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) and (b) 1/73.4 ha. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of cane. (iv) (a) 1961—only. (b) No. (c) Nil. (v) to (vii) No.

5. RESULTS:

(i) 347.3 Q/ha. (ii) 54.7 Q/ha. (iii) Main effect of M alone is significant. (iv) Av. yield of cane in Q/ha.

	S ₀	S ₁	S ₂	Mean
B ₀	308.0	400.0	388.0	365.3
B ₁	261.0	376.0	351.0	329.3
Mean	284.5	388.0	369.5	347.3

C.D. for M marginal means = 58.3 Q/ha.

Crop :- Sugarcane.

Ref :- Hr. 61(95).

Site :- Govt. Agri. Stn., Rohtak.

Type :- 'X'.

Object :-To study the effect of different sources of N on the yield of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Cotton. (c) N.A. (ii) Sandy loam. (iii) 23.3.61. (iv) and (v) N.A. (vi) Col. 29. (vii) Irrigated. (viii) and (ix) N.A. (x) March, 62.

2. TREATMENTS :

g sources of N a: 45 Kg/ha.: S₀ = Control, S₁ = A/S, S₂ = C/S/N, Urea, S₃ = Ammonium liquor, S₄ = Nitro-phosphate, S₅ = A/C and S₇ = N+P+K.

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 1/74.3 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1961—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 310.2 Q/ha. (ii) 67.4 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of cane in Q/ha.

Treatment	S ₀	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇
Av. yield	240.3	295.7	430.1	324.5	285.8	277.0	354.3	274.2

Crop :- Sugarcane.

Ref :- Hr. 60 and 61(SFT).

Site :- District : Rohtak, Ambala and Karnal.

Type :- 'M'.

Object :-Type A : To study the response of Sugarcane to different levels of N, P and K applied individually and in combination.

1. BASAL CONDITIONS :

(i) (a) to (c) N A. (ii) Alluvil. (iii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

N=67.2 Kg/ha. of N,

P=44.8 Kg/ha. of P_2O_5 ,

K=44.8 Kg/ha. of K_2O ,

NP=67.2 Kg/ha. of N+44.8 Kg/ha. of P_2O_5 ,

NK=67.2 Kg/ha. of N+44.8 Kg/ha. of K_2O ,

PK=44.8 Kg/ha. of P_2O_5 +44.8 Kg/ha. of K_2O and

NPK=67.2 Kg/ha. of N+44.8 Kg/ha. of P_2O_5 +44.8 Kg/ha. of K_2O .

3. DESIGN :

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle/thana is changed once in two years within the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on *kharif* cereal, 8 on a *rabi* cereal, 8 on cash crop, 4 on an oilseed crop and 3 on a leguminous crop. Half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. The three trials on legumes are of Type C. Residual effect of phosphate application are studied on Type C trials in two out of the four zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98.8 ha. (b) 1/197.7 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of cane. (iv) (a) 1950-61. (b) and (c) Nil. (v) Nil. (vi) and (vii) N.A.

5. RESULTS :

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.								
			N	P	K	S.E.	NP	NK	PK	NPK	S.E.
60(SFT)											
Rohtak	12	71440	9920	5320	4100	2094.0	110	-1240	2160	-1120	2206.0
Ambala	16	38960	9610	1560	2710	2038.0	-2270	1790	830	-420	1293.0
Karnal	13	49010	7880	2940	1680	2466.0	240	-3450	-610	290	2536.0
61(SFT)											
Rohtak	7	57820	21660	10730	2310	4804.0	-3430	-375.0	6780	10350	2732.0
Ambala	12	30990	7210	1670	4930	494.0	-690	2390	1190	1200	405.0
Karnal	7	32490	10320	3520	7830	379.0	-4970	-610	6430	1180	1142.0

Crop :- Sugarcane.

Ref :- Hr. 60 and 61(SFT).

Site :- District : Rohtak, Ambala and Karnal.

Type :- 'M'.

Object :-Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(1) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

- O=Control (no manure),
 $n_1=67.2$ Kg/ha. of N as A/S,
 $n_2=134.4$ Kg/ha. of N as A/S,
 $n_1'=67.2$ Kg/ha. of N as Urea,
 $n_2'=134.4$ Kg/ha. of N as Urea,
 $n_1''=67.2$ Kg/ha. of N as A/S/N,
 $n_2''=134.4$ Kg/ha. of N as A/S/N.

3. DESIGN :

Same as in type A conducted on Sugarcane crop on page No. 74.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of cane. (iv) (a) 1960-61 (b) and (c) Nil. (v) Nil. (vi) and (vii) N.A.

5. RESULTS :

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			n_1	n_2	n_1'	n_2'	n_1''	n_2''	
60(SFT)									
Rohtak	7	61010	4610	9320	9020	12450	5950	13710	6417.0
Ambala	4	25640	7330	14570	6780	9040	13240	5720	5006.0
61(SFT)									
Rohtak	7	61100	6850	20800	12370	17080	7510	31370	13494.0
Ambala	4	39190	5580	25680	7460	12950	2300	19000	6832.0
Karnal	4	34790	10420	24900	8200	16850	5530	19810	6499.0

Crop :- Sugarcane.

Ref :- Hr. 60(SFT) for Ambala and Karnal
and 61(SFT) for Ambala.Site :- District :- Ambala
and Karnal.

Type :- 'M'.

Object: -Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

- O=Control (no manure),
 $n_1=67.2$ Kg/ha. of N as A/S,
 $n_2=134.4$ Kg/ha. of N as A/S,
 $n_1'=67.2$ Kg/ha. of N as Urea,
 $n_2'=134.4$ Kg/ha. of N as Urea,
 $n_1''=67.2$ Kg/ha. of N as C/A/N and
 $n_2''=134.4$ Kg/ha. of N as C/A/N.

3. DESIGN :

Same as in type A Conducted on Sugarcane Crop on page No. 74.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of cane. (iv) (a) 1960 and 61. (b) and (c) Nil. (v) Nil. (vi) and (vii) N.A.

5. RESULTS :

60(SFT)

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			n_1	n_2	n_1'	n_2'	n_1''	n_2''	
Ambala	8	45470	140	8530	2990	7260	10420	19570	3146.0
Karnal	8	58030	5720	5120	6320	9410	7890	14180	1634.0

61(SFT)

Ambala	5	41640	-3290	750	3110	7510	9830	8940	2718.0
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Crop :- Sugarcane.

Ref :- Hr. 63, 65(SFT) for Hissar, Rohtak and Karnal.

Site :- District : Hissar, Rohtak and Karnal.

Type :- 'M'.

Object :- Type A₁ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments:

O=Control (no manure),

N₁=70 Kg/ha. of N,N₂=140 Kg/ha. of N,P₁=70 Kg/ha. of P₂O₅,N₁P₁=70 Kg/ha. of N+70 Kg/ha. of P₂O₅,N₂P₁=140 Kg/ha. of N+70 Kg/ha. of P₂O₅,N₂P₂=140 Kg/ha. of N+140 Kg/ha. of P₂O₅ andN₂P₂K₁= Kg/ha. of 140 N+140 Kg/ha. of P₂O₅+70 Kg/ha. of K₂O.

3. DESIGN:

(i) and (ii) A selected district is divided into four agriculturally homogenous zones based on climate, soil, cropping pattern etc. In each zone one block is selected at random. A block normally consists of a group of 50 - 100 villages. In each block 36 experiments are conducted in a year of which 11 are of type A₁, 11 of type A₂, 11 of type A₃ and 3 are of type C. The eleven experiments under type A₁, A₂ and A₃ are distributed as 3 on a *kharif* cereal, 3 on a *rabi* cereal, 3 on a cash crop and 2 on oil seed. All the three type—C experiments are conducted on a legume crop. For the purpose of conducting the A₁, A₂ and A₃ experiments 11 villages are randomly selected in each block and in each village 3 experiments one each of type A₁, A₂ and A₃ are laid out. For conducting the three type—C trials three villages are randomly selected in each block.

(iii) (a) 1/100 ha. (b) 1/200 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of cane. (iv) (a) 1962—66 (62 and 64 N.A.) (b) and (c) N.A. (v) to (vii) Nil

5. RESULTS:

Hissar

63(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of cane in Kg/ha.	6262	18581	3755	7215	19076	20163	14628	3215.0

Control yield=54559 Kg/ha. ; No. of trials=2

65(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of cane in Kg/ha.	1833	28333	1000	16000	30333	36666	28333	4260.0

Control yield=58333 Kg/ha. ; No. of trials=3

Rohtak

63(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of cane in Kg/ha.	3558	6490	2833	4909	8006	10839	13277	2429.0

Control yield=60984 Kg/ha. ; No. of trials=3

65(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of cane in Kg/ha.	8708	18529	2775	15783	19345	26166	28579	2341.9

Control yield=59054 Kg/ha. ; No. of trials=15

Karnal

63(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of cane in Kg/ha.	7264	14002	2553	5436	13228	18977	19998	3267.0

Control yield=51676 Kg/ha. ; No. of trials=9

65(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of cane in Kg/ha.	11761	20688	10672	10972	24222	25177	26083	3257.5

Control yield=51661 Kg/ha. ; No. of trials=9

Crop :- Sugarcane (*Annual*).

Ref :- Hr. 63(SFT) for Ambala

Site :- District : Ambala

Type :- 'M'.

Object :- Type A₂ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS and 3. DESIGN :

Same as in Type A₁ conducted under unirrigated condition on Sugarcane crop on page No. 76.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of Sugarcane. (iv) (a) 1962-66 (62 and 64 N.A.) (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS :

63(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of cane in Kg/ha.	7347	8615	6441	14167	15962	19850	9439	3102.0

Control yield=34313 Kg/ha. ; No. of trials=5

65(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of cane in Kg/ha.	11400	11225	5908	14800	20875	31766	36850	4727.2

Control yield=36349 Kg/ha. ; No. of trials=10

Crop :- Sugarcane (*Annual*).

Ref :- Hr. 63 to 65(SFT) for Rohtak, Karnal, Hissar and 63, 64(SFT) for Ambala.

Site:- District : Rohtak, Karnal, Type :- 'M'.
Hissar and Ambala.Object :—Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

N₁=70 Kg/ha. of N,P₁=70 Kg/ha. of P₂O₅,P₂=140 Kg/ha. of P₂O₅,N₁P₁=70 Kg/ha. of N+70 Kg/ha. of P₂O₅,N₁P₂=70 Kg/ha. of N+140 Kg/ha. of P₂O₅,N₂P₂=140 Kg/ha. of N+140 Kg/ha. of P₂O₅ andN₂P₂K₂=140 Kg/ha. of N+140 Kg/ha. of P₂O₅+140 Kg/ha. of K₂O.N applied as A/S, P₂O₅ as Super and K₂O as Mur. Pot.

3. DESIGN :

Same as in type A₁ conducted under unirrigated condition on Sugarcane crop on page No. 76.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of cane (iv) (a) 1963—66 for Rohtak, Karnal, Hissar (62 N.A.) and 1963 to 66 for Ambala (65 N.A.) (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS :

Rohtak

63(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of cane in Kg/ha.	3195	3525	5732	10608	5172	14101	16341	3495.0

Control yield=54658 Kg/ha. ; No. of trials=3

64(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	10155	6943	7651	49391	21209	37921	40886	4179.4

Control yield=55424 Kg/ha. ; No. of trials=7

65(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
response of grain in Kg/ha.	14690	6722	11493	18332	18445	28263	30213	2432.1

Control yield=58296 Kg/ha. ; No. of trials=16

Karnal

63(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S. E.
Av. response of grain in Kg/ha.	10312	5897	4857	9514	14337	19054	18944	3432.0

Control yield=37092 Kg/ha. ; No. of trials=7

64(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	9262	5180	8211	9183	13903	18153	21621	2357.4

Control yield=49514 Kg/ha. ; No. of trials=12

65(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S. E.
Av. response of grain in Kg/ha.	22200	11450	11633	17350	17450	23383	27900	4358.8

Control yield=55983 Kg/ha. ; No. of trials=8

Hissar

63(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	11366	9389	10872	8895	11860	14430	15814	4053.0

Control yield=50408 Kg/ha. ; No. of trials=2

64(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	—	12849	7116	23721	18779	31431	33605	14379.2

Control yield=52385 Kg/ha. ; No. of trials=2

65(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	19000	-6000	-7666	12333	17000	29333	30666	1361.2

Control yield=55999 Kg/ha. ; No. of trials=3

Ambala

63(STF)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	17824	5189	14875	11755	21926	22634	25929	4968.9

Control yield=26357 Kg/ha ; No. of trials=5

64(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	6677	2481	5425	14309	14331	21074	25489	3665.3

Control yield=3127 Kg/ha. ; No. of trials=6

Crop :- Sugarcane.

Ref :- Hr. 65(SFT).

Site :- District : Ambala.

Type :- 'M'.

Object :- Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

Same as in type A₂ conducted crop under irrigated conditions on Sugarcane on page No. 78.

3. DESIGN :

Same as in type A₁ conducted under irrigated conditions on Sugarcane crop on page No. 76.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of cans. (iv) (a) 1965-66. (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS :

65(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	13983	4483	6166	13383	16366	19450	23983	1341.6

Control yield=36933 Kg/ha. ; No. of trials=12

Crop :- Sugarcane

**Ref :- Hr. 63 to 65(SFT) for Karnal,
63 to 65(SFT) for Rohtak and
64 to 65(SFT) for Ambala.**

**Site :- District : Karnal, Rohtak
and Ambala.**

Type :- 'M'.

Object :- Type A₂ : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS:

8 manurial treatments :

O=Control (no manure),

N_1 =70 Kg/ha. of N,

K_1 =70 Kg/ha. of K_2O ,

K_2 =140 Kg/ha. of K_2O ,

N_1K_1 =70 Kg/ha. of N+70 Kg/ha. of K_2O ,

N_1K_2 =70 Kg/ha. of N+140 Kg/ha. of K_2O ,

N_2K_2 =140 Kg/ha. of N+140 Kg/ha. of K_2O and

$N_1P_1K_1$ =70 Kg/ha. of N+70 Kg/ha. of P_2O_5 +70 Kg/ha. of K_2O .

3. DESIGN :

Same as in type A_1 conducted under irrigated condition on Sugarcane on page No. 76.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of cane. (iv) (a) 1963—66 for Karnal and Rohtak and 1964—66 for Ambala (63 N.A.). (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS:

Karnal

63(SFT)

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of cane in Kg/ha.	15353	8516	13755	16028	12783	23836	18548	3351.0

Control yield=37559 Kg/ha. ; No. of trials=7.

64(SFT)

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of cane in Kg/ha.	12046	4250	5794	13775	15666	17655	13563	5591.8

Control yield=42562 Kg/ha. ; No. of trials=9

65(SFT)

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of cane in Kg/ha.	7222	1244	1538	11711	12733	17644	19144	1594.5

Control yield=48694 Kg/ha. ; No. of trials=10

Rohtak

63(SFT)

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of cane in Kg/ha.	6358	625	3953	5304	8566	8566	12124	2629.0

Control yield=60028 Kg/ha. ; No. of trials=3

64(SFT)

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of cane in Kg/ha.	9636	2520	6325	16407	31035	26192	31974	4198.7

Control yield=54757 Kg/ha. ; No. of trials=4

65(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of cane in Kg/ha.	13250	12779	8312	16054	18020	21208	22550	4151.7

Control yield=55112 Kg/ha. ; No. of trials=15

Ambala

64(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of cane in Kg/ha.	7931	1754	5460	6943	16852	16358	17519	2407.0

Control yield=23301 Kg/ha. ; No. of trials=6

65(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of cane in Kg/ha.	8033	2766	7166	10066	10949	19950	18766	3615.4

Control yield=28866 Kg/ha. ; No. of trials=12

Crop :- Sugarcane

Ref :- Hr. 63(SFT).

Site :- District : Ambala.

Type :- 'M'.

Object :—Type A₁ : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) N.A. (ii) Tropical arid brown. (iii) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

Same as in type A₂ conducted under irrigated condition on Sugarcane crop on page No. 81.

3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Sugarcane crop on page No. 76.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of cane. (iv) (a) 1963—only. (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS :

63(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of cane in Kg/ha.	4546	1960	5271	10180	9340	13162	14282	3757.0

Control yield=31562 Kg/ha. ; No. of trials=5

Crop :- Sugarcane.

Ref :- Hr. 60(48).

Site :- Sugarcane Sub-Stn., Jagadhari.

Type :- 'MV'.

Object :—To study the effect of different levels of N on different varieties of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) March, 60. (iv) (a) 4—5 ploughings. (b) to (e) N.A. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) and (ix) N.A. (x) 12.3.61.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 2 varieties : $V_1 = \text{Col-29}$, $V_2 = \text{Co. J-39}$.

(2) 7 levels of N as C/A/N : $N_0 = 0$, $N_1 = 56$, $N_2 = 112$, $N_3 = 168$, $N_4 = 224$, $N_5 = 280$ and $N_6 = 336$ Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 14. (b) N.A. (iii) 3. (iv) (a) N.A. (b) $1/98.8$ ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 841.0 Q/ha. (ii) 60.7 Q/ha. (iii) Main effects of V and N are highly significant. (iv) Av. yield of cane in Q/ha.

	N_0	N_1	N_2	N_3	N_4	N_5	N_6	Mean
V_1	483.9	635.7	755.1	859.5	912.2	948.0	1008.3	800.4
V_2	534.1	647.0	788.3	956.9	1035.5	1059.2	1150.5	881.6
Mean	509.0	641.4	771.7	908.2	973.9	1003.6	1079.4	841.0

C.D. for V marginal means = 32.8 Q/ha.

C.D. for N marginal means = 61.4 Q/ha.

Crop :- Sugarcane.

Ref :- Hr. 60(50), 61(52).

Site :- Sugarcane Sub-Stn., Jagadhari.

Type :- 'MV'.

Object :—To study the effect of different levels of N on the yield of different varieties of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) G.M. —Sugarcane —G.M. (b) G.M. (c) N.A. (ii) Sandy loam. (iii) 1st week of March (iv) (a) 6 to 8 ploughings. (b) to (e) N.A. (v) 50 C.L./ha. of F.Y.M. (vi) As per treatments. (vii) Irrigated. (viii) 4 to 5 weedings. (ix) N.A. (x) 20.2.61 ; 1st fortnight of March, 62.

2. TREATMENTS :

Same as in Expt. No. 60(48) presented above.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 14. (b) N.A. (iii) 4. (iv) (a) $30.48 \text{ m.} \times 3.66 \text{ m.}$ for 60 ; N.A. (b) $27.71 \text{ m.} \times 3.66 \text{ m.}$ for 60 ; $1/98.8$ ha. (v) 139 cm. on either side ; N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Aratan solution sprayed ; N.A. (iii) Yield of cane. (iv) (a) 1960—61. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Nil. (vii) Error variances are heterogeneous and $\text{Treatments} \times \text{Years}$ interaction is present.

5. RESULTS :

Pooled results

(i) 612.5 Q/ha. (ii) 188.7 Q/ha. (based on 13 d.f. made up of $\text{Treatments} \times \text{Years}$ interaction). (iii) Main effect of N is highly significant and that of V is significant. (iv) Av. yield of cane in Q/ha.

	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	Mean
V ₁	346.9	435.9	500.2	610.3	643.0	699.0	759.8	570.7
V ₂	377.9	443.9	566.5	710.7	780.4	833.2	867.4	654.3
Mean	362.4	439.9	533.3	660.5	711.7	766.1	813.6	612.5

C.D. for N marginal means=144.1 Q/ha.

C.D. for V marginal means=77.0 Q/ha.

Individual results

Treatment	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	Sig.
Year 1960	536.1	653.8	768.2	948.5	1028.4	1100.6	1172.5	**
1961	188.8	226.1	298.6	372.5	395.0	431.7	454.6	**
Pooled	362.4	439.9	533.3	660.5	711.7	766.1	813.6	**

V ₁	V ₂	Sig.	G.M.	S.E./plot
843.9	929.8	**	886.9	72.4
297.6	378.8	**	338.2	24.9
570.7	654.3	*	612.5	188.7

Crop :- Sugarcane.

Ref :- Hr. 64(58).

Site :- Sugarcane Sub-Stn., Jagadhari.

Type :- 'MV'.

Object:—To study the effect of different levels of N on different varieties of Sugarcane.

1. BASAL CONDITIONS:

(i) (a) G.M. —Sugarcane—G.M. (b) G.M. (c) N.A. (ii) Sandy loam. (iii) 15.3.64. (iv) (a) 6-8 ploughings. (b) Transplanting. (c) 74100 two budded setts/ha. (d) 60 cm. (e) N.A. (v) N.A. (vi) As per treatments. (vii) Unirrigated. (viii) 2 weedings. (ix) N.A. (x) Last week of 65.

2. TREATMENTS:

Main-plot treatments :

4 varieties: V₁=Co -1007, V₂=Co-546, V₃=Co-1148 and V₄=Co-975.

Sub-plot treatments:

6 levels of N: N₀=0, N₁=112, N₂=140, N₃=168, N₄=196 and N₅=224 Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication and 6 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/93.3 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Poor. (ii) N.A. (iii) Yield of cane. (iv) (a) 1964- only. (b) N.A. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 296.1 Q/ha. (ii) (a) 130.6 Q/ha. (b) 40.1 Q/ha. (iii) Interaction $N \times V$ is significant. (iv) Av. yield of cane in Q/ha.

	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅	Mean
V ₁	361.0	342.0	380.3	336.3	323.2	334.3	346.2
V ₂	255.3	234.3	261.4	256.2	257.5	315.3	263.3
V ₃	327.2	283.7	283.7	291.3	300.0	313.1	299.8
V ₄	245.6	309.9	310.0	254.0	286.9	243.2	274.9
Mean	297.3	292.5	308.9	284.5	291.9	301.5	296.1

C.D. for V means at the same level of $N=99.5$ Q/ha.

C.D. for N means at the same level of $V=56.8$ Q/ha.

Crop :- Sugarcane.

Ref :- Hr. 64(57).

Site :- Sugarcane Sub-Stn., Jagadhari.

Type :- 'C'.

Object :- To study the effect of different methods and seed rates on the yield of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) G.M. (Sannhemp)—Sugarcane—Ratoon—G.M. (b) G.M. (c) 67.6 Kg/ha. of P_2O_5 . (ii) Sandy loam. (iii) 1st week of March, 64. (iv) (a) 5-6 ploughings. (b) to (e) N.A. (v) 49.4 C.L./ha. of F.Y.M. (vi) COI—46. (vii) Unirrigated. (viii) 4—5 weedings. (ix) N.A. (x) First fortnight of March, 65.

2. TREATMENTS :

All combinations of (1) and (2)

(2) 2 methods of planting : M_1 =Flat and M_2 =Trench.

(2) 2 seed rates : S_1 =49400 two budded setts/ha. and S_2 =74100 two budded setts/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 4. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/98.8 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Fair. (ii) Nil. (iii) Yield of cane. (iv) (a) 1964—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 583.2 Q/ha. (ii) 64.0 Q/ha. (iii) Main effect of M and interaction $S \times M$ is significant. (iv) Av. yield of cane in Q/ha.

	S ₁	S ₂	Mean
M ₁	595.3	546.9	571.1
M ₂	591.8	599.0	595.4
Mean	593.5	572.9	583.2

C.D. for M marginal means=72.4 Q/ha.

C.D. for the body of $S \times M$ table=102.3 Q/ha.

Crop :- Sugarcane.**Ref :- Hr. 65(77).****Site :- Punjab Agri. University (Hissar Campus), Hissar. Type :- 'C'.****Object :-**To study the effect of methods of sowing with seed rate and spacing on Sugarcane crop.**1. BASAL CONDITIONS:**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) End of March, 65. (iv) (a) 4—5 ploughings. (b) As per treatments. (c) 7500 two budded setts/ha. (d) As per treatments. (e) Nil. (v) N.A. (vi) COL.—46. (vii) Irrigated. (viii) 3 hoeings and 3 weedings. (ix) N.A. (x) March, 66.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 2 methods of sowing : M_1 =Flat sowing and M_2 =Trench sowing.(2) 3 spacings : S_1 =60 cm. in between rows, S_2 =90 cm. between rows and S_3 =60 cm. \times 60 cm.**3. DESIGN :**

(i) Fact. in R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/198 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) 5.7 litre of fello-drin mixed with 1591 litre of water was sprayed/ha. (iii) Yield of cane. (iv) (a) 1965—only. (b) No. (c) —. (v) to (vii) N.A.

5. RESULTS:(i) 723.2 Q/ha. (ii) 86.0 Q/ha. (iii) Main effect of M and interaction $S \times M$ are significant. (iv) Av. yield of cane in Q/ha.

	S_1	S_2	S_3	Mean
M_1	702.4	607.9	677.2	662.5
M_2	755.4	886.5	709.8	783.9
Mean	728.9	747.2	693.5	723.2

C.D. for M marginal means=74.8 Q/ha.

C.D. for the body of $S \times M$ table=129.6 Q/ha.**Crop :- Cotton (Kharif).****Ref :- Hr. 61(98).****Site :- Govt. Agri. Stn., Hansi.****Type :- 'M'.****Object :-**To study the effect of different sources of N on the yield of Cotton.**1. BASAL CONDITIONS :**

(i) (a) N.A. (b) Fallow. (c) Nil. (ii) Sandy loam. (iii) 29.3 61. (iv) and (v) N.A. (vi) H—14. (vii) Irrigated. (viii) and (ix) N.A. (x) 15.10.61 to 25.11.61.

2. TREATMENTS :4 sources of 50 Kg/ha. of N : S_0 =Control, S_1 =A/S, S_2 =Ammo. Phos. and S_3 =F.Y.M.**3. DESIGN :**

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 2. (iv) (a) N.A. (b) 1/16.48 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of kapas. (iv) (a) 1961—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 539.3 Kg/ha. (ii) 60.0 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	S ₀	S ₁	S ₂	S ₃
Av. yield	499.5	530.3	585.6	541.8

Crop :- Cotton (Kharif).

Ref :- Hr. 63(79).

Site :- Govt. Agri. Stn., Hansi.

Type :- 'M'.

Object :- To study the effect of N, P and K on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loam. (iii) May, 63. (iv) to (vi) N.A. (vii) Irrigated. (viii) 3 hoeings. (ix) N.A. (x) Pickings from 1.10.63 to 2.12.63.

2. TREATMENTS :

All combinations of (1), (2) and (3)

(1) 3 levels of N as C/A/N : N₀=0, N₁=60 and N₂=120 Kg/ha.

(2) 2 levels of P₂O₅ : P₀=0 and P₁=60 Kg/ha.

(3) 2 levels of K₂O : K₀=0 and K₁=60 Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) 10.97 m. × 7.32 m. (b) 10.21 m. × 6.10 m. (v) 38 cm. × 61 cm. (vi) Yes.

4. GENERAL :

(i) Poor. (ii) N.A. (iii) Yield of *kapas*. (iv) (a) 1962 -only. (b) and (c) Nil. (v) Hissar. (vi) and (vii) Nil.

5. RESULTS :

(i) 411 Kg/ha. (ii) 212.6 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of *kapas* in Kg/ha.

	N ₀	N ₁	N ₂	K ₀	K ₁	Mean
P ₀	285	403	491	416	370	393
P ₁	336	452	497	468	388	428
Mean	311	427	494	442	379	411
K ₀	379	464	484			
K ₁	243	391	504			

Crop :- Cotton (Kharif).

Ref :- Hr. 63(75), 64(501).

Site :- Govt. Res. Stn., Hansi.

Type :- 'M'.

Object :- To study the effect of soil application of micronutrients on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) N.A. (iv) (a) 3 ploughings. (b) to (e) N.A. (v) to (vii) N.A. (viii) 2 hoeings ; 3 hoeings. (ix) N.A. (x) Nov./Dec., 63 ; N.A.

2. TREATMENTS:

7 micronutrient treatments: T_0 =Control, T_1 =Borax, T_2 = $MnSO_4$, T_3 = $CuSO_4$, T_4 = $ZnSO_4$, T_5 = $FeSO_4$, and T_6 =Ammono. Molybdate.

The level and time of application—N.A.

3. DESIGN :

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/274.2 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of *kapas*. (iv) (a) 1963—64. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) Hissar. (vi) Nil. (vii) Error variances are homogeneous and Treatments \times Years interaction is absent.

5. RESULTS :

Pooled results

(i) 823 Kg/ha. (ii) 131.8 Kg/ha. (based on 66 d.f. made up of pooled error and Treatments \times Years interaction). (iii) Treatment differences are not significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6
Av. yield	789	783	870	827	832	853	810

Individual results

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	Sig.	G.M.	S.E./plot
Year										
1963	741	694	840	771	749	823	749	N.S.	767	104.0
1964	838	872	900	882	914	882	872	N.S.	880	87.5
Pooled	789	783	870	827	832	853	810	N.S.	823	131.8

Crop :- Cotton (Kharif).

Ref :- Hr. 62(73).

Site :- Punjab Agri. University (Hissar Campus), Hissar. Type :- 'M'.

Object:—To find out the optimum time of application of N on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loamy. (iii) 1st week of May, 62. (iv) (a) 3 ploughings. (b) to (e) N.A. (v) N.A. (vi) H—14. (vii) Irrigated. (viii) and (ix) N.A. (x) Nov., 62.

2. TREATMENTS:

All combinations of (1) and (2) + control (two plots) :

(1) 6 times of application: T_1 =Full dose at sowing, T_2 =Full dose at thinning, T_3 =Full dose at flowering, T_4 = $\frac{1}{2}$ dose at sowing + $\frac{1}{2}$ at thinning, T_5 = $\frac{1}{2}$ at sowing + $\frac{1}{2}$ at flowering and T_6 = $\frac{1}{2}$ at thinning + $\frac{1}{2}$ at flowering.

(2) 2 levels of N: N_1 =56 and N_2 =112 Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 14. (b) N.A. (iii) 2. (iv) (a) N.A. (b) 1/299.9 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of *kapas*. (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 1589 Kg/ha. (ii) 284.9 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of *kapas* in Kg/ha.

Control=1364 Kg/ha.

	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	Mean
N ₁	1533	1804	1446	1594	1603	1551	1589
N ₂	1525	1420	1690	1734	1385	1777	1589
Mean	1529	1612	1568	1664	1494	1664	1589

Crop :- Cotton (Kharif).

Ref :- Hr. 62(79).

Site :- Punjab Agri. University (Hissar Campus), Hissar. Type :- 'M'.

Object :- To study the effect of N on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loamy. (iii) 2nd week of May, 62. (iv) (a) 5 ploughings. (b) to (e) N.A. (vi) N.A. (vii) H-14. (viii) Irrigated. (viii) and (ix) Nov./Dec., 62.

2. TREATMENTS :

3 levels of N as C/A/N : N₀=0, N₁=56 and N₂=112 Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 3. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/298.9 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of *kapas*. (iv) (a) 1962-only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 1458 Kg/ha. (ii) 85.4 Kg/ha. (iii) Treatment differences are significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	N ₀	N ₁	N ₂
Av. yield	1350	1486	1538

C.D.=147.8 Kg/ha.

Crop :- Cotton (Kharif).

Ref :- Hr. 64(87). 65(43).

Site :- Punjab Agri. University (Hissar Campus), Hissar.

Type :- 'M'.

Object :- To find out the best method of fertilizer placement for Cotton.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) N.A. ; Gram. (c) N.A. (ii) Loamy soil. (iii) 23.5.64 ; 3rd week of April, 65. (iv) (a) 3 ploughings with tractor and one *desi Hal*. (b) to (e) N.A. (v) N.A. (vi) H-14. (vii) Irrigated. (viii) 2 hoeings ; 1 thinning. (ix) N.A. (x) 22.10.64 to 13.11.64 ; 25.10.65 to 3.12.65.

2. TREATMENTS :

10 methods of fertilizer placement : C_0 =Control, C_1 =Fertilizer was applied by plough Sole. method one week before sowing, C_2 =Seed and fertilizer were applied in the same line but from separate bowls, C_3 =Both in the same line were applied but fertilizer 4 cm. deeper than seed, C_4 =Fertilizer 10 cm. deep but 4 cm. away from seed line, C_5 =Fertilizer was broadcasted at sowing before last cultivation, C_6 =Fertilizer was broadcasted at final thinning, C_7 =Fertilizer was broadcasted at flowering stage, C_8 =Fertilizer was top dressed along Cotton rows at final thinning and C_9 =Fertilizer was top dressed along with Cotton rows at flowering.

3. DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) 6.71 m. \times 7.32 m., 9.60 m. \times 4.80 m. (b) 5.94 m. \times 6.10 m., 1/309 ha. (v) 38 cm. \times 61 cm. ; N.A. (vi) Yes.

4. GENERAL :

(i) Normal ; Poor. (ii) N.A. ; Nil. (iii) Yield of *kapas*. (iv) (a) 1964—Contd. (b) No. (c) Nil. (v) No. (vi) N.A. (vii) Since the expt. is contd. beyond 65, results of individual years are presented under 5. Results.

5. RESULTS :

64(87)

(i) 1315 Kg/ha. (ii) 349.3 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	C_0	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	D_9
Av. yield	1487	1449	1283	1056	1421	1442	1201	1259	1321	1235

65(43)

(i) 1244 Kg/ha. (ii) 338.4 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	C_0	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9
Av. yield	1485	1070	1124	1312	1010	1284	1426	1160	1154	1412

Crop :- Cotton (Kharif).

Ref. : Hr. 64(89), 65(44).

Site :- Punjab Agri. University (Hissar Campus), Hissar.

Type :- 'M'.

Object :-To determine the effect of soil application of micronutrients on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) N.A. ; Bajra. (c) N.A. (ii) Loamy soil. (iii) N.A. ; 23.4.65. (iv) (a) 3 to 4 ploughings by disc harrow. (b) to (e) N.A. (v) N.A. (vi) N.A. ; H-14. (vii) N.A. ; Irrigated. (viii) N.A. ; Hoeings. (ix) N.A. (x) 21.10.64 to 24.11.64 ; 14.10.65 to 4.11.65.

2. TREATMENTS :

7 micronutrient treatments : M_0 =Control, M_1 =0.25 Kg/ha. of Borax, M_2 =1.00 Kg/ha. of manganese sul., M_3 =0.50 Kg/ha. of copper sul., M_4 =1.00 Kg/ha. of Zinc sul., M_5 =2.50 Kg/ha. of Ferrous sul. and M_6 =0.25 Kg/ha. of Ammo. molybdate.

(Micronutrients were applied to soil).

3. DESIGN :

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 6. (iv) (a) 9.14 m. \times 4.57 m. ; 6.60 m. \times 6.90 m. (b) 7.92 m. \times 3.81. ; 5.40 m. \times 6.30 m. (v) 61 cm. \times 38 cm. ; 60 cm. \times 30 cm. (vi) Yes.

4. GENERAL:

(i) Normal; Very poor. (ii) N.A.; **Endrine was sprayed** against Jassid attack. (iii) Yield of *kapas*. (iv) (a) 1964—contd. (b) No. (c) Nil. (v) No. (vi) Nil. (vii) Since expt. is contd. beyond 65, results of individual years are presented under 5. Results.

5. RESULTS:

64(89)

(i) 755 Kg/ha. (ii) 209.0 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆
Av. yield	632	795	872	657	701	726	905

65(44)

(i) 389 Kg/ha. (ii) 223.7 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆
Av. yield	505	313	289	372	313	485	441

Crop :- Cotton (Kharif).

Ref :- Hr. 64(90), 65(45).

Site :- Punjab Agri. University (Hissar Campus), Hissar.

Type :- 'M'.

Object :—To determine the effect of foliar spray of micronutrients on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) N.A.; Bajra. (c) N.A. (ii) Loamy. (iii) 15.5.64; 22.4.65. (iv) (a) 3 to 4 ploughings with harrow. (b) to (e) N.A. (v) N.A. (vi) H—14. (vii) Irrigated. (viii) and (ix) N.A. (x) 20.10.64 to 20.11.64; 14.10.65 to 11.11.65.

2. TREATMENTS :

Same as in expt. no. 64(89), 65(44) and presented on page no. 90.

(Micronutrients applied as foliar spray).

3. DESIGN :

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 6. (iv) (a) 9.14 m. × 4.57 m.; 6.60 m. × 6.90 m. (b) 7.92 m. × 3.81 m.; 5.40 m. × 6.30 m. (v) 61 cm. × 38 cm.; 60 cm. × 30 cm. (vi) Yes.

4. GENERAL :

(i) Normal; Poor. (ii) Jassid attack, Endrin sprayed. (iii) Yield of cotton. (iv) (a) 1964—65. (b) No. (c) Nil. (v) No. (vi) Nil. (vii) Error variances are heterogeneous and Treatments × Years interaction is absent, hence the results of individual years are presented under 5. Results.

5. RESULTS :

64(90)

(i) 1287 Kg/ha. (ii) 227.1 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆
Av. yield	1209	1324	1435	1258	1253	1352	1181

65(45)

(i) 1016 Kg/ha. (ii) 395.6 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆
Av. yield	798	1111	1200	813	1209	891	1092

Crop :- Cotton (*Kharif*).

Ref :- Hr. 64(92), 65(40).

Site :- Punjab Agri. University (Hissar Campus), Hissar.

Type :- 'M'.

Object: To work out the critical level of N, P and K at different levels of fertility.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) N.A.; Bajra. (c) N.A. (ii) Loamy. (iii) 17.5.74; 18.4.65. (iv) (a) 3 ploughings with disc harrow. (b) to (e) N.A. (v) N.A.; Nil. (vi) H-14. (vii) Irrigated. (viii) N.A.; 3 hoeings and 1 thinning. (ix) N.A. (x) 20.10.64 to 16.11.64; 14.10.65 to 11.11.65.

2. TREATMENTS:

Same as in expt. no. 63(79) and presented on page no. 87.
(Manures were applied at the time of sowing).

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) 6.70 m. × 10.97 m.; 4.80 m. × 9.60 m. (b) 5.94 m. × 9.75 m.; 3.60 m. × 9.00 m. (v) 39 cm. × 61 cm.; 60 cm. × 30 cm. (vi) Yes.

4. GENERAL:

(i) Poor. (ii) 2 spray of Endrin both seasons. (iii) Yield of *kapas*. (iv) (a) 1964-65. (b) No. (c) Nil. (v) Hansi. (vi) Nil; Drought. (vii) Error variances are heterogeneous and Treatments × Years interaction is absent, hence the results of individual years are presented under 5. Results.

5. RESULTS:

64(92)

(i) 901 Kg/ha. (ii) 33.5 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of *kapas* in Kg/ha.

	P ₀	P ₁	K ₀	K ₁	Mean
N ₀	768	964	895	837	866
N ₁	1042	910	1069	884	976
N ₂	907	818	856	868	862
Mean	906	897	940	863	901
K ₀	980	940			
K ₁	831	895			

65(92)

(i) 1081 Kg/ha. (ii) 126.5 Kg/ha. (iii) Main effects of N, P and K are significant. (iv) Av. yield of *kapas* in Kg/ha.

	P ₀	P ₁	K ₀	K ₁	Mean
N ₀	944	1080	1048	977	1012
N ₁	1138	1145	1195	1089	1142
N ₂	1044	1132	1128	1048	1088
Mean	1042	1119	1124	1038	1081
K ₀	1111	1136			
K ₁	973	1103			

C.D. for N marginal means=91.0 Kg/ha.

C.D. for K marginal means=74.3 Kg/ha.

Crop :- Cotton (Kharif).

Ref :- Hr. 60(11).

Site :- Govt. Agri. Farm, Rohtak.

Type :- 'M'.

Object :-To study the effect of different sources of N on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) and (c) N.A. (ii) Sandy loam. (iii) 20.5.60. (iv) (a) to (e) N.A. (v) Nil. (vi) H-14. (vii) Irrigated. (viii) and (ix) N.A. (x) Sept., 60.

2. TREATMENTS :

8 sources at 56 Kg/ha. of N : S₀=Control, S₁=A/S. S₂=A/C, S₃=C/A/N, S₄=Urea, S₅=A/S/N, S₆=A/N and S₇=Cal. Nitrate.

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 2. (iv) (a) and (b) 1/39.5 ha. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of *kapas*. (iv) (a) 1960 -only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 622 Kg/ha. (ii) 92.7 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	S ₀	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇
Av. yield	602	758	615	627	699	585	564	527

Crop :- Cotton (Kharif).

Ref :- Hr. 60(93).

Site :- Govt. Agri. Farm, Rohtak.

Type :- 'M'.

Object :-To study the effect of times and methods of application of N on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Berseem. (c) N.A. (ii) Sandy loam. (iii) 25.5.60. (iv) and (v) N.A. (vi) H-14. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

4 times and methods of application of N at 67 Kg/ha. as C/A/N : T₁=Full dose at sowing, T₂= $\frac{1}{2}$ dose at thinning+ $\frac{1}{2}$ dose at pre-flowering. T₃=1/2 dose at sowing+1/2 dose at thinning and T₄=1/2 dose at sowing+1/2 dose at pre-flowering.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/39.5 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of *Kapas*. (iv) (a) 1960—only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 372 Kg/ha. (ii) 99.0 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	T ₁	T ₂	T ₃	T ₄
Av. yield	334	435	356	362

Crop :- Cotton (Kharif).

Ref :- Hr. 60(119), 61(89).

Site :- Govt. Agri. Farm, Rohtak.

Type :- 'M'.

Object :- To study the effect of different sources of N on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Berseem. (c) N.A. (ii) Sandy loam. (iii) 17.5.60 ; 24.5.61. (iv) and (v) N.A. (vi) H—14. (vii) Irrigated. (viii) and (ix) N.A. (x) 15.10.61 to 20.11.60 ; Mid of Oct. to 20.11.61.

2. TREATMENTS :

8 manures : M₀=Control, M₁=A/C, M₂=C/A/N, M₃=Urea, M₄=Ammono. Liquor, M₅=A/S/N, M₆=K as Mur. Pot. and M₇=56.0 Kg/ha. of N+56.0 Kg/ha. of P₂O₅+56.0 Kg/ha. of K₂O.

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 2. (iv) (a) N.A. (b) 1/39.5 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of *kapas*. (iv) (a) 1960—61. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Nil. (vii) Error variances are homogeneous and Treatments × Years interaction is absent.

5. RESULTS :

Pooled results

(i) 585 Kg/ha. (ii) 76.0 Kg/ha. (based on 21 d.f. made up of pooled error and Treatments × Years interaction). (iii) Treatment differences are highly significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆	M ₇
Av. yield	494	548	598	654	586	640	474	686

C.D.=111.8 Kg/ha.

Individual results

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆	M ₇	Sig.	G.M.	S.E./plot
Year											
1960	534	627	567	695	606	652	531	694	N.S.	613	91.0
1961	454	470	630	612	565	628	416	677	**	556	67.0
Pooled	494	548	598	654	586	640	474	686	**	585	76.0

Crop :- Cotton (Kharif).

Ref :- Hr. 61(91).

Site :- Govt. Agri. Stn., Rohtak.

Type :- 'M'.

Object :- To study the effect of F.Y.M. with different levels of N on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 21.5.61. (iv) and (v) N.A. (vi) H-14. (vii) Irrigated. (viii) and (ix) N.A. (x) 15.10.61 to 18.11.61.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 2 levels of F.Y.M. : F_0 = Without F.Y.M. and F_1 = With F.Y.M.

(2) 4 levels of N as C/A/N : $N_0=0$, $N_1=67$, $N_2=134$ and $N_3=202$ Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 8. (b) N.A. (iii) 2. (iv) N.A. (v) $1/39.5$ ha. (vi) N.A. (vii) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of *kapas*. (iv) (a) 1961—only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 337 Kg/ha. (ii) 48.0 Kg/ha. (iii) Main effect of F alone is significant. (iv) Av. yield of *kapas* in Kg/ha.

	N_0	N_1	N_2	N_3	Mean
F_0	279	310	292	345	306
F_1	368	348	384	371	388
Mean	324	329	338	358	337

C.D. for F marginal means = 55.3 Kg/ha.

Crop :- Cotton (Kharif).

Ref :- Hr. 61(18), 62(64).

Site :- Govt. Agri. Farm, Rohtak.

Type :- 'M'.

Object :- To study the effect of different levels of K on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) N.A. ; Nil. (b) Sugarcane ; N.A. (c) Nil ; N.A. (ii) Sandy loam. (iii) 18.5.61 ; 15.5.62. (iv) (a) to (e) N.A. (v) Nil. (vi) H-14. (vii) Irrigated. (viii) and (ix) N.A. (x) Sept. and October.

2. TREATMENTS :

6 manurial treatments : M_0 = Control, M_1 = 67.2 Kg/ha. of N as C/A/N, M_2 = M_0 + 67.2 Kg/ha. of P_2O_5 , M_3 = M_2 + 67.2 Kg/ha. of K_2O as Mur. Pot., M_4 = M_2 + 134.4 Kg/ha. of K_2O as Mur. Pot. and M_5 = M_2 + 268.8 Kg/ha. of K_2O as Mur. Pot.

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 3. (iv) (a) and (b) $1/46.9$ ha.; $1/44.5$ ha. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of *kapas*. (iv) (a) 1961—62. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) and (vi) No. (vii) Error variances are homogeneous and Treatments \times Years interaction is absent.

5. RESULTS :

Pooled results

(i) 599 Kg/ha. (ii) 80.2 Kg/ha. (based on 25 d.f. made up of pooled error and Treatments \times Years interaction). (iii) Treatment differences are not significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄	M ₅
Av. yield	536	608	630	604	619	600

Individual results

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄	M ₅	Sig.	G.M.	S.E./plot
Year									
1961	300	394	386	400	405	418	N.S.	384	83.1
1962	772	822	875	809	833	781	N.S.	815	87.6
Pooled	536	608	630	604	619	600	N.S.	599	80.2

Crop :- Cotton (Kharif).

Ref :- Hr. 61(19), 62(60).

Site :- Govt. Agri. Farm, Rohtak.

Type :- 'M'.

Object :- To study the effect of surface and deep application of F.Y.M. with or without N, P and K on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) Gram ; N.A. (c) N.A. (ii) Sandy loam. (iii) 6.5.61 ; 10.5.62. (iv) (a) to (e) N.A. (v) Nil. (vi) H-14. (vii) Irrigated. (viii) and (ix) N.A. (x) September and October.

2. TREATMENTS :

5 manurial treatments : M₁=Surface application of F.Y.M., M₂=Deep application of F.Y.M., M₃=M₁+N.P.K, M₄=Surface application of NPK and M₅=Deep application of NPK.

(F.Y.M. application at 125 Q/ha. and NPK : 67.2 Kg/ha. of N+33.6 Kg/ha. of P₂O₅+33.6 Kg/ha. of K₂O.)

3. DESIGN :

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) and (b) N.A. (v) No. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of *kapas*. (iv) (a) 1961-62. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) No. (vi) Nil. (vii) Error variances are homogeneous and Treatments \times Years interaction is absent.

5. RESULTS :

Pooled results

(i) 428 Kg/ha. (ii) 74.8 Kg/ha. (based on 28 d.f. made up of pooled error and Treatments \times Years interaction). (iii) Treatment differences are highly significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	M ₁	M ₂	M ₃	M ₄	M ₅
Av. yield	446	312	484	460	436

C.D. = 76.6 Kg/ha.

Individual results

Treatment	M ₁	M ₂	M ₃	M ₄	M ₅	Sig.	G.M.	S.E./plot
Year 1961	389	348	396	378	395	N.S.	581	58.3
1962	504	276	571	542	478	*	474	126.5
Pooled	466	312	484	463	436	**	428	74.8

Crop :- Cotton (Kharif).

Ref :- Hr. 62(61).

Site :- Govt. Agri. Farm, Rohtak.

Type :- 'M'.

Object :- To study the effect of different sources of N on the yield of Cotton.

1. BASAL CONDITION :

(i) (a) Nil. (b) and (c) N.A. (ii) Sandy loam. (iii) 10.5.62. (iv) (a) to (e) N.A. (v) Nil. (vi) H-14. (vii) Irrigated. (viii) and (ix) N.A. (x) Oct. and Nov., 62.

2. TREATMENTS :

1 Control and 3 sources of N at 44.8 Kg/ha. : S₀=Control, S₁=C/A/N, S₂=Urea and S₃=A/S/N.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 2. (iv) (a) and (b) 1/19.8 ha. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of *kapas*. (iv) (a) 1962—only. (b) No. (c) Nil. (v) No. (vi) and (vii) Nil.

5. RESULTS :

(i) 1269 Kg/ha. (ii) 65.0 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	S ₀	S ₁	S ₂	S ₃
Av. yield	1218	1246	1315	1296

Crop :- Cotton (Kharif).

Ref :- Hr. 62(62).

Site :- Govt. Agri. Farm, Rohtak.

Type :- 'M'.

Object :- To study the effect of different sources of N on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) and (c) N.A. (ii) Sandy loam. (iii) 10.5.62. (iv) (a) to (e) N.A. (v) Nil. (vi) H-14. (vii) Irrigated. (viii) and (ix) N.A. (x) Oct. and Nov., 62.

2. TREATMENTS :

1 Control and 3 sources of N at 44.8 Kg/ha. : S₀=Control, S₁=C/A/N, S₂=Urea and S₃=A/S.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 2. (iv) (a) 1/19.8 ha. (b) N.A. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of *kapas*. (iv) (a) 1962—only. (b) N.A. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 1053 Kg/ha. (ii) 33.0 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	S ₀	S ₁	S ₂	S ₃
Av. yield	982	1136	1043	1051

Crop :- Cotton (Kharif).

Ref :- Hr. 62(63).

Site :- Govt. Agri. Farm, Rohtak.

Type :- 'M'.

Object:—To study the effect of different levels of N on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) and (c) N.A. (ii) Sandy loam. (iii) 10.5.62. (iv) (a) to (e) N.A. (v) Nil. (vi) H—14. (vii) Irrigated. (viii) and (ix) N.A. (x) Oct. and Nov., 62.

2. TREATMENTS :

4 levels of N as C/A/N : N₀=0, N₁=67.2, N₂=134.4 and N₃=201.6 Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 4. (iv) (a) and (b) 1/39.5 ha. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of *kapas*. (iv) (a) 1962—only. (b) and (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 623 Kg/ha. (ii) 145.0 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	N ₀	N ₁	N ₂	N ₃
Av. yield	818	875	590	210

C.D.—233.4 Kg/ha.

Crop :- Cotton (Kharif).

Ref :- Hr. 60 and 61(SFT).

Site :- District - Karnal and Hissar.

Type :- 'M'.

Object:—Type A : To study the response of N, P and K applied individually and in combination on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Alluvial. (iii) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

N=44.8 Kg/ha. of N,

P=22.4 Kg/ha. of P₂O₅,

K=22.4 Kg/ha. of K₂O,

NP=44.8 Kg/ha. of N+22.4 Kg/ha. of P₂O₅,

NK=44.8 Kg/ha. of N+22.4 Kg/ha. of K₂O,

PK=22.4 Kg/ha. of N+22.4 Kg/ha. of K₂O and

NPK=44.8 Kg/ha. of N+22.4 Kg/ha. of P₂O₅+22.4 Kg/ha. of K₂O.

3. DESIGN :

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle/thana is changed once in two years within the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on *Kharif* cereal, 8 on a *Rabi* cereal, 8 on cash crop, 4 on an oilseed crop and 3 on a leguminous crop. Half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. The three trials on legumes are of type C. Residual effects of phosphate application are studied on Type C trials in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98·8 ha. (b) 1/197·7 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of *Kapas*. (iv) (a) 1960—61. (b) and (c) N.A. (v) Nil. (vi) and (vii) N.A.

5. RESULTS:

60(SFT)

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.								
			N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Karnal	9	290	110	60	30	14·0	40	-14	10	30	18·0
Hissar	7	690	90	70	10	34·0	-20	-20	60	10	28·0

61(SFT)

Karnal	6	290	60	70	30	18·0	10	-20	-10	20	12·0
Hissar	6	680	130	70	70	20·0	-30	30	10	0	33·0

Crop :- Cotton.

Site :- (District) : Hissar.

Ref :- Hr. 60(SFT).

Type :- 'M'.

Object :—Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

7 manurial treatments:

O=Control (no manure),

n_1 =28 Kg/ha. of N as A/S,

n_2 =56 Kg/ha. of N as A/S,

n_1' =28 Kg/ha. of N as Urea,

n_2' =56 Kg/ha. of N as Urea,

n_1'' =28 Kg/ha. of N as A/S/N and

n_2'' =56 Kg/ha. of N as A/S/N.

3. DESIGN :

Same as in type A conducted under irrigated condition on Cotton crop on page No. 98.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of *kapas*. (iv) (a) 1960—only. (b) and (c) Nil. (v) Nil. (vi) and (vii) N.A.

5. RESULTS :

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			n_1	n_2	n_1'	n_2'	n_1''	n_2''	
Rohtak	5	940	220	-30	180	100	100	340	50·0

Crop :- Cotton (Kharif).

Ref :- Hr. 61(SFT).

Site :- (District) : Hissar.

Type :- 'M'.

Object :—Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Alluvial. (iii) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (no manure),
 $n_1=44.8$ Kg/ha. of N as A/S,
 $n_2=89.6$ Kg/ha. of N as A/S,
 $n_1'=44.8$ Kg/ha. of N as Urea,
 $n_2'=89.6$ Kg/ha. of N as Urea,
 $n_1''=44.8$ Kg/ha. of N as A/S/N and
 $n_2''=89.6$ Kg/ha. of N as A/S/N.

3. DESIGN :

Same as in type A conducted under irrigated condition on Cotton crop on page No. 98.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of Kapas. (iv) (a) 1961—only. (b) and (c) Nil. (v) Nil. (vi) and (vii) N.A.

5. RESULTS :

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			n_1	n_2	n_1'	n_2'	n_1''	n_2''	
Hissar	8	420	130	220	110	220	110	270	43.0

Crop :- Cotton (Kharif).

Ref :- Hr. 62, 64 and 65(SFT).

Site :- (District) : Hissar.

Type :- 'M'.

Object :—Type A₁ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),
 $N_1=60$ Kg/ha. of N,
 $N_2=120$ Kg/ha. of N,
 $P_1=35$ Kg/ha. of P_2O_5 ,
 $N_1P_1=60$ Kg/ha. of N+35 Kg/ha. of P_2O_5 ,
 $N_2P_1=120$ Kg/ha. of N+35 Kg/ha. of P_2O_5 ,
 $N_2P_2=120$ Kg/ha. of N+70 Kg/ha. of P_2O_5 and
 $N_2P_2K_1=120$ Kg/ha. of N+70 Kg/ha. of P_2O_5 +35 Kg/ha. of K_2O .

3. DESIGN:

(i) and (ii) A selected district is divided into four agriculturally homogeneous zones based on climate, soil, cropping pattern etc. In each zone one block is selected at random. A block normally consists of a group of 50–100 villages. In each block 36 experiments are conducted in a year of which 11 are of type A₁, 11 of type A₂, 11 of type A₃ and 3 are of type C. The eleven experiments under type A₁, A₂ and A₃ are distributed as 3 on a *Kharif* cereal, 3 on a *rabi* cereal, 3 on a cash crop and 2 on oil seed. All the three type—C experiments are conducted on a legume crop. For the purpose of conducting the A₁, A₂ and A₃ experiments 11 villages are randomly selected in each block and in each village 3 experiments one each of type A₁, A₂ and A₃ are laid out. For conducting the three villages are randomly selected in each block. (iii) (a) 1/100 ha. (b) 1/200 ha. (iv) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of Kapas. (iv) (a) 1962–66 (63 N.A.). (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

62(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₁ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	217	413	136	292	377	511	506	61.1

Control yield=810 Kg/ha.; No. of trials=10

64(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	183	347	107	388	475	564	636	97.4

Control yield=732 Kg/ha.; No. of trials=8

65(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	355	505	-17	424	596	676	621	65.9

Control yield=631 Kg/ha.; No. of trials=8.

Crop :- Cotton (Kharif).

Ref :- Hr. 63, 64, 65(SFT).

Site :- (District) : Hissar.

Type :- 'M'.

Object :—Type A₂: To study the response curves of important cereal, cash and oilseed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS:

8 manurial treatments:

O=Control (no manure),

N₁=60 Kg/ha. of N,

P₁=35 Kg/ha. of P₂O₅,

P₂=70 Kg/ha. of P₂O₅,

N₁P₁=60 Kg/ha. of N+35 Kg/ha. of P₂O₅,

N₁P₂=60 Kg/ha. of N+70 Kg/ha. of P₂O₅,

N₂P₂=120 Kg/ha. of N+70 Kg/ha. of P₂O₅, and

N₂P₂K₁=120 Kg/ha. of N+72 Kg/ha. of P₂O₅+70 Kg/ha. of K₂O.

3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Cotton crop on page No. 101.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of Kapas. (iv) (a) 1962—66 (63 N.A.) (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS:

62(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₁ K ₂	S.E.
Av. response of yield in Kg/ha.	210	48	162	257	293	438	451	34.5

Control yield=933 Kg/ha.; No. of trials=8

64(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₁ K ₂	S.E.
Av. response of yield in Kg/ha.	419	38	133	276	400	516	626	73.3

Control yield=606 Kg/ha.; No. of trials=8

65(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₁ K ₂	S.E.
Av. response of yield in Kg/ha.	215	-21	5	284	327	503	523	48.9

Control yield=607 Kg/ha.; No. of trials=9

Crop :- Cotton (Kharif)

Ref :- Hr. 64 to 65(SFT).

Site :- (District) : Hissar.

Type :- 'M'.

Object:—Type A₃ : To study the response curves of important cereal, cash and oilseed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments:

O=Control (no manure),

N₁=60 Kg/ha. of N,

K₁=35 Kg/ha. of K₂O,

K₂=70 Kg/ha. of K₂O,

N₁K₁=60 Kg/ha. of N+35 Kg/ha. of K₂O,

N₁K₂=60 Kg/ha. of N+70 Kg/ha. of K₂O,

N₂K₂=120 Kg/ha. of N+70 Kg/ha. of K₂O and

N₁P₁K₁=60 Kg/ha. of N+35 Kg/ha. of P₂O₅+35 Kg/ha. of K₂O.

3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Cotton crop page No. 101.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of Kapas. (iv) (a) 1962—66 (62 and 63 N.A.) (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

64(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	256	40	28	299	358	616	503	38.0

Control yield=501 Kg/ha. ; No. of trials=7

65(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	299	-18	26	358	342	607	350	53.4

Control yield=589 Kg/ha. ; No. of trials=7

Crop :- Cotton (*Kharif*).

Ref :- Hr. 64(84), 65(41).

Site :- Punjab Agri- University (Hissar Campus),
Hissar. Type :- 'C'.

Object :- To study the effect of pruning at different stages of crop growth and on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) N.A. ; *Bajra*. (c) N.A. (ii) Loam. (iii) May 1964 ; 21.4.65. (iv) (a) 3 to 4 disc harrow and Ploughings. (b) to (d) N.A. (e) Nil. (v) Nil. (vi) H-14. (vii) Irrigated. (viii) 1 thinning and 2 hoeings. (ix) N.A. (x) 30.10.64 to 15.12.64 ; 27.10.65 to 6.12.65.

2. TREATMENTS :

10 dates of pruning : D₀=Control (no pruning), D₁=25th July, D₂=15th August, D₃=5th Sept., D₄=D₁+D₂, D₅=D₁+D₃, D₆=D₂+D₃, D₇=D₁+D₃, D₈=5th August and D₉=25th August.

3. DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 6. (iv) (a) 6.71 m. × 4.57 m. ; 3.60 m. × 5.00 m. (b) 5.49 m. × 3.81 m. ; 2.40 m. × 4.40 m. (v) 61 cm. × 38 cm. ; 60 cm. × 30 cm. (vi) Yes.

4. GENERAL :

(i) Normal ; Poor. (ii) N.A. ; Endrin sprayed on 16.8.65. (iii) Yield of *kapas*. (iv) (a) 1964-65. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) Abohar, Ludhiana, Jullundur. (vi) Nil. (vii) Error variances are homogeneous and Treatments × Years interaction is present.

5. RESULTS :

Pooled results :

(i) 818 Kg/ha. (ii) 324.4 Kg/ha. (based on 9 d.f. made up of Treatments × Years interaction). (iii) Treatment differences are not significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	D ₀	D ₁	D ₂	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	D ₉
Av. yield	824	846	820	862	787	812	857	944	703	726

Individual results

Treatment	D ₀	D ₁	D ₂	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	D ₉	Sig.	G.M.	S.E./plot
Year													
1964	797	765	765	933	813	997	829	1132	718	710	N.S.	846	249.2
1965	850	927	874	791	761	628	885	756	688	743	N.S.	790	193.8
Pooled	824	846	820	862	787	812	857	944	703	726	N.S.	818	324.4

Crop :- Cotton (Kharif).

Ref :- Hr. 65(46).

Site :- Punjab Agri. University (Hissar Campus), Hissar. Type :- 'C'.

Object :- To study the effect of deep ploughings and interculturings.

1. BASAL CONDITIONS :

(i) (a) Wheat—Cotton. (b) Wheat. (c) N.A. (ii) Loamy. (iii) 21.5.65. (iv) (a) 2 ploughings. (b) to (e) N.A. (v) 80 Kg/ha. of N at sowing. (vi) H-14. (vii) Irrigated. (viii) 3 hoeings. (ix) N.A. (x) 3 pickings from 16.10.65 and 6.12.65.

2. TREATMENTS :

Main-plot treatments:

3 levels of ploughing : P_1 —Normal ploughing, P_2 —22 cm. deep ploughing every year (after wheat and Cotton harvest) and P_3 —22 cm. deep ploughing once in two years after Wheat harvesting.

Sub-plot treatments :

3 levels of interculturing : $C_1=1$, $C_2=2$ and $C_3=3$ interculture.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication ; 3 sub-plots/main-plot. (b) Nil. (iii) 4. (iv) (a) 9'60 m. x 4'80 m. (b) 9'00 m. x 3'40 m. (v) 30 cm. x 70 cm. (vi) Yes.

4. GENERAL :

(i) Poor. (ii) Nil. (iii) Yield of *kapas*. (iv) (a) 1964—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 2077 Kg/ha. (ii) (a) 298.2 Kg/ha. (b) 425.4 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of *kapas* in Kg/ha.

	P_1	P_2	P_3	Mean
C_1	2064	2027	1717	1936
C_2	2097	2305	2109	2170
C_3	2183	1904	2281	2124
Mean	2115	2080	2036	2077

Crop :- Cotton (Kharif).

Ref :- Hr. 63(82).

Site :- Cotton Res. Stn., Hansi.

Type :- 'CM'.

Object :- To find out: the best method of fertilizer placement for Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loam. (iii) Mid. of May 63. (iv) (a) 4 ploughings. (b) to (e) N.A. (v) 62 Kg/ha. of N+37 Kg/ha. of P_2O_5 . (vi) N.A. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) 24.9/2.11.63.

2. TREATMENTS :

10 cultural treatments: C_0 —No fertilizer C_1 —Plough sule method fertilizer one week before sowing, C_2 —Seed and fertilizer in the same line but from separate bowls, C_3 —Both in the same line fertilizer 4 cm deeper than the seed, C_4 —Fertilizer 10 cm. deep but 4 cm away from seed line, C_5 —Fertilizer broadcast at sowing before last cultivation, C_6 —Fertilizer broadcast at final thinning, C_7 —Fertilizer broadcast at flowering, C_8 —Fertilizer top dressed along cotton rows at final thinning and C_9 —Fertilizer top dressed along cotton rows at final flowering.

3. DESIGN:

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) 9'14 m. × 5'49 m. (b) 8'30 m. × 4'27 m. (v) 38 cm. × 61 cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) 1 % solution of endrine sprayed. (iii) Yield of *kapas*. (iv) (a) 1963—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 785 Kg/ha. (ii) 106.2 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	C ₀	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉
Av. yield	590	772	769	824	814	828	831	870	583	964

C.D. = 154.1 Kg/ha.

Crop :- Cotton (*Kharif*).

Ref :- Hr. 63(84).

Site :- Cotton Sub-Stn., Hansi.

Type :- 'CM'.

Object : —To study the effect of intercropping on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loam. (iii) May, 63. (iv) (a) 3 ploughings. (b) and (c) N.A. (d) As per treatments. (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) 30.9.63 to 3.12.63.

2. TREATMENTS :

All combinations of (1) and (2)+2 controls

(1) 8 crop treatments: T₁=Cotton (n) normal spacing 60 cm. × 45 cm., T₂=Cotton (w) wide spacing 90 cm. × 30 cm., T₃=Cotton (w)+Bhindi one row (for fruit) variety Pb. 13, T₄=Cotton (w)+Bhindi two rows (for fruit) variety Pb. 13, T₅=Cotton (w)+cowpeas one row (for grain) variety Branco, T₆=Cotton (w) cowpeas two rows (Green manure), Pb. 10, T₇=Cotton (w)+Guara two rows (for fodder) and T₈=Cotton (w)+Guara two rows (G.M.)

(2) 2 levels of N : N₁=60, N₂=120 Kg/ha. of N.

Control : C₀=Cotton (n) without N and C₁=Cotton (w) without N.

3. DESIGN :

(i) Fact. in R.B.D. + two controls. (ii) (a) 18. (b) N.A. (iii) 4. (iv) (a) 10'97 m. × 4'57 m. (b) 10'36 m. × 2'74 m. (v) 30 cm. × 91 cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of *kapas*. (iv) (a) 1963—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 503 Kg/ha. (ii) 246.2 Kg/ha. (iii) Main effect of T is highly significant and that of N is significant. (iv) Av. yield of *kapas* in Kg/ha.

$C_0=434$ and $C_1=661$ Kg/ha.

	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	Mean
N ₁	660	512	288	186	576	399	426	424	454
N ₂	550	835	377	222	622	527	736	617	561
Mean	605	674	332	204	599	463	581	520	497

C.D. for T marginal means=247.3 Kg/ha.

C.D. for N marginal means=123.6 Kg/ha.

Crop :- Cotton (Kharif).

Ref :- Hr. 62(68).

Site :- Punjab Agri. University, (Hissar Campus), Hissar. Type :- 'M'.

Object:—To study the effect of different dates of sowing, spacings and levels of N on the yield of Cotton.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Loamy. (iii) As per treatments. (iv) (a) 6 to 8 ploughings with *deshi* plough. (b) and (c) N.A. (d) As per treatments. (e) N.A. (v) N.A. (vi) H-14. (vii) to (x) N.A.

2. TREATMENTS:

Main-plot treatments:

(i) All combinations of (1) and (2)

(1) 4 dates of sowing: D₁=7.4.62, D₂=28.4.62, D₃=17.5.62 and D₄=7.6.62.

(2) 3 spacings: S₁=61 cm. × 46 cm., S₂=61 cm. × 61 cm. and S₃=61 cm × 76 cm.

Sub-plot treatments:

3 levels of N: N₀=0, N₁=56 and N₂=112 Kg/ha.

3. DESIGN:

(i) Split-plot. (ii) (a) 12 main-plots/replication; 3 sub-plots/main-plot. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 1/299.0 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Good. (ii) N.A. (iii) Yield of *kapas*. (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 1493 Kg/ha. (ii) (a) 875.1 Kg/ha. (b) 656.9 Kg/ha. (iii) Main effect of D alone is highly significant. (iv) Av. yield of *kapas* in Kg/ha.

	D ₁	D ₂	D ₃	D ₄	S ₁	S ₂	S ₃	Mean
N ₀	1988	1628	1189	596	1333	1365	1353	1350
N ₁	2215	2060	1353	662	1634	1568	1516	1573
N ₂	2153	2076	1363	631	1586	1581	1500	1556
Mean	2119	1921	1302	630	1518	1505	1456	1493
S ₁	2151	1942	1466	511				
S ₂	1946	2076	1394	604				
S ₃	2260	1746	1046	774				

Crop :- Cotton (*Kharif*).

Ref :- Hr. 64(86), 65(37).

Site :- Punjab Agri. University (Hissar (Compus),
Hissar.

Type 'CMP'.

Object :—To study the effect of mixed cropping along with levels of N on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loamy. (iii) 22.5.64 ; 10.5.65. (iv) (a) 2 to 4 ploughings. (b) and (c) N.A. (d) As per treatments. (e) N.A. (v) N.A. (vi) H—14. (vii) Irrigated. (viii) 3 hoeings. (ix) N.A (x) 23.10.64 to 23.12.64 ; 1.11.65 to 21.11.65.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 8 cultural treatments : T₁=Cotton 60 cm. × 46 cm. spacing, T₂=Cotton wide 90 cm. × 30 cm. spacing
T₃=T₂+1 row of *Bhindi*, T₄=T₂+two rows of *Bhindi*, T₅=T₂+One row of cowpea, T₆=T₂+two rows of cowpea (for G.M.), T₇=T₂+two rows of Guara (for fodder) and T₈=T₂+two rows of Guara (for G.M.)(2) 2 levels of N : N₁=60 and N₂=120 Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 16. (b) N.A. (iii) 4. (iv) (a) 7.32 m. × 6.71 m. ; 9.60 m. × 4.80 m. (b) 1/299 ha. 9.0 m. × 3.0 m. (v) N.A. ; 30 cm. × 40 cm. (vi) Yes.

4. GENERAL :

(i) Normal ; Poor. (ii) Nil. (iii) Yield of *kapas*. (iv) (a) 1964—65. (b) and (c) No. (v) Abohar, Jullundur, Ludhiana in Punjab. (vi) Lack of rains for 65. (vii) Error variances are homogeneous and Treatments × Years interaction is absent.

5. RESULTS :

Pooled results

(i) 874 Kg/ha. (ii) 185.1 Kg/ha. (based on 105 d.f. made up of pooled error and Treatments × Years interaction. (iii) Main effect of T alone is significant. (iv) Av. yield of *kapas* in Kg/ha.

	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	Mean
N ₁	1088	912	898	800	741	799	922	809	871
N ₂	918	1024	811	918	817	934	752	835	876
Mean	1003	968	855	859	779	867	837	822	874

C.D. for T marginal means=129.5 Kg/ha.

Individual results

Treatments	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	Sig.
Year 1964	1095	1226	1058	1088	964	1046	1020	1136	N.S.
1965	911	710	652	632	594	687	654	668	**
Pooled	1003	968	855	859	779	867	837	822	*

N ₁	N ₂	Sig.	G.M.	S.E./plot
1096	1062	N.S.	1079	193.7
647	690	N.S.	668	191.0
871	876	N.S.	874	185.1

Crop :- Cotton (Kharif).

Ref :- Hr. 63(85).

Site :- Govt. Agri. Res. Stn., Hansi.

Type 'IM'.

Object:—To study the effect of irrigation requirements with the graded doses of N on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) May, 63. (iv) (a) to (e) N.A. (v) 120 Kg/ha. of P_2O_5 + 40 Kg/ha. of K_2O + 200 Kg/ha. of F.Y.M. before sowing. (vi) N.A. (vii) As per treatments. (viii) 3 hoeings. (ix) N.A. (x) Nov. and Dec., 63.

2. TREATMENTS :

Main-plot treatments :

8 levels of irrigation : I_0 = Local practice of Irrigation, $I_1 = T_1T_1$, $I_2 = T_2T_1$, $I_3 = T_3T_1$, $I_4 = T_2T_2$, $I_5 = T_3T_2$, $I_6 = T_3T_3$ and $I_7 = T_3T_3$.

Sub-plot treatments:

3 levels of N : $N_0 = 0$, $N_1 = 60$ and $N_2 = 120$ Kg/ha.

Where T_1 , T_2 and T_3 respectively stand for irrigation when 25 %, 50 % and 75 % of the available soil moisture in the top 30 cm. of the soil was consumed. The first letter of the treatment combination stands for pre-flowering and later for Post-flowering stages.

3. DESIGN :

(i) Split-plot. (ii) (a) 8 main-plots/replication ; 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) 9'14 m. \times 5'49 m. (b) 8'23 m. \times 4'27 m. (v) 46 cm. \times 61 cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of kapas. (iv) (a) 1963—only. (b) No. (c) Nil. (v) Hissar. (vi) and (vii) Nil.

5. RESULTS :

(i) 854 Kg/ha. (ii) (a) 146.9 Kg/ha. (b) 158.9 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of kapas in Kg/ha.

	I_1	I_2	I_3	I_4	I_5	I_6	I_7	I_8	Mea
N_0	681	655	673	701	737	819	669	794	716
N_1	758	1000	861	897	954	1004	822	929	903
N_2	897	940	1032	858	972	1014	865	968	943
Mean	779	865	855	819	888	946	785	897	854

C.D. for N marginal means = 299.7 Kg/ha.

Crop :- Cotton (Kharif).

Ref :- Hr., 64(91), 65(64).

Site :- Punjab Agri. University Hissar.

Type :- 'IM'.

Object:—To study the effect of irrigational requirements with graded doses of N on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) N.A. ; Bajra. (c) N.A. (ii) Loamy soil. (iii) May 64 ; 21.4.65. (iv) (a) 3 to 4 ploughings by tractor. (b) to (e) N.A. (v) N.A. ; 40 Kg/ha. of P_2O_5 + 40 Kg/ha. of K_2O . (vi) H-14. (vii) Irrigated. (viii) 2 thinnings. (ix) N.A. (x) Pickings from 17.10.64 to 10.12.64 ; 15.10.65 to 27.11.65.

2. TREATMENTS :

Same as in expt. no. 63(85) presented on page No. 108.

3. DESIGN:

(i) Split-plot. (ii) (a) 8 main-plots/replication ; 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) 6.70 m. × 5.49 m. ; 4.80 m. × 9.60 m. (b) 5.94 m. × 4.27 m. ; 3.60 m. × 9.00 m. (v) 38 cm. × 61 cm. ; 60 cm. × 30 cm. (vi) Yes.

4. GENERAL :

(i) Poor. (ii) N.A. ; Endrin was sprayed. (iii) Yield of *kapas*. (iv) (a) 1964—contd. (b) No. (c) Nil. (v) Hansi. (vi) Nil ; Drought. (vii) Since the expt. is contd. beyond 65, results of individual years are presented under 5 Results.

5. RESULTS :

64(91)

(i) 1297 Kg/ha. (ii) (a) 288.6 Kg/ha. (b) 201.6 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of *kapas* in Kg/ha.

	I ₀	I ₁	I ₂	I ₃	I ₄	I ₅	I ₆	I ₇	Mean
N ₀	1117	1305	1334	1275	1473	1512	1290	1028	1292
N ₁	1117	1349	1334	1349	1280	1315	1240	1171	1269
N ₂	1423	1349	1431	1265	1369	1324	1364	1423	1331
Mean	1119	1334	1366	1296	1374	1384	1298	1207	1297

65(64)

(i) 935 Kg/ha. (ii) (a) 334.3 Kg/ha. (b) 280.2 Kg/ha. (iii) Main effect of I alone is significant. (iv) Av. yield of *kapas* in Kg/ha.

	I ₀	I ₁	I ₂	I ₃	I ₄	I ₅	I ₆	I ₇	Mean
N ₀	880	1242	1103	741	779	964	880	1019	951
N ₁	1057	1242	1111	872	779	710	988	1157	989
N ₂	610	910	1281	702	656	864	918	964	863
Mean	849	1131	1165	772	738	846	929	1047	935

C.D. for I marginal means=283.9 Kg/ha.

Crop :- Cotton (*Kharif*).

Ref :- Hr. 64(208).

Site :- Punjab Agri University (Hissar Campus), Hissar. Type :- 'IMV'.

Object:—To study the effect of irrigations and N on different varieties of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 15.5.64. (iv) (a) N.A. (b) Dibbling. (c) N.A. (d) 45 cm. × 30 cm. (e) N.A. (v) Nil. (vi) As per treatments. (vii) Irrigated. (viii) and (ix) N.A. (x) 20th Oct. to 28th Dec.. 64

2. TREATMENTS :

All combinations of (1), (2) and (3)

(1) 3 times of Irrigations when available moisture depth by : $I_0=20\%$, $I_1=40\%$ and $I_2=60\%$.

(2) 3 doses of N : $N_1=40$, $N_2=100$ and $N_3=150$ Kg/ha.

(3) 2 varieties : $V_1=H-14$ and $V_2=F-320$.

Dates of irrigation for : I_0 : 15.6.64, 29.6.64, 24.9.64 ; I_1 : 29.6.65 and I_2 : no. irrigation.

Entire dose of N applied before sowing.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 18. (b) N.A. (iii) 4. (iv) and (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of *kapas*. (iv) (a) 1964—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 1361 Kg/ha. (ii) 270.0 Kg/ha. (iii) Main effect of V is highly significant and that of N is significant. (iv) Av. yield of *kapas* in Kg/ha.

	V_1	V_2	N_0	N_1	N_2	Mean
I_0	1565	1299	1567	1497	1233	1432
I_1	1466	1247	1534	1287	1249	1356
I_2	1440	1150	1277	1307	1302	1295
Mean	1490	1232	1459	1364	1261	1361
N_0	1621	1297				
N_1	1488	1239				
N_2	1362	1160				

C.D. for V marginal means = 127.9 Kg/ha.

C.D. for N marginal means = 156.7 Kg/ha.

Crop :- Cotton (Kharif).

Site :- Govt. Agri. Res. Stn., Hansi.

Ref :- Hr. 63(77),

Type :- 'D'.

Object :—To study the effect of beta Naphthoxyacetic acid (NOA) on the yield of Cotton.

1. BASAL CONDITIONS :

(i) N.A. (ii) Loam. (iii) May, 63. (iv) (a) 4 Ploughings. (b) to (e) N.A. (V) and (VI) N.A. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) Pickings from 24.9.63 and 31.10.63.

2. TREATMENTS :

All combinations of (1), (2) and (3)

(1) 3 concentrations of hormones : $C_1=5$, $C_2=10$, $C_3=15$ p.p.m. of NOA.

(2) 2 wetting agents : W_0 =Without water and W_1 =With water.

(3) 3 timings of spray : T_1 =One week after opening the 1st flower, T_2 =Two weeks after opening the 1st flower and T_3 =Three weeks after opening the 1st flower.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 18. (b) N.A. (iii) 4. (iv) (a) 8.53 m × 5.49 m. (b) 7.77 m × 4.27 m. (v) 38 cm. × 61 cm. (vi) Yes

4. GENERAL:

(i) Normal. (ii) 1% endrine spray for jassid attack. (iii) Yield of *kapas*. (iv) (a) 1963—only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 698 Kg/ha. (ii) 133.2 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of *kapas* in Kg/ha.

	C ₁	C ₂	C ₃	T ₁	T ₂	T ₃	Mean
W ₀	702	700	716	749	703	665	706
W ₁	706	705	665	744	673	657	691
Mean	704	702	690	746	688	661	698
T ₁	739	829	671				
T ₂	716	658	694				
T ₃	656	620	706				

Crop :- Cotton (Kharif).

Ref :- Hr. 63(78).

Site :- Govt. Agri. Res. Stn., Hansi.

Type :- 'D'.

Object :- To determine suitable method of controlling weeds and its effects on the yield of Cotton.

1. BASAL CONDITIONS:

(i) N.A. (ii) Loom. (iii) Mid. of May 63. (iv) (a) 3 ploughings. (b) to (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) 20.9.62, 7.11.63.

2. TREATMENTS:

10 weedicidal treatments: W₀—Unweeded, W₁—Local method of weeding, W₂—2 Kg/ha. of Eptam, W₃—4 Kg/ha. of Eptam, W₄—0.5 Kg/ha. of CMU, W₅—1.00 Kg/ha. of CMU, W₆—25 Kg/ha. of PCP, W₇—50 Kg/ha. of PCP, W₈—50 Kg/ha. of Dawpon and W₉—10 Kg/ha. of Dowpon.

3. DESIGN:

(i) R B D. (ii) (a) 10. (b) N.A. (iii) 6. (iv) (a) 6.71 m. × 7.62 m. (b) 5.49 m. × 6.71 m. (v) 61 cm. × 46 cm. (vi) Yes.

GENERAL:

(i) Normal. (ii) 1% solution of Endrine sprayed at flowering. (iii) Yield of *kapas*. (iv) (a) 1963—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 222 Kg/ha. (ii) 60.5 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	W ₀	W ₁	W ₂	W ₃	W ₄	W ₅	W ₆	W ₇	W ₈	W ₉
Av. yield	248	344	177	178	326	297	206	127	143	107

C.D. for W marginal means = 69.9 Kg/ha.

Crop :- Cotton (Kharif).

Ref :- Hr. 63(83).

Site :- Cotton Res. Stn., Hansi-

Type :- 'D'.

Object :-To determine the ideal plant population for obtaining high cotton yield under the condition of high fertilization and restricted plant growth.

1. BASAL CONDITIONS :

(i) N.A. (ii) Sandy loam. (iii) N.A. (iv) (a) 3 to 4 ploughings with country plough. (b) N.A. (c) and (d) As per treatment. (e) N.A. (v) 15 Kg. each of K_2O and S.P. + 10 C.L. of F.Y.M. (vi) N.A. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) 8.10.63 to 29.11.63.

2. TREATMENTS :

All combinations of (1), (2), (3) and (4)

(1) 3 spacings : $S_1=60\text{ cm.} \times 30\text{ cm.}$, $S_2=60\text{ cm.} \times 45\text{ cm.}$ and $S_3=60\text{ cm.} \times 60\text{ cm.}$

(2) 3 plant population per hill : $P_1=1$, $P_2=2$ and $P_3=3$ plants/hill.

(3) 3 levels of N as C/A/N : $N_0=0$, $N_1=125$ and $N_2=250$ Kg/ha.

(4) 3 doses of N.A.A. : $H_0=0$, $H_1=20$ and $H_2=40$ p.p.m.

3. DESIGN :

(i) 3^4 confd. (ii) (a) 9 plots/block, 9 blocks/replications. (b) N.A. (iii) 1. (iv) (a) $8.53\text{ m.} \times 5.18\text{ m}$ (b) $7.62\text{ m.} \times 3.96\text{ m.}$ (v) $46\text{ cm.} \times 61\text{ cm.}$ (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A.A. sprayed to check the *Jassid*. (iii) Yield of *kapas*. (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 1123 Kg/ha. (ii) 317.9 Kg/ha. (iii) Main effects of S and H are significant. (iv) Av. yield of *kapas* in Kg/ha.

	N_0	N_1	N_2	S_1	S_2	S_3	H_0	H_1	H_2	Mean
P_1	1069	990	1121	937	1008	1235	1176	1019	984	1060
P_2	1176	1121	1082	1027	1165	1187	1404	815	1159	1126
P_3	1227	1161	1163	1051	1154	1347	1167	1143	1242	1184
Mean	1157	1091	1122	1035	1109	1256	1249	992	1128	1123
H_0	1406	1115	1225	1214	1183	1349				
H_1	991	990	988	832	931	1214				
H_2	1067	1167	1152	968	1213	1205				
S_1	1093	856	1065							
S_2	1159	1109	1058							
S_3	1223	1306	1242							

C.D. for S or H marginal means = 183.4 Kg/ha.

Crop :- Cotton.

Ref :- Hr. 63(81).

Site :- Cotton Res. Stn., Hansi.

Type :- 'D'.

Object :-To study the effect of soaking Cotton seed in different concentrations of some plant regulators on yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) May, 63. (iv) (a) 3 ploughings. (b) to (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) 20.9.63 to 2.11.63.

2. TREATMENTS :

All combinations of (1), (2), (3) and (4)+Control

(1) 3 plant regulations : R_1 =Naph. acetic acid, R_2 =Indole-3 acetic acid and R_3 =Indole-3 butyric acid

(2) 3 concentrations : C_1 =10, C_2 =20 and C_3 =30 p.p.m. in H_2O .

(3) 3 spacings : S_1 =60 cm. \times 15 cm., S_2 =60 cm. \times 30 cm. and S_3 =60 cm. \times 45 cm.

(4) 3 doses of N : N_1 =60, N_2 =120 and N_3 =180 Kg/ha.

Each confd. block had an additional control plot. Control plot-water soaked, sown at 60 cm. \times 45 cm., at 60 Kg/ha. of N.

3. DESIGN :

(i) 3⁴ confd+one control. (ii) (a) 10 plots/block, 9 blocks/replication. (b) N.A. (iii) 1. (iv) (a) 9.14 m. \times 4.57 m. (b) 8.53 m. \times 3.35 m. (v) 30 cm \times 61 cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) 1% solution of Endrine spray at flowering. (iii) Yield of *kapas*. (iv) (a) 1963—only. (b) No. (c) Nil. (v) and (vi) N.A. (vii) Before sowing the cotton seed was soaked in the hormone soln. of desired concentration for 8 hrs. One Kg of seed was soaked in 3 litres of soln.

5. RESULTS :

(i) 339 Kg/ha. (ii) 103.7 Kg/ha. (iii) Interaction (S \times N) and S \times R are significant. (iv) Av. yield of *kapas* in Kg/ha

Control=397

	C_1	C_2	C_3	S_1	S_2	S_3	N_1	N_2	N_3	Mean
R_1	377	272	227	389	226	261	307	275	295	292
R_2	374	336	348	326	344	389	370	342	346	353
R_3	342	347	365	380	376	298	355	345	354	351
Mean	364	318	313	365	315	316	344	321	331	332
N_1	377	315	320	404	298	330				
N_2	349	326	288	402	287	274				
N_3	367	294	332	289	361	344				
S_1	367	339	389							
S_2	348	332	266							
S_3	378	284	285							

C.D. for (S \times N) or (R \times S) body of the table=98.4 Kg/ha.

Crop :- Cotton (*Kharif*).

Ref :- Hr. 62(69).

Site :- Punjab Agri. University (Hissar Campus) Hissar. Type :- 'D'.

Object :—To study the effect of (Naphthalene acetic acid) (NAA) application on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy soil. (iii) May, 62. (iv) and (v) N.A. (vi) H—14. (vii) Irrigated. (viii) and (ix) N.A. (x) Oct. to end of Nov., 62.

2. TREATMENTS:

Main-plot treatments .

All combinations of (1), (2)+control (2 plots)

(1) 2 concentrations of NAA: $C_1=10$, and $C_2=20$ p.p.m.

(2) 2 times of spray: $T_1=At$ 4 to 5 leaf stage, $T_2=At$ flowering stage and $T_3=\frac{1}{2}$ as $T_1+\frac{1}{2}$ as T_2 .

Sub-plot treatments:

2 manurial treatments: $M_1=56$ Kg/ha. of N+33.6 Kg/ha. of P_2O_5 +56 Kg/ha. of K_2O and $M_2=112$ Kg/ha. of N+67.2 Kg/ha. of P_2O_5 +67.2 Kg/ha. of K_2O .

3. DESIGN:

(i) Split-plot. (ii) (a) 8 main-plots/replication; 2 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/299 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Good. (ii) N.A. (iii) Yield of *kapas*. (iv) (a) and (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 1366 Kg/ha. (ii) (a) 341.8 Kg/ha. (b) 315.3 Kg/ha. (iii) Main effect of M alone is highly significant. (iv) Av. yield of *kapas* in Kg/ha.

Control $M_1=1236$, Control $M_2=1418$ Kg/ha.

	T_1	T_2	T_3	C_1	C_2	Mean
M_1	1255	1272	1324	1237	1330	1284
M_2	1636	1292	1494	1490	1458	1474
Mean	1445	1282	1409	1364	1394	1379
C_1	1327	1263	1500			
C_2	1564	1300	1318			

C.D. for M marginal means=187.9 Kg/ha.

Crop :- Cotton.

Ref. :- Hr. 64(83).

Site :- Punjab Agri. University (Hissar Campus) Hissar. Type :- 'D'.

Object: To study the effect of soaking of seed in different concentrations of plant regulators on growth and yield of Cotton.

1. BASAL CONDITIONS:

(i) N.A. (ii) Loamy soil. (iii) May, 64. (iv) (a) 3 ploughings. (b) and (c) N.A. (d) As per treatments. (e) N.A. (v) N.A. (vi) H-14. (vii) Irrigated. (viii) 1 thinning. (ix) N.A. (x) 16.10.64 to 18.11.64.

2. TREATMENTS:

All combinations of (1), (2), (3) and (4)

(1) 3 plant regulators: $P_1=NAA$ (Naphthalene acetic acid), $P_2=IAA$ (Indole -3 acetic acid) and $P_3=IBA$ (Indole -3 butyric acid).

(2) 3 concentrations of plant regulators: $C_1=10$, $C_2=20$ and $C_3=30$ p.p.m.

(3) 3 spacings: $S_1=60$ cm. \times 15 cm., $S_2=60$ cm. \times 30 cm. and $S_3=60$ cm. \times 45 cm.

(4) 3 levels of N: $N_1=0$, $N_2=120$ and $N_3=180$ Kg/ha.

3. DESIGN:

(i) 3⁴ confd. (ii) (a) 9 plots/block, 9 blocks/replication. (b) N.A. (iii) 1. (iv) 9.14 m. \times 5.49 m. (b) 7.92 m. \times 4.88 m. (v) 61 cm. \times 30 cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of *kapas*. (iv) (a) 1964—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 752 Kg/ha. (ii) 221.3 Kg/ha. (iii) Main effect of S and interaction P×C are highly significant. Main effect of P is significant. (iv) Av. yield of *kapas* in Kg/ha.

	P ₁	P ₂	P ₃	N ₁	N ₂	N ₃	C ₁	C ₂	C ₃	Mean
S ₁	569	748	678	631	575	790	699	639	637	665
S ₂	799	838	950	855	881	851	789	903	896	862
S ₃	605	837	748	764	616	810	777	684	728	730
Mean	658	807	792	750	691	817	755	748	754	752
C ₁	706	724	834	783	642	840				
C ₂	751	892	602	677	717	851				
C ₃	516	805	941	790	713	759				
N ₁	619	838	792							
N ₂	522	791	759							
N ₃	832	792	826							

C.D. for S or P marginal means=127.8 Kg/ha.

C.D. for the body of P×C table=221.3 Kg/ha.

Crop :- Cotton (*Kharif*).

Ref :- Hr. 64(93).

Site :- Punjab Agri. University (Hissar Campus) Hissar. Type :- 'D'.

Object :—To determine the ideal plant population for obtaining high cotton yield under high fertilizer.

1. BASAL CONDITIONS :

(i) N.A. (ii) Loamy soil. (iii) 23/24.4.64. (iv) (a) 3 to 5 ploughings with *Disc* harrow. (b) and (c) N.A. (d) and (e) As per treatments. (v) 37 Kg/ha. of P₂O₅+K₂O and 10 C.L. of F.Y.M. (vi) H-14. (vii) Irrigated. (viii) 2 thinnings. (ix) N.A. (x) 7.11.64 to 26.11.64.

2. TREATMENTS :

Same as in Expt. No. 63(83) and presented on page No. 112.

3. DESIGN :

(i) 3⁴ confd. (ii) (a) 9 plots/block ; 9 blocks/replication. (b) N.A. (iii) 1. (iv) (a) N.A. (b) 1/224 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Attack of *Jassid* and white fly, 2 sprayings of Endrine. (iii) Yield of *kapas*. (iv) (a) 1964—only. (b) No. (c) Nil. (v) (a) Hissar, Abohar. (b) Nil. (vi) and (vii) N.A.

5. RESULTS :

(i) 985 Kg/ha. (ii) 182.9 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of *kapas* in Kg/ha.

	S ₁	S ₂	S ₃	P ₁	P ₂	P ₃	H ₀	H ₁	H ₂	Mean
N ₀	831	909	909	739	963	946	922	857	869	883
N ₁	1000	990	1017	1052	957	1000	1027	992	989	1003
N ₂	997	1101	1107	1037	1017	1150	1076	1058	1369	1068
Mean	943	1000	1011	943	979	1032	1008	969	976	985

C.D. for N marginal means=105.5 Kg/ha.

Crop :- Cotton (Kharif).

Ref :- Hr. 64(94).

Site :- Punjab Agri. University (Hissar Campus), Hissar. Type :- 'D'.

Object :-To determine the optimum time of spray and concentration of ANAA (alpha naphthalene acetic acid) for Cotton.

1. BASAL CONDITIONS :

(i) N.A. (ii) Loamy soil. (iii) 3rd week of May, 64. (iv) (a) to (c) N.A. (d) As per treatments. (e) N.A. (v) N.A. (vi) H-14. (vii) As per treatments. (viii) 2 thinnings. (ix) N.A. (x) 19.10.64 to 10.11.64.

2. TREATMENTS :

All combinations of (1), (2), (3) and (4)

(1) 3 concentrations of NAA : C₁=5, C₂=10 and C₃=20 p.p.m.

(2) 3 times of spray : T₁=15th June, T₂=15th June+30th June and T₃=15th June+30th June+15th July.

(3) 3 times of irrigation : I₁=40, I₂=50 and I₃=60 days after sowing.

(4) 3 spacings : S₁=60 cm × 15 cm., S₂=60 cm. × 30 cm. and S₃=60 cm. × 45 cm.

3. DESIGN :

(i) 3⁴ confd. (ii) (a) 9 plots/block, 9 blocks/replication. (b) N.A. (iii) 1. (iv) 7.62 m. × 5.49 m. (b) 6.10 m. × 5.49 m. (v) 76 cm. on either side. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of *kapas*. (iv) (a) 1964—only. (b) No. (c) Nil. (v) and (vi) N.A. (vii) Results presented under 5. Results, are available only.

5. RESULTS :

(i) 1315 Kg/ha. (ii) 212.1 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of *kapas* in Kg/ha.

	C ₁	C ₂	C ₃	T ₁	T ₂	T ₃	I ₁	I ₂	I ₃	Mean
S ₁	1141	1322	1342	1342	1262	1196	1276	1342	1187	1262
S ₂	1247	1321	1239	1213	1329	1265	1247	1215	2332	1269
S ₃	1470	1435	1318	1446	1431	1346	1381	1381	1462	1407
Mean	1286	1356	1300	1334	1341	1269	1301	1313	1327	1315

Other tables are not given.

Crop :- Cotton (Kharif).

Ref :- Hr. 64 (85), 65(42).

Site :- Punjab Agri. University (Hissar Campus), Hissar. Type :- 'D'.

Object :-To determine the suitable method of controlling weeds and its effects on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) N.A. ; Gram. (c) N.A. (ii) Loamy. (iii) May, 64 ; 18.5.65. (iv) (a) 2 to 3 ploughings. (b) to (e) N.A. (v) Nil. ; 80 Kg/ha. of N. (vi) H-14. (vii) Irrigated. (viii) 1 to 3 hoeings (ix) N.A. (x) 28.10.64 to 22.12.64 ; 20.10.65 to 10.11.65.

2. TREATMENTS :

10 weedicidal treatments: W_0 =Unweeded, W_1 =Local method of weeding, W_2 =2 Kg/ha. of Eptum before sowing, W_3 =4 Kg/ha. of Eptum before sowing, W_4 =0.5 Kg/ha. of Chloromethyle Urea pre-emergence, W_5 =1.0 Kg/ha. of Chloromethyle Urea pre-emergence, W_6 =25 Kg/ha. of Penta-Chlorophenyle post-emergence, W_7 =50 Kg/ha. of Penta-Chlorophenyle post-emergence, W_8 =5 Kg/ha. of Dowpon post-emergence and W_9 =10 Kg/ha. of Dowpon post-emergence.

3. DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 6 ; 5. (iv) (a) 6.71 m. \times 4.57 m. ; 9.00 m. \times 4.80 m. (b) 5.49 m. \times 3.81 m. ; 8.40 m. \times 3.60 m. (v) 61 cm. \times 38 cm. ; 30 cm. \times 60 cm. (vi) Yes.

4. GENERAL.

(i) Normal ; Poor. (ii) Nil. (iii) Yield of *kapas* (iv) (a) 1964--65. (b) No. (c) Nil. (v) and (vi) Nil. (vii) Error variances are heterogeneous and Treatments \times Years interaction is absent, hence the results of individual years are presented under 5. Results.

5. RESULTS :

64(85)

(i) 993 Kg/ha. (ii) 335.7 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	W_0	W_1	W_2	W_3	W_4	W_5	W_6	W_7	W_8	W_9
Av. yield	957	925	981	1100	989	909	965	1076	1092	933

65(42)

(i) 1791 Kg/ha. (ii) 431.9 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of *kapas* in Kg/ha.

Treatment	W_0	W_1	W_2	W_3	W_4	W_5	W_6	W_7	W_8	W_9
Av. yield	1825	1575	1854	1766	1791	1721	1616	1652	2003	1811

Crop :- Cotton (Kharif).

Ref :- Hr. 64(88), 65(47)

Site :- Punjab Agri. University (Hissar Campus), Hissar.

Type :- 'D'.

Object :-To study the effect of (Beta naphthoxyacetic acid) BNA spray on growth and yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) N.A. ; Bajra (c) N.A. (ii) Loamy. (iii) 25.4.65 (iv) (a) 3 to 4 ploughings with disc harrow. (b) to (e) N.A. (v) 70 kg/ha. of N. (vi) N.A. ; H-14. (vii) N.A. ; Irrigated. (viii) 1 thinning ; 1 thinning and 3 hoeings. (ix) N.A. (x) 20.10.64 to 11.12.64 ; 4.11.65 to 26.11.65.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 4 concentrations: $C_0=0$, $C_1=5$, $C_2=10$ and $C_3=15$.

(2) 3 times of spray: T_1 =one week after flowering, T_2 =two weeks after flowering and T_3 =three weeks after flowering.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) 6.10 m. \times 6.71 m. ; 4.80 m. \times 9.60 m. (b) 4.88 m. \times 5.94 m. ; 3.60 m. \times 9.00 m. (v) 51 cm. \times 38 cm. ; 60 cm. \times 30 cm. (vi) Yes.

4. GENERAL :

(i) Normal ; very poor. (ii) N.A. ; 2 Endrin sprayings. (iii) Yield of *kapas*. (iv) (a) 1964-65. (b) No. (c) Nil. (v) No. (vi) N.A. ; Drought. (vii) Error variances are homogeneous and Treatments \times Years interaction is absent.

5. RESULTS :

Pooled results

(i) 825 kg/ha. (ii) 219.2 kg/ha. (based on 77 d.f. made up of pooled error and Treatments \times Years interaction). (iii) None of the effects is significant. (iv) Av. yield of *kapas* in kg/ha.

	C ₀	C ₁	C ₂	C ₃	Mean
T ₁	794	714	903	689	775
T ₂	913	862	851	817	861
T ₃	885	833	761	873	838
Mean	864	803	838	793	825

Individual results

Treatment	C ₀	C ₁	C ₂	C ₃	Sig.	T ₁	T ₂	T ₃
Year 1964	1124	1069	1127	1041	N.S.	1016	1141	1114
1965	604	537	550	545	N.S.	534	580	563
Pooled	864	803	838	793	N.S.	775	861	838

Sig.	G.M.	S.E./plot
N.S.	1090	213.9
N.S.	559	215.0
N.S.	825	219.2

Crop :- Tobacco (*Rabi*).

Site :- Tobacco Res. Sub. Stn., Gurgaon.

Ref :- Hr. 62(32).

Type :- 'M'.

Object :- To study the different methods of application and sources of N on the yield of Tobacco.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 23.1.62 (iv) (a) 6 ploughings (b) Transplanting (c) 0.288 Kg./ha. (d) 61 cm \times 30 cm. (e) N. A. (v) N. A. (vi) C-302 (vii) Irrigated (viii) 2 hoeings and 2 weedings. (ix) 19.3 cm. (x) Mid of June 62.

2. TREATMENTS :

Main-plot treatments :

3 methods of application of N : M₁=Band, M₂=Broad cast and M₃=Plough Furrow.

Sub-plot treatments:

3 sources of 166.8 Kg/ha. of N : S₁=C/A/N, S₂=Urea and S₃=A/S.

3. DESIGN:

(i) Split-plot. (ii) (a) 3 main-plots/replication and 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) and (b) 2.4 m \times 6.0 m. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of leaves. (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 338.7 Q/ha. (ii) (a) 144.5 Q/ha. (b) 41.0 Q/ha. (iii) Main effect of S alone is significant. (iv) Av. yield of Tobacco in Q/ha.

	S ₁	S ₂	S ₃	Mean
M ₁	309.0	286.5	333.3	309.6
M ₂	336.2	305.6	317.7	320.0
M ₃	404.5	357.6	397.6	386.6
Mean	350.1	316.5	349.5	338.7

C. D. for S marginal means=35.2 Q/ha.

Crop :- Tobacco (Kharif).
Site :- Tobacco Res. Sub. Stn., Gurgaon.

Ref :- Hr. 62(48).
Type :- 'M'.

Object :- To study the effect of bulky manures and N, P and K on the yield of Tobacco.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) (a) Sandy loam. (b) N.A. (iii) 21.2.62. (iv) (a) 6 ploughings. (b) Transplanting (c) 0.288 Kg/ha. (d) 61 cm × 30 cm. (e) N.A. (v) As per treatments. (vi) C-302. (vii) Irrigated. (viii) 2 harrowings and 2 weedings. (ix) 19.3 cm. (x) Middle of June.

2. TREATMENTS :

Main-plot treatments :

3 bulky manures : M₀=Control (no manure), M₁=333.6 Kg/ha. of N as F.Y.M., 1½ months before planting and M₂=G.M. (Guara).

Sub-plot treatments :

All combinations of (1) and (2)

(1) 3 levels of P₂O₅ : P₀=0, P₁=55.6 and P₂=111.2 Kg/ha.

(2) 3 levels of K₂O : K₀=0, K₁=55.6 and K₂=111.2 Kg/ha.

(Each sub-plot was given 166.8 Kg/ha. of N as A/S)

3. DESIGN:

(i) Split-plot. (ii) (a) 3 main-plots/replication, 9 sub-plots/main-plot. (b) N.A. (iii) 5. (iv) (a) and (b) 3.00 m × 6.00 m. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of leaves. (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 210.0 Q/ha. (ii) (a) 50.90 Q/ha. (b) 30.36 Q/ha. (iii) Main effect of M alone is significant. (iv) Av. yield of tobacco (green leaves) in Q/ha.

	M ₀	M ₁	M ₂	P ₀	P ₁	P ₂	Mean
K ₀	194	232	208	220	200	213	211
K ₁	196	210	208	198	209	207	205
K ₂	201	244	200	216	207	222	215
Mean	197	229	205	211	205	214	210
P ₀	197	226	210				
P ₁	191	224	202				
P ₂	203	236	204				

C.D. for M marginal means=24.7 Q/ha.

Crop :- Tobacco (Rabi).
Site :- Tobacco Res. Stn., Gurgaon.

Ref :- Hr. 63(32), 64(20), 65(2)
Type :- 'M'.

Object : To study the effect of times of application of different sources of N on the yield of Tobacco.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 17 2.63 ; 18.2.64 ; 9.2.65. (iv) 3 to 4 ploughings. (b) Trans-planting. (c) 0.28 Kg/ha. (d) 61 cm x 30 cm. (e) N.A. (v) Nil. (vi) C-302. (vii) Irrigated. (viii) 3 to 4 hoeings. (ix) 54.1 cms ; 16.6 cms ; N.A. (x) Middle of June.

2. TREATMENTS:

Main-plot treatments:

3 sources of N at 225 Kg/ha : $S_1=C/A/N$, $S_2=Urea$ and $S_3=A/S$.

Sub-plot treatments :

4 times of application : $T_1=Half$ applied before planting and half 15 days after planting, $T_2=Half$ applied before and half 30 days after planting, $T_3=Half$ applied before planting and half 45 days after planting and $T_4=Half$ applied 15 days after planting and half 45 days after planting.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication ; 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) and (b) 3'00 m x 5'40 m, (v) Nil. (vi) Yes.

4. GENERAL :

(i) Good. (ii) N.A. ; N.A. ; Nil. (iii) Yield of green leaf. (iv) (a) 1963-65. (b) No. (c) Results of combined analysis have been presented under 5-Results. (v) and (vi) Nil. (vii) Both the error variances are homogeneous and Treatments x Years interaction is present in case of main-plot treatments and absent in case of sub-plot treatments.

5. RESULTS :

Pooled results

(i) 288.5 Q/ha. (ii) (a) 164.5 Q/ha. (based on 4 d.f. made up of Treatments x Years interaction). (b) 32.4 Q/ha. (based on 99 d. f. made up of pooled error and Treatments x Years interaction). (iii) Main effect of T alone is highly significant. (iv) Av. yield of green leaf in Q/ha.

	T_1	T_2	T_3	T_4	Mean
S_1	292.3	276.0	267.0	245.0	270.0
S_2	324.3	303.3	281.6	273.6	295.7
S_3	322.6	313.0	294.6	269.3	299.9
Mean	313.1	297.4	281.1	262.6	288.5

C. D. for T marginal means = 15.3 Q/ha.

Individual results

Treatment	S_1	S_2	S_3	Sig.	T_1	T_2	T_3	T_4
Year 1963	252.4	372.8	336.9	*	361.5	341.6	306.3	273.5
1964	223.4	200.6	223.8	N.S.	229.7	220.7	207.6	205.8
1965	334.7	314.0	339.2	N.S.	348.2	330.2	329.6	309.2
Pooled	270.0	295.7	299.9	N.S.	313.1	297.4	281.1	262.6

Sig.	G.M.	S.E./plot	Main	Sub
**	320.7	96.7	35.2	
N.S.	215.9	54.4	23.5	
N.S.	329.3	60.8	32.9	
N.S.	288.5	164.5	32.4	

Crop :- Tobacco (Rabi).**Ref :- Hr., 64(24).****Site :- Tobacco Res. Stn., Gurgaon.****Type :- 'MV'.****Object :** To study the effect of high doses of N on the different varieties of Tobacco.**1. BASAL CONDITIONS :**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 22.12.64. (iv) (a) to (e) N.A. (v) Nil. (vi) As per treatment (vii) Irrigated. (viii) and (ix) N.A. (x) Mid. of June.

2. TREATMENTS :**Main-plot treatments :**6 levels of N: $N_1=168$, $N_2=224$, $N_3=280$, $N_4=336$, $N_5=392$ and $N_6=448$ Kg/ha.**Sub-plot treatments :**3 varieties: $V_1=T-238$, $V_2=C-302$ and $V_3=T-370$.**3. DESIGN :**

(i) Split-plot. (ii) (a) 6 main-plots/replication and 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) & (b) 1.60 m x 3.60 m. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Good. (ii) N.A. (iii) Yield of leaves. (iv) (a) 1964—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 516 Q/ha. (ii) (a) 88.1 Q/ha. (b) 56.8 Q/ha. (iii) Main effect of V is highly significant and that of N is significant. (iv) Av. yield of tobacco (green leaves) in Q/ha.

	N_1	N_2	N_3	N_4	N_5	N_6	Mean
V_1	420	486	544	542	490	472	492
V_2	405	420	537	505	480	442	465
V_3	474	636	619	635	615	565	591
Mean	433	514	567	561	528	493	516

C. D. for N marginal means=76.6 Q/ha.

C. D. for V marginal means=33.3 Q/ha.

Crop :- Tobacco (Rabi).**Ref :- Hr. 62(13).****Site :- Tobacco Res. Stn. Gurgaon.****Type :- 'CV'.****Object :** To study the effects of different dates of sowing for the max. production of seed.**1. BASAL CONDITIONS :**

(i) (a) Nil. (b) and (c) N.A. (ii) (a) Sandy loam. (b) Nil. (iii) As per treatments. (iv) (a) ploughings. (b) Transplanting. (c) 0.288 Kg/ha in nursery. (d) 30 cm x 30 cm on ridges. (e) N.A. (v) Nil. (vi) As per treatments. (vii) Irrigated. (viii) 2 weedings and 2 harrowings. (ix) 19.3 cm. (x) Mid. of June.

2. TREATMENTS :**Main-plot treatments :**4 dates of sowing:— $D_1=17.10.62$, $D_2=3.11.62$, $D_3=17.11.62$ and $D_4=17.12.62$.**Sub-plot treatments :**2 varieties; $V_1=C-302$ and $V_2=T-238$.**3. DESIGN:**

(i) Split-plot. (ii) (a) 4 main-plots/replication; 2 sub-plots/main-plot. (b) N.A. (iii) 5. (iv) (a) and (b) 1.80 m. x 5.40 m. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of tobacco. (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 444 Kg/ha. (ii) (a) 113.2 Kg/ha. (b) 102.9 Kg/ha. (iii) Main effects of D and V are highly significant. (iv) Av. yield of tobacco in Kg/ha.

	D ₁	D ₂	D ₃	D ₄	Mean
V ₁	549	376	317	70	328
V ₂	675	774	665	122	559
Mean	612	575	491	96	444

C. D. for D marginal means=110.3 Kg/ha.

C. D. for V marginal means=65.9 Kg/ha.

Crop :- Tobacco (Rabi).

Ref :- Hr. 62(42).

Site :- Tobacco Res. Stn., Gurgaon.

Type :- 'CV'.

Object :- To study the effect of piercing on the suppression of suckers of different varieties of Tobacco Crop.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 12.1.62. (iv) (a) 6 ploughings. (b) Transplanting. (c) 0.288 Kg/ha. (d) 30 cm × 30 cm. (e) N.A. (v) Nil. (vi) As per treatments. (vii) Irrigated. (viii) 3 to 4 hoeings. (ix) N.A. (x) Middle of June.

2. TREATMENTS:

Main-plot treatments :

2 levels of Piercings : P₀=No piercing and P₁=Piercing.

Sub-plot treatments :

4 varieties : V₁=C-302 × 192, V₂=S-131 × 192, V₃=C-302 and V₄=T-238

3. DESIGN:

(i) split-plot. (ii) (a) 2 main-plots/replication, 4 sub-plots/main-plot. (b) N.A. (iii) 5. (iv) (a) and (b) 0.60 m × 3.00 m. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil (iii) Yield of suckers. (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 3101 Kg/ha. (ii) (a) 1224.4 Kg/ha. (b) 1508.4 Kg/ha. (iii) Main effect of P alone is highly significant. (iv) Av. yield of Tobacco (suckers) in Kg/ha.

	V ₁	V ₂	V ₃	V ₄	Mean
P ₀	4833	5111	2889	3722	4139
P ₁	2078	2222	1622	2333	2064
Mean	3456	3666	2256	3027	3101

C. D. for P marginal means=1074.8 Kg/ha.

Crop :- Tobacco (Rabi).**Ref :- Hr. 63(34).****Site :- Tobacco Res. Stn., Gurgaon.****Type :- 'CV'.****Object :-**To study the effect of topping on the yield of different varieties of Tobacco.**1. BASAL CONDITIONS :**

(i) (a) Nil. (b) and (c) N.A. (ii) (a) Sandy loam. (b) Nil. (iii) 17.2.63. (iv) (a) 6 ploughings. (b) Transplanting. (c) 0.288 Kg/ha. (d) 30 cm × 30 cm. (e) N.A. (v) Nil. (vi) As per treatments. (vii) Irrigated. (viii) 4 hoeings. (ix) N.A. (x) Mid. of June 63.

2. TREATMENTS :

All combinations of (1) and (2),

(1) 2 toppings : T_0 = No topping and T_1 = topping.(2) 7 varieties : V_1 = T-238, V_2 = C-302, V_3 = T-370, V_4 = C-390, V_5 = C-435, V_6 = 131 × 192, V_7 = 302 × 192.**3. DESIGN :**

(i) Fact. in R. B. D. (ii) (a) 14. (b) N.A. (iii) 4. (iv) (a) and (b) 0.3 m × 5.4 m. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of tobacco. (iv) (a) 1963—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :(i) 406.8 Q/ha. (ii) 77.04 Q/ha. (iii) Main effect of V is significant. Main effect of T and interaction $V \times T$ are highly significant. (iv) Av. yield of Tobacco in Q/ha.

	V_1	V_2	V_3	V_4	V_5	V_6	V_7	Mean
T_1	436.7	571.8	447.5	346.4	393.5	467.7	425.9	441.4
T_2	342.1	392.0	347.2	479.9	353.4	424.4	267.0	372.3
Mean	389.4	431.9	397.4	413.2	373.5	446.0	346.5	406.8

C. D. for V marginal means = 77.8 Q/ha.

C. D. for T marginal means = 41.6 Q/ha.

C. D. for the body of $V \times T$ table = 110.0 Q/ha.**Crop :- Tobacco (Rabi).****Ref :- Hr. 63(31), 64(14).****Site :- Tobacco Res. Stn., Gurgaon.****Type :- 'CV'.****Object :-**To find out the effect of piercings and topping on the yield of different varieties of Tobacco.**1. BASAL CONDITIONS :**

(i) (a) to (c). (ii) Sandy loam. (iii) 17.2.63 ; 19.2.64. (iv) (a) 5 to 6 ploughings ; N.A. (b) Transplanting on ridges. (c) 0.14 Kg/ha. in nursery. (d) 61 cm × 30 cm. (e) N.A. (v) 37 C.L./ha. of F. Y. M. ; Nil. (vi) As per treatments. (vii) Irrigated. (viii) 3 to 4 hoeings ; N.A. (ix) N.A. (x) 2nd week of June.

2. TREATMENTS :**Main-plot treatments :**4 varieties : V_1 = Hybrid 302 × 192, V_2 = Hybrid 131 × 192, V_3 = T-238, and V_4 = C-302.**Sub-plot treatments :**2 piercings : P_0 = No piercing and P_1 = Piercing,**Sub-sub-plot treatments :**3 toppings stages : T_1 = 10 leaves, T_2 = 12 leaves and T_3 = Topping at flowering stage.
Piercing done after topping.

3. DESIGN :

- (i) Split-Split-plot. (ii) (a) 4 main-plots/replication ; 2 sub-plots/main-plot and 3 sub-sub-plot /sub-plot.
 (b) N.A. (iii) 5 ; 6. (iv) (a) and (b) 0.30 m × 5.40 m ; 0.60 m × 5.40 m. (v) Nil. (vi) Yes.

4. GENERAL :

- (i) Normal. (ii) Nil. (iii) Yield of leaves. (iv) (a) 1963—64. (b) No. (c) Nil. (v) and (vi) Nil. (vii)
 As error variances are heterogeneous, the results of individual years are presented under 5. Results.

5. RESULTS:

63(31)

- (i) 361.6 Q/ha. (ii) (a) 50.62 Q/ha. (b) 50.47 Q/ha. (c) 43.28 Q/ha. (iii) Main effects of V and T are significant. (iv) Av. yield of green leaves in Q/ha.

	V ₁	V ₂	V ₃	V ₄	T ₁	T ₂	T ₃	Mean
P ₀	393.4	388.9	350.6	342.8	351.8	375.5	379.5	368.9
P ₁	342.8	390.5	350.2	333.3	341.5	357.1	363.7	354.2
Mean	368.1	389.7	350.4	338.1	346.4	366.7	371.6	361.6
T ₁	341.7	365.4	346.6	332.1				
T ₂	373.1	403.7	333.3	356.5				
T ₃	389.5	400.0	371.3	325.6				

C.D. for V marginal means=28.48 Q/ha.

C.D. for T marginal means=19.36 Q/ha.

64(14)

- (i) 229.3 Q/ha. (ii) (a) 70.80 Q/ha. (b) 68.21 Q/ha. (c) 51.54 Q/ha. (iii) Main effects of V and T are highly significant while interaction T × V is significant. (iv) Av. yield of leaves in Q/ha.

	V ₁	V ₂	V ₃	V ₄	T ₁	T ₂	T ₃	Mean
P ₀	184.3	211.6	281.4	273.7	221.8	235.5	255.9	237.7
P ₁	184.3	191.4	269.4	238.2	196.4	211.4	254.6	220.8
Mean	184.3	201.5	275.4	255.9	209.1	223.4	255.2	229.3
T ₁	162.3	179.3	259.8	235.1				
T ₂	196.2	163.6	282.2	251.8				
T ₃	194.4	261.6	284.2	280.8				

C. D. for V marginal means = 35.56 Q/ha.

C. D. for T marginal means = 20.97 Q/ha.

C. D. for T means at the same level of V=41.93 Q/ha.

C. D. for V means at the same level of T=49.34 Q/ha.

Crop :- Tobacco (Rabi)

Ref :- Hr. 64(23).

Site :- Tobacco Res. Stn., Gurgaon.

Type :- 'CV'.

Object :- To study the effect of topping on the yield of different varieties of Tobacco crop.

1 BASAL CONDITIONS :

- (i) (a) to (c) N.A. (ii) (a) Sandy loam. (b) N.A. (iii) 18.2.64. (iv) (a) 6 ploughings. (b) Transplanting.

(c) 0.288 Kg./ha. in nursery. (d) 30 cm × 30 cm. (e) N.A. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 4 harrowings. (ix) 16.4 cm. (x) 15.6.64.

2. TREATMENTS :

Main-plot treatments :

7 varieties :— $V_1=T-238$, $V_2=C-302$, $V_3=C-390$, $V_4=C-194$, $V_5=T-370$, $V_6=131 \times 192$ and $V_7=302 \times 192$.

Sub-plot treatments :

3 toppings :— T_0 =No topping, T_1 =Topping and T_2 =Topping at 12 leaves stage.

3. DESIGN :

(i) Split-plot. (ii) (a) 7 main-plots/replication ; 3 sub-plots/main-plot. (b) N. A. (iii) 4. (iv) (a) and (b) 0.60 m × 5.40 m. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of leaves. (iv) (a) 1964—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 263.9 Q/ha. (ii) (a) 46.76 Q/ha. (b) 40.37 Q/ha. (iii) Main effects of V and T are highly significant. (iv) Av. yield of Tobacco in (Green leaves) Q/ha.

	V_1	V_2	V_3	V_4	V_5	V_6	V_7	Mean
T_0	173.6	277.0	213.7	301.7	264.7	224.5	217.6	239.0
T_1	224.5	359.6	276.2	297.1	294.7	285.5	280.9	288.4
T_2	202.9	312.5	266.2	249.2	288.6	277.0	253.9	264.3
Mean	200.4	316.4	252.0	282.7	282.7	262.3	250.8	263.9

C. D. for V marginal means=40.11 Q/ha.

C. D. for T marginal means=21.78 Q/ha.

Crop :- Tobacco (Rabi).

Site :- Tobacco Res. Stn., Gurgaon.

Ref :- Hr. 65(5).

Type :- 'GV'.

Object :- To study the effects of Topping and no Topping on the yield of different varieties of Tobacco.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) (a) Sandy loam. (b) Nil. (iii) 5.2.65. (iv) (a) to (e) N.A. (v) Nil. (vi) As per treatments. (vii) Irrigated. (viii) and (ix) N.A. (x) Mid. of June, 65.

2. TREATMENTS :

Main-plot treatments :

8 varieties : $V_1=T-238$, $V_2=C-302$, $V_3=C-390$, $V_4=C-194$, $V_5=T-370$, $V_6=131 \times 192$, $V_7=302 \times 192$ and $V_8=435$.

Sub-plot treatments :

3 Toppings : T_0 =No topping, T_1 =Topping at 12 leaves stage and T_2 =Topping at flowering.

3. DESIGN :

(i) Split-plot. (ii) (a) 8 main-plots/replication ; 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) and (b) 0.60 m × 5.40 m. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of green plants. (iv) (a) 1965—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

- (i) 356.1 Q/ha. (ii) (a) 50.31 Q/ha. (b) 26.85 Q/ha. (iii) Main effect of T alone is highly significant. (iv) Av. yield of Tobacco (green plants) in Q/ha.

	V ₁	V ₂	V ₃	V ₄	V ₅	V ₆	V ₇	V ₈	Mean
T ₀	362.6	308.6	347.2	331.1	312.5	343.4	339.5	362.7	338.5
T ₁	374.1	335.6	324.8	358.8	343.4	370.4	312.5	362.7	347.7
T ₂	424.4	354.9	405.1	362.6	378.1	370.4	362.7	397.4	381.9
Mean	387.1	333.1	358.8	351.1	344.7	361.4	338.2	374.2	356.1

C. D. for T marginal means=13.7 Q/ha.

Crop :- Tobacco (Rabi).

Ref :- Hr. 63(35).

Site :- Tobacco Res. Stn., Gurgaon.

Type :- 'CM'.

Object ;—To study the effect of N and spacings on the yield of Tobacco crop.

1. BASAL CONDITIONS :

- (i) (a) to (c) N.A. (ii) Sandy loam. (iii) 17.2.63 (iv) (a) to (e) N.A. (v) Nil. (vi) C-302—(ear.y). (vii) Irrigated. (viii) N.A. (ix) N.A. (x) Mid. of June, 63.

2. TREATMENTS :

Main-plot treatments ;

3 doses of N as C/A/N : N₁=100, N₂=200 and N₃=300 kg/ha.

Sub-plot treatments:

4 spacings : S₁=30 cm × 30 cm, S₂=60 cm × 22.5 cm, S₃=60 cm × 30 cm and S₄=60 cm × 45 cm.

3. DESIGN :

- (i) Split-plot. (ii) (a) 3 main-plots/block ; 4 sub-plots/main-plot. (b) N. A. (iii) 4. (iv) (a) and (b) 2.40 m × 5.40 m. (v) Nil. (vi) Yes.

4. GENERAL :

- (i) Good growth. (ii) N.A. (iii) Yield of leaves. (iv) (a) 1963—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

- (i) 521 Q/ha. (ii) (a) 102.5 Q/ha. (b) 45.2 Q/ha. (iii) Main effects of N and S are highly significant. (iv) Av. yield of Tobacco (green leaves) in Q/ha.

	S ₁	S ₂	S ₃	S ₄	Mean
N ₁	452	378	454	335	405
N ₂	616	518	576	397	527
N ₃	711	613	676	529	632
Mean	593	503	569	420	521

C. D. for N marginal means=88.7 Q/ha.

C. D. for S marginal means =37.9 Q/ha.

Crop :- Tobacco (*Rabi*)

Ref :- Hr. 63(27), 65(7)

Site :- Tobacco Res. Stn , Gurgaon,

Type :- 'CM'.

Object :- To study the effect of different doses of N and spacings on the yield of Tobacco.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 21.12.63 ; 3.1.65. (iv) (a) to (e) N. A. (v) Nil ; N. A. (vi) C-302. (vii) Irrigated. (viii) and (ix) N.A. (x) Mid. of June.

TREATMENTS :

Same as in expt. no. 63(35) presented on page no. 126.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication ; 4 sub-plots/main-plot. (b) N. A. (iii) 4. (iv) (a) and (b) 2 40m x 5.40 m. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of green leaves. (iv) (a) 1963-65 (1964 N.A.) (b) No. (c) Nil. (v) and (vi) Nil. (vii) As sub-plot error variances are heterogeneous, hence results of individual years are given below.

5. RESULTS :

63(27)

(i) 233 Q/ha. (ii) (a) 85.8 Q/ha. (b) 16.5 Q/ha. (iii) Main effect of S and interaction S x N are highly significant. (iv) Av. yield of green leaves in Q/ha.

	S ₁	S ₂	S ₃	S ₄	Mean
N ₀	218	203	196	160	197
N ₁	294	235	214	207	238
N ₂	319	285	243	204	263
Mean	277	241	218	193	233

C. D. for S marginal means = 14 Q/ha.

C. D. for S means at the same level of N = 24 Q/ha.

65(7)

(i) 309 Q/ha. (ii) (a) 65.8 Q/ha. (b) 42.9 Q/ha. (iii) Main effect of S is highly significant and that of N is significant. (iv) Av. yield of green leaves in Q/ha.

	V ₁	V ₂	V ₃	V ₄	Mean
N ₁	329	217	245	279	267
N ₂	358	304	255	341	314
N ₃	386	307	306	382	345
Mean	357	276	268	334	309

C. D. for N marginal means = 57 Q/ha.

C. D. for S marginal means = 35 Q/ha.

Crop :- Tobacco (Rabi).**Ref :- Hr. 65(6).****Site :- Tobacco Res. Stn., Gurgaon.****Type :- 'CM'.**

Object:—To study the effect of different doses of N, different dates of planting and spacings on the yield of Tobacco.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) As per treatments. (iv) (a) to (c) N.A. (d) As per treatments. (e) N.A. (v) Nil. (vi) C—302. (vii) Irrigated. (viii) to (ix) N.A. (x) Mid. of June, 65.

2. TREATMENTS :**Main-plot treatments :**

6 dates of sowing: $D_1=12\text{th Nov., }64$, $D_2=3\text{rd Dec., }64$, $D_3=24\text{th Dec., }64$, $D_4=14\text{th Jan., }65$, $D_5=4\text{th Feb., }65$ and $D_6=25\text{th Feb., }65$.

Sub-plot treatments ;

4 doses of N as C/A/N : $N_1=125$, $N_2=175$, $N_3=225$ and $N_4=275$ Kg/ha.

Sub-sub-plot treatments :

3 spacings : $S_1=60\text{ cm} \times 30\text{ cm.}$, $S_2=45\text{ cm} \times 30\text{ cm.}$ and $S_3=30\text{ cm} \times 30\text{ cm.}$

3 DESIGN :

(i) Split-Split-plot. (ii) 6 main-plots/replication ; 4 sub-plots/main-plot and 3 sub-sub plots/sub-plot. (iii) 4. (iv) (a) and (b) $0.60\text{ m} \times 5.40\text{ m.}$ (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of green leaves. (iv) (a) 1965—only. (b) and (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 496 Q/ha., (ii) (a) 140.1 Q/ha. (b) 76.2 Q/ha. (c) 61.1 Q/ha. (iii) Main effects of D, N, S and interaction D \times S are highly significant. (iv) Av. yield of Tobacco in Q/ha.

	D_1	D_2	D_3	D_4	D_5	D_6	S_1	S_2	S_3	Mean
N_1	419	509	410	370	448	302	496	411	358	422
N_2	559	605	496	398	455	333	545	459	419	474
N_3	613	600	596	496	497	343	627	515	431	524
N_4	668	695	618	500	514	389	668	547	477	564
Mean	583	602	530	441	479	342	584	433	421	496
S_1	724	713	634	498	544	390				
S_2	558	582	519	431	470	337				
S_3	466	512	436	394	421	298				

C. D. for D marginal means = 61.0 Q/ha.

C. D. for N marginal means = 25.5 Q/ha.

C. D. for S marginal means = 19.5 Q/ha.

Crop :- Tobacco (Rabi).**Ref :- Hr. 64(25).****Site :- Tobacco Res. Stn., Gurgaon.****Type :- 'CMV'.**

Object:—To study the effect of different dates of sowing in combination with the doses of 'P'. On the different varieties of Tobacco.

1. BASAL CONDITIONS :

(i) (a) to (c) N. A. (ii) Sandy loam. (iii) As per treatments. (iv) (a) 4 to 5 ploughings. (b) Transplant-

ing. (c) 300 gm/ha. (d) and (e) N. A. (v) 150 Kg/ha. of N. (vi) As per treatments. (vii) Irrigated. (viii) and (ix) N.A. (x) Mid. of June.

2. TREATMENTS:

Main-plot treatments:

4 dates of sowing : $D_1=16.10.64$, $D_2=1.11.64$, $D_3=16.11.74$ and $D_4=1.12.64$.

Sub-plot treatments:

3 levels of P_2O_5 as super ; $P_0=$ Control (no P_2O_5), $P_1=112$ and $P_2=224$ Kg/ha.

Sub-sub-plot treatments:

2 varieties : $V_1=C-302$ and $V_2=T-238$,

P_2O_5 broadcasted before transplanting.

3. DESIGN:

(i) Split-split-plot. (ii) (a) 4-main-plots/replication ; 3 sub-plots/main-plot and 3 sub-sub-plots/sub-plot. (b) N.A. (iii) 3. (iv) (a) and (b) 1.80 m x 5.40 m. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of leaves ; Yield of seed. (iv) (a) 1964—only. (b) No. (c) Nil, (v) to (vii) Nil.

5. RESULTS:

(i) 1093 Kg/ha. (ii) (a) 435.2 Kg/ha. (b) 372.1 Kg/ha. (c) 170.5 Kg/ha. (iii) Main effect of D is significant and that of V is highly significant. (iv) Av. yield of tobacco (seed) in Kg/ha.

	D_1	D_2	D_3	D_4	P_0	P_1	P_2	Mean
V_1	1068	1021	646	668	766	892	894	851
V_2	1638	1516	1069	1117	1223	1318	1463	1335
Mean	1353	1268	858	892	994	1105	1179	1093
P_0	1248	1202	722	806				
P_1	1346	1229	917	926				
P_2	1464	1373	933	945				

C. D. for D marginal means = 355.0 Kg/ha.

C. D. for V marginal means = 82.9 Kg/ha.

Crop :- Tobacco (Rabi).

Site :- Tobacco Res. Sta., Gurgaon.

Ref :- Hr. 64(21), 65(3).

Type :- 'CMV'.

Object :- To study the effect of different doses of N and spacings on different varieties of Tobacco Crop.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 10.3.64 ; 9.2.65. (iv) (a) 4 to 5 ploughings. (b) Transplanting. (c) — (d) As per treatments. (e) N.A. (v) Nil ; N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 hoeings ; N.A. (ix) 30.8 cm ; N.A. (x) 16.9.64 ; Mid of June.

2. TREATMENTS:

Main-plot treatments:

3 levels of N as C/A/N : $N_1=112$, $N_2=168$ and $N_3=224$ Kg/ha.

Sub-plot treatments:

4 varieties : $V_1=131 \times 92$, $V_2=302 \times 192$, $V_3=C-302$ and $V_4=T-238$.

Sub-sub-plot treatments:

4 spacings : $S_1=30\text{ cm} \times 15\text{ cm}$, $S_2=30\text{ cm} \times 23\text{ cm}$, $S_3=30\text{ cm} \times 30\text{ cm}$ and $S_4=30\text{ cm} \times 46\text{ cm}$.

3. DESIGN:

(i) Split-split-plot. (ii) (a) 3 main-plots/replication; 4 sub-plots/main-plot; 4 sub-sub-plots/sub-plot. (b) N.A.
(iii) 4. (iv) (a) and (b) $0.60\text{ m} \times 5.40\text{ m}$. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Good. (ii) N.A. (iii) Yield of green leaves. (iv) (a) 1964—65. (b) No. (c) Nil. (v) and. (vi) Nil.
(vii) Because sub-sub plot error variances are heterogeneous, therefore results of individual years are given below.

5. RESULTS:

64(21)

(i) 253 Q/ha. (ii) (a) 74.4 Q/ha. (b) 85.8 Q/ha. (c) 46.3 Q/ha. (iii) Main effect of V and S are highly significant. (iv) Av. yield of green leaves in Q/ha.

	V ₁	V ₂	V ₃	V ₄	S ₁	S ₂	S ₃	S ₄	Mean
N ₁	279	262	251	192	292	265	239	188	246
N ₂	295	263	236	201	308	265	230	193	249
N ₃	322	317	220	194	328	270	249	206	363
Mean	298	281	236	196	309	267	239	196	253
S ₁	358	343	290	246					
S ₂	314	292	235	216					
S ₃	289	267	224	177					
S ₄	232	220	176	155					

C.D. for V marginal means=35.9 Q/ha.

C.D. for S marginal means=18.8 Q/ha.

65(3)

(i) 272 Q/ha. (ii) (a) 91.0 Q/ha. (b) 10.7 Q/ha. (c) 3.8 Q/ha. (iii) Main effects of N and S are highly significant and that of V is significant. (iv) Av. yield of tobacco (green leaves) in Q/ha.

	V ₁	V ₂	V ₃	V ₄	S ₁	S ₂	S ₃	S ₄	Mean
N ₁	193	241	276	246	312	233	234	175	239
N ₂	231	255	296	266	324	275	243	205	262
N ₃	285	318	335	324	380	304	311	268	316
Mean	237	273	302	279	339	271	263	216	272
S ₁	302	329	374	350					
S ₂	239	285	292	266					
S ₃	234	262	292	265					
S ₄	171	210	251	234					

C.D. for N marginal means=39 Q/ha.

C.D. for V marginal means=45 Q/hg.

C.D. for S marginal means=25 Q/ha.

Crop :- Tobacco (*Rabi*).

Ref :- Hr. 63(33), 64(26), 65(8)

Site :- Tobacco Res. Stn., Gurgaon.

Type :- 'D'.

Object :- To study the effect of different chemicals and oils on the suppression of suckers and on the yield of Tobacco.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 17.2.63 ; 19.2.64 ; 5.2.65. (iv) (a) to (e) N.A (v) Nil. (vi) C-302. (vii) Irrigated. (viii) and (ix) N.A. (x) Middle of June.

2. TREATMENTS :

8 chemical treatments: C₀—Control, C₁—Mustard oil, C₂—Coconut oil, C₃—Coconut oil in 1 : 2 emulsion, C₄—Coconut oil 1 : 5 emulsion, C₅—Maleic Hydrazide 1% in water as spray, C₆—Maleic Hydrazide 2% in water spray and C₇—Naphthalene acetic acid 2% in triethynolamine.

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 6. (iv) (a) and (b) 0.30 m × 3.00 m for 63 ; 0.60 m × 5.40 m for others. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of suckers and green leaves. (iv) (a) 1963 to 65. (b) No. (c) The results of the combined analysis are presented under 5-Results. (v) and (vi) Nil. (vii) (i) Error variances are heterogeneous and Treatments × years interaction is present for suckers. (ii) Error variances are homogeneous and Treatments × years interaction is absent.

5. RESULTS :

Suckers

Pooled results :

(i) 4415 Kg/ha. (ii) 2550 Kg/ha. (based on 14 d.f. made up of Treatments × years interaction.) (iii) Treatment differences are not significant. (iv) Av. yield of suckers in Kg/ha.

Treatment	C ₀	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇
Av. yield	5644	4746	2666	4646	4633	3746	5036	4203

Individual results

Treatment	C ₀	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	Sig.	G.M.	S.E./plot
Year											
1963	12046	10593	5704	9602	9194	7528	10741	9712	**	9390	1111.1
1964	3112	2160	1188	2083	1980	2135	2701	1363	**	2090	512.3
1965	1775	1432	1106	2263	2726	1569	1672	1543	*	1768	725.3
Pooled	5644	4746	2666	4646	4633	3746	5036	4203	N.S.	4415	2550.0

Green leaves

Pooled results

(i) 331 Q/ha. (ii) 42.2 Q/ha. (based on 119 d.f. made up of pooled error and Treatments × years interaction). (iii) Treatment differences are not significant. (iv) Av. yield of green leaves in Q/ha.

Treatment	C ₀	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇
Av. yield	325	330	362	337	328	322	324	319

Individual results

Treatment	C ₀	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	Sig.	G.M.	S.E./plot
Year 1963	398	418	481	415	413	382	400	422	N.S.	416	46.2
1964	234	249	254	251	249	243	242	202	N.S.	241	33.4
1965	342	324	352	345	321	342	332	334	N.S.	337	45.7
Pooled	325	330	362	337	328	322	324	319	N.S.	331	42.2

Crop :- Groundnut (Kharif).

Ref :- Hr. 60 and 61(SFT).

Site :- (District) : Ambala.

Type :- 'M'.

Type A:—To study the response of Groundnut on different levels of N, P and K applied individually and in combination.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Alluvial. (iii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure)

N=22.4 Kg/ha. of N,

P=33.6 Kg/ha. of P₂O₅,

K=33.6 Kg/ha. of K₂O,

NP=22.4 Kg/ha. of N+33.6 Kg/ha. of P₂O₅,

NK=22.4 Kg/ha. of N+33.6 Kg/ha. of K₂O,

PK=33.6 Kg/ha. of P₂O₅+33.6 Kg/ha. of K₂O and

NPK=22.4 Kg/ha. of N+33.6 Kg/ha. of P₂O₅+33.6 Kg/ha. of K₂O.

3. DESIGN :

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and circle/thana is changed once in two years within the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on Kharif cereal, 8 on a Rabi cereal, 8 on cash crop, 4 on an oilseed crop and 3 on a leguminous crop. Half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. The three trials on legumes are of type C. Residual effects of phosphate application are studied on Type C trial in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98.8 ha. (b) 1/197.7 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—61. (b) and (c) Nil. (v) Nil. (vi) and (vii) N.A. Av. response in Kg/ha.

5. RESULTS :

1960

District	No of trials	Control yield in Kg/ha.	N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Ambala	2	1440	190	-40	250	115.0	110	-180	-3	540	78.0

1961

Ambala	4	1210	110	130	110	47.0	260	60	-110	20	133.0
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Crop :- Groundnut (Kharif).

Ref :- Hr. 64(SFT).

Site :- (District) Ambala.

Type :- 'M'.

Object :-Type A₁ : To study the response curves of important cereal, cash and oilseed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O = Control (no manure).

N₁ = 15 Kg/ha. of N,

N₂ = 30 Kg/ha. of N,

P₁ = 20 Kg/ha. of P₂O₅,

N₁P₁ = 15 Kg/ha. of N + 20 Kg/ha. of P₂O₅,

N₂P₁ = 30 Kg/ha. of N + 20 Kg/ha. of P₂O₅,

N₂P₂ = 30 Kg/ha. of N + 40 Kg/ha. of P₂O₅ and

N₂P₂K₁ = 30 Kg/ha. of N + 40 Kg/ha. of P₂O₅ + 20 Kg/ha. of K₂O.

3. DESIGN :

(i) and (ii) A selected district is divided into four agriculturally homogeneous zones based on climate, soil, cropping pattern etc. In each zone one block is selected at random. A block normally consists of a group of 50-100 villages. In each block 36 experiments are conducted in a year of which 11 are of type A₁, 11 of type A₂, 11 of type A₃ and 3 are of type C. The above experiments under type A₁, A₂ and A₃ are distributed as 3 on a Kharif cereal, 3 on a Rabi cereal, 3 on a cash crop and 2 on oil seed. All the three type-C experiments are conducted on a legume crop. For the purpose of conducting the A₁, A₂ and A₃ experiments 11 villages are randomly selected in each block and in each village 3 experiments one each of type A₁, A₂ and A₃ are laid out. For conducting the experiments three villages are randomly selected in each block. (iii) (a) 1/100 ha. (b) 1/200 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of Kernel. (iv) (a) 1964—only. (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS :

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	770	349	698	942	777	1024	1228	495.9

Control yield = 1627 Kg/ha. No. of trials = 3.

Crop :- Groundnut (Kharif).

Ref :- Hr. 65(SFT).

Site :- (District) Hissar.

Type :- 'M'.

Object :-Type A₁ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O = Control (no manure),

- $N_1=15$ Kg/ha. of N,
 $N_2=30$ Kg/ha. of N,
 $P_1=30$ Kg/ha. of P_2O_5 ,
 $N_1P_1=15$ Kg/ha. of N+30 Kg/ha. of P_2O_5 ,
 $N_2P_1=30$ Kg/ha. of N+30 Kg/ha. of P_2O_5 ,
 $N_1P_2=30$ Kg/ha. of N+60 Kg/ha. of P_2O_5 ,
 $N_2P_2K_1=30$ Kg/ha. of N+60 Kg/ha. of P_2O_5 +30 Kg/ha. of K_2O .

3. DESIGN:

Same as in type A_1 conducted under unirrigated conditions on groundnut crop on page No. 133.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of Kernel. (iv) (a) 1965—only. (b) and (c) Nil. (v) to (vii) N.A.

5. RESULTS:

Treatment	N_1	N_2	P_1	N_1P_1	N_2P_1	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of yield in Kg/ha.	230	280	170	340	390	350	360	51.8

Control yield=490 Kg/ha. No. of trials=2.

Crop :- Groundnut (*Kharif*).

Ref :- Hr. 64(SFT) for Ambala
and 65(SFT) for Hissar.

Site :- (District) Hissar and Ambala.

Type :- 'M'.

Object :—Type A_2 : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS:

8 manurial treatments:

- O=Control (no manure),
 $N_1=15$ Kg/ha. of N,
 $P_1=20$ Kg/ha. of P_2O_5 ,
 $P_2=40$ Kg/ha. of P_2O_5 ,
 $N_1P_1=15$ Kg/ha. of N+20 Kg/ha. of P_2O_5 ,
 $N_1P_2=15$ Kg/ha. of N+40 Kg/ha. of P_2O_5 ,
 $N_2P_2=30$ Kg/ha. of N+40 Kg/ha. of P_2O_5 and
 $N_2P_2K_2=30$ Kg/ha. of N+40 Kg/ha. of P_2O_5 +40 Kg/ha. of K_2O .

3. DESIGN:

Same as in type A_1 conducted under unirrigated conditions on groundnut crop on page No. 133.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of Pods. (iv) (a) 1965 for Hissar and 64 for Ambala. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

Hissar
65(SFT)

Treatment	N_1	P_1	P_2	N_1P_1	N_1P_2	N_2P_2	$N_2P_2K_2$	S.E.
Av. response of yield in Kg/ha.	560	20	60	850	860	920	930	100.8

Control yield=800 Kg/ha. ; No. of trials=2

Ambala

64(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	227	467	609	625	408	632	876	234.0

Control yield=1107 Kg/ha. ; No. of trials=3.

Crop :- Groundnut (*Kharif*).

Ref :- Hr. 65(198).

Site :- Punjab Agri. University (Hissar Campus), Hissar. Type :- 'IM'.

Object :—To study the minimum water and fertilizer requirements of Groundnut.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) to (v) N.A. (vi) C—501. (vii) As per treatments. (viii) to (x) N.A.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 3 levels of irrigation :

I₀=No irrigation, I₁=One irrigation at flowering and I₂=One irrigation at flowering and one at fruiting.

(2) 3 levels of fertilizers :

F₀=No fertilizer, F₁=15 Kg/ha. of P₂O₅+10 Kg/ha. of N and F₂=30 Kg/ha. of P₂O₅+20 Kg/ha. of N.The fertilizer were applied just before sowing by *pora*.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/269.39 ha. (v) N.A. (vi) Yes

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of pods. (iv) (a) 1965—only. (b) No. (c) Nil. (v) No. (vi) Nil. (vii) Only the following results are supplied by research station.

5. RESULTS :

(i) 2036 Kg/ha. (ii) 1044.8 Kg/ha. (iii) Main effect of I alone is highly significant. (iv) Av. yield of pods in Kg/ha.

Treatment	I ₀	I ₁	I ₂	F ₀	F ₁	F ₂
Av. yield	1597	1372	2820	1872	2047	2511

(Two-way table of means—N.A.)

C.D. for I marginal means=873.6 Kg/ha.

Crop :- Castor (*Kharif*).

Ref :- Hr. 65(126).

Site :- Agri. Res. Stn., Gurgaon.

Type :- 'M'.

Object :—To study the effects of different times of application on different levels of N.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) (a) Sandy loam. (b) N.A. (iii) 22.7.65. (iv) (a) 4 to 5 ploughings. (b) to (e) N.A. (v) N.A. (vi) Pl-1. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) 3rd week of Nov., 65.

2. TREATMENTS :

All combinations of (1) and (2)+One control (N_0)

(1) 4 levels of N :

$N_1=22.4$, $N_2=33.6$, $N_3=44.8$ and $N_4=56$ Kg/ha.

(2) Two times of application of N :

T_1 =Full dose at sowing and T_2 = 1/2 dose at sowing +1/2 after 2 months.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/271.82 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of Castor. (iv) (a) 1965-contd. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 1976 Kg/ha. (ii) 416.5 Kg/ha. (iii) Main effect of 'N' alone is significant. (iv) Av. yield of Castor in Kg/ha.

	N_1	N_2	N_3	N_4	Mean
T_1	1665	1914	1936	2081	1899
T_2	1545	1934	2400	2329	2052
Mean	1605	1924	2168	2205	1976

C.D. for N marginal means=429.8 Kg/ha.

Crop :- Castor (Kharif).

Ref :- Hr. 65(156).

Site :- Agri. Res. Stn., Gurgaon.

Type :- 'C'.

Object :-To study the effect of dates of sowing-cum-spacing on the yield of castor.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) As per treatments. (iv) (a) to (c) N.A. (d) As per treatments. (v) N.A. (vi) PC No. 1. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS:

Main-plot treatments :

All combinations of (1) and (2)

(1) 3 dates of sowing :— D_1 =15th June, D_2 =5th July and D_3 =25th July,

(2) 3 row to row spacings :— R_1 =35, R_2 =60 and R_3 =75 cm.

Sub-plot treatments :

3 plant to plant spacings : R_1 =45, R_2 =60 and R_3 =75 cm.

3. DESIGN :

(i) Split-plot design. (ii) (a) 9 main-plots/replication, 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/370.72 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of seed. (iv) (a) 1965—contd. (b) and (c) Nil. (v) and (vi) N.A. (vii) Only the following results are supplied by research station.

5. RESULTS :

(i) 1419 Kg/ha. (ii) (a) 213.0 Kg/ha. (b) N.A. (iii) Main effect of D alone is significant. (iv) Av. yield of castor in Kg/ha.

Treatment	D ₁	D ₂	D ₃	S ₁	S ₂	S ₃	R ₁	R ₂	R ₃
Av. yield	1396	1593	1267	1351	1428	1478	1353	1480	1423

C.D. for D marginal means=103.6 Kg/ha.

Crop :- Sarson (Rabi).

Ref :- Hr. 63(9), 64(11).

Site :- Oil Seed Sub-Stn., Jagadhari.

Type :- 'M'.

Object :-To study the effect of different levels of N on the yield and quality of Sarson.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) and (c) N.A. (ii) Sandy loam. (iii) October. (iv) (a) to (e) N.A. (v) N.A. (vi) B.S.G. (improved). (vii) Irrigated. (viii) N.A. ; 2 weedings. (ix) N.A. (x) Last week of March.

2. TREATMENTS :

6 levels of N as C/A/N : N₀=0, N₁=22.4, N₂=44.8, N₃=67.2, N₄=89.6 and N₅=112.0 Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 6. (iv) (a) and (b) 1/197.6 ha. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. ; Spraying of Bosodine in January. (iii) Yield of sarson. (iv) (a) 1963 to 64. (b) No. (c) Results of combined analysis are presented under 5-Results. (v) and (vi) Nil. (vii) Error variances are homogeneous. and 'Treatments×years' interaction is present.

5. RESULTS :

Pooled results :

(i) 546 Kg/ha. (ii) 771.2 Kg/ha. (based on 5 d.f. made up of Treatments×years interaction). (iii) Treatment differences are not significant. (iv) Av. yield of sarson in Kg/ha.

Treatment	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅
Av. yield	183	340	528	692	756	776

Individual results :

Treatment	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅	Sig.	G.M.	S.E./plot
Year									
1963	162	202	263	314	219	188	N.S.	225	104.8
1964	204	478	794	1071	1292	1365	**	867	130.5
Pooled	183	340	528	692	756	776	N.S.	546	771.2

Crop :- Mustard (Rabi).

Ref :- Hr. 60 and 61(SFT).

Site :- District : Hissar.

Type :- 'M'.

Object :-Type A : To study the response of Mustard to different levels of N, P and K applied individually and in combination.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (iii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments:

O=Control (no manure),

N=22.4 Kg/ha. of N,

P=22.4 Kg/ha. of P_2O_5 ,K=22.4 Kg/ha. of K_2O ,NP=22.4 Kg/ha. of N+22.4 Kg/ha. of P_2O_5 ,NK=22.4 Kg/ha. of N+22.4 Kg/ha. of K_2O ,PK=22.4 Kg/ha. of P_2O_5 +22.4 Kg/ha. of K_2O ,NPK=22.4 Kg/ha. of N+22.4 Kg/ha. of P_2O_5 +22.4 Kg/ha. of K_2O .

3. DESIGN :

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle/thana is changed once in two years within the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on Kharif cereal, 8 on a Rabi cereal, 8 on cash crop, 4 on oilseed crop and 3 on a leguminous crop. Half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. The three trials on legumes are of type C. Residual effects of phosphate application are studied on Type C trials in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village, (iii) (a) 1/98.8 ha. (b) 1/197.7 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of mustard. (iv) (a) 1960-61. (b) and (c) Nil (v) Nil (vi) and (vii) N.A.

5. RESULTS :

60(SFT)

District	No. of trials	Control yield in Kg/ha.	N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Hissar	6	910	70	60	40	27.0	-10	-70	70	60	21.0
61(SFT)											
Hissar	6	1130	250	100	20	43.0	-60	-30	-10	40	45.0

Crop :- Mustard (*Rabi*).

Site :- District : Hissar.

Ref :- Hr. 60(SFT).

Type :- 'M'.

Object :- Type B : To investigate the relative efficiency of different fertilizers of N at different doses.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (no manure.)

 N_1 =22.4 Kg/ha. of N as A/S, N_2 =44.8 Kg/ha. of N as A/S, N_1' =22.4 Kg/ha. of N as urea, N_2' =44.8 Kg/ha. of N as urea, N_1'' =22.4 Kg/ha. of N as C/A/N, N_2'' =44.8 Kg/ha. of N as C/A/N,

3. DESIGN:

same as in type A Conducted on mustard crop on page No. 137.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of mustard. (iv) (a) 1960—only. (b) & (c) Nil (v) Nil (vi) and (vii) N.A.

5. RESULTS:

District	No of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			N ₁	N ₂	N ₁ '	N ₂ '	N ₁ ''	N ₂ ''	
Hissar	5	780	30	140	-10	120	60	980	78.0

Crop :- Mustard (*Rabi*).

Site :- District : Hissar.

Ref :- Hr. 61(SFT).

Type :- 'M'.

Object :—Type B: To investigate the relative efficiency of different fertilizers of N at different doses.

1. BASAL CONDITIONS:

(i) to (x) N.A.

2. TREATMENTS:

7 manurial treatments:

O=Control (no manure)

N₁=22.4 Kg/ha. of N as A/S,

N₂=44.8 Kg/ha. of N as A/S,

N₁'=22.4 Kg/ha. of N as urea,

N₂'=44.8 Kg/ha. of N as urea,

N₁''=22.4 Kg/ha. of N as A/S/N,

N₂''=44.8 Kg/ha. of N as A/S/N,

3. DESIGN:

same as in type A Conducted on mustard crop on page No. 137.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of mustard. (iv) (a) 1961—only. (b) and (c) Nil. (v) Nil. (vi) and (vii) N.A.

5. RESULTS:

District	No of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			N ₁	N ₂	N ₁ '	N ₂ '	N ₁ ''	N ₂ ''	
Hissar	4	1340	300	560	200	480	280	500	61.0

Crop :- Mustard (Kharif).

**Ref :- Hr. 62, 64(SFT) for Hissar
and 62(SFT) for Gurgaon
and 65(SFT) for Ambala.**

**Site :- District : Hissar, Ambala, and
Gurgaon.**

Type :- 'M'.

Object:—Type A₁ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Irrigated and (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments i

O=Control (no manure)

N₁=35 Kg/ha. of N,

N₂=70 Kg/ha of N,

P₁=25 Kg/ha. of P₂O₅.

N₁P₁=35 Kg/ha. of N+25 Kg/ha. of P₂O₅,

N₂P₁=70 Kg/ha. of N+25 Kg/ha. of P₂O₅,

N₂P₂=70 Kg/ha. of N+50 Kg/ha. of P₂O₅.

N₂P₂K₁=70 Kg/ha. of N+50 Kg/ha. of P₂O₅+25 Kg/ha. of K₂O.

3. DESIGN :

(i) and (ii) A selected district is divided into four agriculturally homogeneous zones based on climate soil, cropping pattern etc. In each zone one block is selected at random. A block normally consists of a group of 50—100 villages. In each block 36 experiments are conducted in a year of which 11 are of type A₁, 11 of type A₂ and 11 of type A₃ and 3 are of type C. The eleven experiments under type A₁, A₂, A₃ are distributed as 3 on a Kharif cereal, 3 on a Rabi cereal, 3 on a cash crop and 2 on oil seed. All the three type—C experiments are conducted on a legume crop. For the purpose of conducting the A₁, A₂ and A₃ experiments, 11 villages are randomly selected in each block and in each village 3 experiments one each of type A₁, A₂ and A₃ are laid out. For conducting the three villages are randomly selected in each block. (iii) (a) 1/100 ha. (b) 1/200 ha. (iv) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of mustard. (iv) (a) 1965 for Ambala, 1962 and 64 for Hissar (65 N.A.) and 1962 for Gurgaon. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Ambala

65 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	100	50	-166	153	580	650	650	454.6

Control yield=1633 Kg/ha. ; No of trials=3

Hissar

62 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	388	595	268	316	516	602	654	89.1

Control yield=883 Kg/ha. ; No. of trials=7.

64(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	220	446	92	280	535	479	505	91.1

Control yield=848 Kg/ha. ; No. of trials=5

Gurgaon

62(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	84	197	—	133	271	345	494	57.8

Control yield=321 Kg/ha. ; No. of trials=2

Crop :- Mustard (Rabi).

Ref :- Hr. 62(SFT) for Gurgaon, 62, (4(SFT) for Hissar and Ambala.

Site :- District : Gurgaon, Type :- 'M'.
Hissar and Ambala.Object :- Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

N₁=35 Kg/ha. of N,P₁=25 Kg/ha. of P₂O₅,P₂=50 Kg/ha. of P₂O₅,N₁P₁=35 Kg/ha. of N+25 Kg/ha. of P₂O₅,N₁P₂=35 Kg/ha. of N+50 Kg/ha. of P₂O₅,N₂P₂=70 Kg/ha. of N+50 Kg/ha. of P₂O₅ andN₂P₂K₂=70 Kg/ha. of N+50 Kg/ha. of P₂O₅+50 Kg/ha. of K₂O.

3. DESIGN :

Same as in type A₁ conducted under irrigated conditions on Mustard [crop on page No. 140.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of mustard. (iv) (a) 1962-66 for Gurgaon (63, 64, 65 N.A.), 1962-66 for Hissar (63, 65 N.A.) and 1965 for Ambala. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

Gurgaon

62(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	301	29	108	261	370	261	583	116.6

Control yield=306 Kg/ha. ; No. of trials=2

Hissar

62(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	196	253	124	204	295	553	639	48.2

Control yield=927 Kg/ha. ; No. of trials=5

64(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₁	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	196	34	133	255	205	474	578	109.6

Control yield=1034 Kg/ha. ; No. of trials=5

Ambala

65(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₁	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	110	96	310	243	143	83	243	241.3

Control yield=1236 Kg/ha. ; No. of trials=5

Crop :- Mustard (*Rabi*).Ref :- Hr. 62(SFT) for Gurgaon
and 62, 64(SFT) for
Hissar.

Site :- District : Gurgaon and Hissar.

Type :- 'M'.

Object :- Type A₂ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS

8 manurial treatments:

O=Control (no manure),

N₁=35 Kg/ha. of N,K₁=25 Kg/ha. of K₂O,K₂=50 Kg/ha. of K₂O,N₁K₁=35 Kg/ha. of N+25 Kg/ha. of K₂O,N₁K₂=35 Kg/ha. of N+50 Kg/ha. of K₂O,N₂K₂=70 Kg/ha. of N+50 Kg/ha. of K₂O andN₁P₁K₁= 35 Kg/ha. of N+25 Kg/ha. of P₂O₅+25 Kg/ha. of K₂O.

3. DESIGN :

Same as in type A₁ conducted under irrigated conditions on mustard crop on page No. 140.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of mustard. (iv) (a) 1962 to 66 for Gurgaon (63 to 65 N.A.) and 19.2 to 66 for Hissar (63 and 65 N.A.). (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Gurgaon

62(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	118	24	59	163	133	276	355	19.2

Control yield=395 Kg/ha. ; No. of trials=2

Hissar

62(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	313	—24	191	443	263	532	371	85.4

Control yield=944 Kg/ha. ; No. of trials=7

64(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	425	-2	-46	400	427	555	217	162.7

Control yield=1027 Kg/ha. ; No. of trials=3

Crop :- Sarson (*Rabi*).

Ref :- Hr. 64(21), 65(125).

Site :- Oil seed sub-Stn., Gurgaon.

Type :- 'C'.

Object :--To study the effect of different dates of sowing and spacings on the yield of Sarson.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) As per treatments. (iv) (a) N.A., 6 Ploughings. (b) N.A., Hand drill. (c) N.A., 12 Kg/ha. (d) As per treatments. (e) N.A. (v) N.A. ; 50 Kg/ha. of N. (vi) BSH-1 (vii) Irrigated. (viii) N.A ; 1 hoeing. (ix) N.A. (x) March, 65 ; 1st week of February, 66.

2. TREATMENTS :

Main-Plot treatments :

4 dates of sowing : D₁=20th Sept., D₂=1st Oct., D₃=11th Oct. and D₄=21st Oct.

Sub-Plot treatments :

6 spacings : S₁=30 cm × 5 cm, S₂=30 cm × 10 cm, S₃=30 cm × 15 cm, S₄=38 cm × 5 cm, S₅=38 cm × 10 cm and S₆=38 cm × 15 cm.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication ; 6 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) and (b) 1/23.5 ha. ; 1/668.6 ha. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. ; SAFOS pray. (iii) Yield of sarson. (iv) (a) 1964-65. (b) No. (c) Results of combined analysis are presented under 5—Results. (v) and (vi) Nil. (vii) Main-plot and sub-plot error variances are homogeneous and main-plot treatments × years and sub-plot treatments × years interactions are absent.

5. RESULTS :

Pooled results :

(i) 2719 Kg/ha. (ii) (a) 5573.8 Kg/ha. (based on 21 d.f. made up of pooled error and Treatments × years interaction). (b) 5102.2 Kg/ha (based on 138 d.f. made up of pooled error and Treatments × years interaction). (iii) None of the effects is significant. (iv) Av. yield of sarson in Kg/ha.

	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	Mean
D ₁	3378	3126	3256	2994	2772	2893	3070
D ₂	2784	3248	2897	2962	3094	2828	2969
D ₃	3220	3332	3221	3106	2835	2941	3109
D ₄	1687	1743	2019	1755	1846	1320	1729
Mean	2757	2862	2848	2705	2637	2496	2719

Individual results :

Treatment	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	Sig.
Year 1964	4695	4828	4857	4618	4409	4239	N.S.
1965	840	898	840	790	865	752	N.S.
Pooled	2767	2862	2848	2705	2637	2496	N.S.

D ₁	D ₂	D ₃	D ₄	Sig.	G.M.	S.E./plot	
						Main	Sub
5313	4906	5436	2775	**	4607	2215.3	704.2
827	1031	783	682	N.S.	831	381.1	255.9
3078	2969	3109	1729	N.S.	2719	5573.8	5102.2

Crop :- Sarson (Rabi).

Ref :- Hr. 65(139).

Site :- Agri. Res. Stn., Gurgaon.

Type :- 'C'.

Object : To study the effect of different dates of sowing and spacings on the yield of Sarson.

1. BASAL CONDITIONS ;

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) As per treatments. (iv) (a) 3 Ploughings. (b) N.A. (c) 12 Kg/ha. (d) As per treatments. (e)—(v) and (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

Main-Plot treatments :

4 dates of sowing :—D₁=20th Sept., D₂=1st Oct., D₃=11th Oct., and D₄=21st Oct.

Sub-Plot treatments :

6 spacings :—S₁=30 cm × 5 cm, S₂=30cm × 10 cm, S₃=30 cm × 15 cm, S₄=45 cm × 5 cm, S₅=45 cm × 10 cm and S₆=45 cm × 15 cm.

3. DESIGN :

(i) Split-plot design. (ii) (a) 4 main-plots/replication and 6 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) and (b) N.A., (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of seeds. (iv) (a) 1965—only, (b) No (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 229 Kg/ha. (ii) 337.2 Kg/ha. (iii) N.A. (iv) Main effect of D alone is significant. (v) Av. yield of sarson in Kg/ha.

Treatment	D ₁	D ₂	D ₃	D ₄	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆
Av. yield	828	1036	773	681	776	829	776	848	935	811

(Cell means of two-way table are not available)

C.D. for D marginal means=220.2 Kg/ha.

Crop :- Sarson (Rabi).

Ref :- Hr. 65(90).

Site :- Agri. Res. Stn., Gurgaon.

Type :- 'CM'.

Object : To study the effect of spacings, seed rates and fertilizers on Sarson crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 21.10.66. (iv) (a) 3 Ploughings. (b) By hand drill. (c) and (d) As per treatments. (e) Nil (v) Nil (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS:

All Combinations of (1), (2) and (3)

(1) 3 spacings :— $S_1=30$, $S_2=45$ and $S_3=60$ cm.(2) 3 seed rates :— $R_1=3.7$, $R_2=4.9$ and $R_3=6.2$ Kg/ha.(3) 3 levels of fertilizers :— $F_0=0$, $F_1=34$ Kg/ha. of N+17 Kg/ha. of P_2O_5 +17 Kg/ha. of K_2O and $F_2=68$ Kg/ha. of N+34 Kg/ha. of P_2O_5 +34 Kg/ha. of K_2O .

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 27. (b) N.A. (iii) 2. (iv) (a) $4.57m \times 6.10m$ (b) $3.96m \times 5.49m$. (v) $30.5cm \times 30.5$ cm. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of seed. (iv) (a) 1965—contd. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 765 Kg/ha. (ii) 135.8 Kg/ha. (iii) Main effect of F and interaction $S \times R$ are significant. Interaction $R \times F$ is highly significant. (iv) Av. yield of seed in Kg/ha.

	R_1	R_2	R_3	F_0	F_1	F_2	Mean
S_1	778	759	893	533	866	1031	810
S_2	632	820	847	636	797	866	766
S_3	824	655	675	571	816	767	718
Mean	745	745	805	580	826	888	765
F_0	698	506	537				
F_1	778	858	843				
F_2	759	870	1035				

C.D. for F Marginal means=194.8 Kg/ha.

C.D. for the body of $R \times F$ or $S \times R$ table=217.6 Kg/ha.

Crop :- Sarson (Rabi).

Ref :- Hr. 65(124).

Site :- Agri. Res. Stn., Gurgaon.

Type :- 'CM'.

Object : To study the effect of different seed rates, spacings and fertilizers on the yield.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) N.A. (iv) (a) 2 Ploughings. (b) By hand drill. (c) and (d) As per treatments. (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS:

All Combinations of (1), (2) & (3)

(1) 3 Spacings : $S_1=30.5$, $S_2=45.7$ and $S_3=61.0$ cm.(2) 3 Seeds rates : $R_1=4$, $R_2=5$ and $R_3=6.2$ Kg/ha.(3) 3 Fertilizers : $F_0=0$, $F_1=34$ Kg/ha. of N+17 Kg/ha. of K_2O and $F_2=68$ Kg/ha. of N+34 Kg/ha. of P_2O_5 .

3. DESIGN:

(i) 3^3 Confounding. (ii) (a) 9 plots / block and 3 blocks/replication. (b) N.A. (iii) 2 (iv) (a) and (b) $1/358.294$ ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of seed. (iv) (a) 1965—only. (b) No (c) Nil. (v) and (vi) N.A. (vii) Only following results are supplied by research station.

5. RESULTS:

(i) 754 Kg/ha. (ii) 257.6 Kg/ha. (iii) Main effect of F alone is highly significant. (iv) Av. Yield of seed in Kg/ha.

Treatment	S ₁	S ₂	S ₃	R ₁	R ₂	R ₃	F ₀	F ₁	F ₂
Av. yield	745	738	778	748	718	795	553	828	880

(Cell means of the two-way tables are not available).

C.D. for F marginal means=178.1 Kg/ha.

Crop :- Raya (Rabi).

Ref :- Hr. 63(21), 64(10).

Site :- Oil seed sub-Stn., Gurgaon.

Type :- 'M'.

Object: To study the effect of different levels of N on the yield of Raya crop.

1. BASAL CONDITIONS:

(i) (a) Nil. (b) and (c) N.A. (ii) Sandy loam. (iii) Last week of October. (iv) (a) to (e) N.A. (v) Nil (vi) RL-18. (vii) Irrigated. (viii) N.A.; 2 hoeings and 2 weedings. (ix) N.A. (x) Middle of March.

2. TREATMENTS:

6 Levels of N as C/A/N : N₀=0, N₁=22.4, N₂=44.8, N₃=67.2, N₄=89.7 and N₅=112.1 Kg/ha.

3. DESIGN:

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 6. (iv) (a) and (b) 1/197.7 ha. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of Raya. (iv) (a) 1963-64. (b) No (c) Results of combined analysis are presented under 5 Results. (v) and (vi) Nil (vii) Error Variances are heterogeneous and Treatments x years interaction is present:

5. RESULTS:

Pooled results:

(i) 737 Kg/ha. (ii) 737.1 Kg/ha. based (on 5 d.f. made up of Treatments x years interaction). (iii) Treatment differences are not significant. (iv) Av. yield of raya in Kg/ha.

Treatment	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅
Av. yield	322	548	690	862	972	1028

Individual results:

Treatment	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅	Sig.	G.M.	S.E./plot
Year 1963	359	432	465	521	501	511	**	465	71.2
1964	285	644	915	1203	1443	1545	**	1009	153.2
Pooled	322	548	690	862	972	1028	N.S.	737	737.1

Crop :- Raya (Rabi).

Ref :- Hr. 64(16), 65(127).

Site :- Oil seed sub-Stn., Gurgaon.

Type :- 'MV'.

Object: To study the effect of different levels of N on different varieties of Raya crop.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy Loam. (iii) N.A.; 3-11-65. (iv) (a) N.A.; 4-5 Ploughings. (b) N.A.; Hand drill. (c) to (e) N.A. (v) N.A. (vi) As per treatments. (vii) unirrigated; Irrigated. (viii) N.A.; hoeing. (ix) N.A. (x) N.A.; 29.3.66.

2 TREATMENTS :

All combinations of (1) and (2).

(1) 4 Varieties : $V_1=RG-1$, $V_2=RG-3$, $V_3=RL-9$ and $V_4=RL-18$.(2) 3 Levels of N: $N_0=0$, $N_1=16.8$ and $N_2=33.6$ Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 12 (b) N.A. (iii) 4. (iv) (a) 1/247 ha.; N.A. (b) 1/247 ha.; 1/448.5 ha. (v) Nil; N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of raya. (iv) (a) 1964-65. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) and (vi) Nil. (vii) Error Variances are homogeneous and Treatments \times years interaction is present.

5. RESULTS :

Pooled results :

(i) 998 Kg/ha. (ii) 436.2 Kg/ha. (based on 11 d.f. made up of Treatments \times years interaction). (iii) Main effect of N alone is highly significant. (iv) Av. yield of raya in Kg/ha.

	V_1	V_2	V_3	V_4	Mean
N_0	543	453	567	587	537
N_1	916	1006	680	1134	1009
N_2	1498	1393	1468	1438	1449
Mean	986	951	1005	1052	998

C.D. for N marginal means=240.02 Kg/ha.

Individual results :

Treatment	N_0	N_1	N_2	Sig.	V_1	V_2	V_3	V_4	Sig.	G.M.	S.E./plot
Year											
1964	587	1137	1819	**	1164	1124	1180	1256	N.S.	1181	189.5
1965	488	880	1079	**	807	777	830	848	N.S.	816	196.1
Pooled	537	1009	1449	**	986	951	1005	1052	N.S.	998	436.2

Crop :- Raya (Rabi).

Ref :- Hr. 65(122).

Site :- Agri. Res. Stn., Gurgaon.

Type :- 'C'.

Object: To study the effect of different dates of sowing and spacings on the yield of Raya Crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) (a) Sandy Loam. (b) N.A. (iii) As per treatments. (iv) (a) 4 to 5 Ploughings. (b) Hand drill. (c) N.A. (d) As per treatments. (e) N.A. (v) 75 Kg/ha. of N. (vi) RL-18. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 24.3.66.

2. TREATMENTS:

Main-Plot treatments :

3 dates of sowing : $D_1=20.10.65$, $D_2=27.10.65$ and $D_3=3.11.65$.

Sub-Plot treatments :

4 Spacings : $S_1=30\text{ cm}\times 9\text{ cm}$, $S_2=30\text{ cm}\times 15\text{ cm}$, $S_3=45\text{ cm}\times 9\text{ cm}$ and $S_4=45\times 15\text{ cm}$.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 Main-plots/replication, 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/637 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of raya. (iv) (a) 1965—Contd. (b) No (c) Nil. (v) (a) and (b) Nil. (vi) and (vii) Nil.

5. RESULTS

(i) 1015 Kg/ha. (ii) (a) 220.7 Kg/ha. (b) 227.7 Kg/ha. (iii) Main effect of D alone is highly significant. (iv) Av. yield of raya in Kg/ha.

	S_1	S_2	S_3	S_4	Mean
D_1	1306	1529	971	1147	1238
D_2	1383	987	1163	812	1011
D_3	796	1003	733	653	796
Mean	1062	1173	956	871	1015

C.D. for D marginal means=190.9 Kg/ha.

Crop :- Raya (Rabi).

Ref :- Hr. 65(201).

**Site :- Punjab Agri. University (Hissar Campus),
Hissar.**

Type :- 'CM'.

Object : To locate the optimum levels of spacing, seed-rate and fertilizer for Raya crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy Loam. (iii) N.A. (iv) (a) and (b) N.A. (c) and (d) As per treatments. (e) Nil. (v) to (x) N.A.

2. TREATMENTS:

All combinations of (1), (2) and (3)

(1) Spacings : $S_1=30$, $S_2=45$ and $S_3=260\text{ cm}$.

(2) seed-rates : $R_1=3.70$, $R_2=4.94$ and $R_3=6.17\text{ Kg/ha}$.

(3) 3 Levels of fertilizers : F_0 =Control, $F_1=33.6\text{ Kg/ha}$ of N+16.8 Kg/ha. of P_2O_5 and $F_2=2 F_1$.

3. DESIGN :

(i) 3^3 Confounding. (ii) (a) 9 plots/block and 3 blocks/replication. (b) N.A. (iii) 2. (iv) and (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of seed. (iv) (a) 1965—Only. (b) No (c) Nil. (v) and (vi) N.A. (vii) Only the following results are supplied by Res. stn.

5. RESULTS :

(i) 2787 Kg/ha. (ii) 184.5 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of Raya in Kg/ha.

Treatment	S ₁	S ₂	S ₃	R ₁	R ₂	R ₃	F ₀	F ₁	F ₂
Av. yield	2987	2629	2745	2937	2744	2680	2832	2699	2839

(Cell means of the two-way tables are not available).

Crop :- Raya (Rabi).

Ref. : Hr. 64(15).

Site :- Oil seed sub-Stn., Gurgaon.

Type :- 'M'.

Object :—To study the effect of different dates of sowing and levels of N on the different Varieties of Raya.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy Loam. (iii) As per treatments. (iv) (a) to (c) N.A. (v) Nil. (vi) As per treatments. (vii) Irrigated. (viii) and (ix) N.A. (x) Middle of March.

2. TREATMENTS :

Main-plot treatments :

4 dates of sowing : D₁=10th Oct., D₂=25th Oct., D₃=21st Nov. and D₄=25th Nov., '64.

Sub-plot treatments :

4 Varieties : V₁=RG-1, V₂=RG-5, V₃=RL-9, and V₄=RL-18.

Sub-Sub-plot treatments :

3 Levels of N as C/A/N : N₀=0 N₁=74.10 and N₂=111.1 Kg/ha.

3. DESIGN :

(i) Split-split-plot. (ii) (a) 4 Main-plots/replication, 4 sub-plots/main-plot and 3 sub-sub-plots./sub-plot (b) N.A (iii) 3. (iv) (a) and (b) 1/741 ha. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of Raya. (iv) (a) 1964—Only. (b) and (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 2012 Kg/ha. (ii) (a) 805.8 Kg/ha. (b) 354.9 Kg/ha. (c) 296.8 Kg/ha. (iii) Main Effects of D and N are highly significant and interaction D × V is significant. (iv) Av. yield of Raya in Kg/ha.

	D ₁	D ₂	D ₃	D ₄	V ₁	V ₂	V ₃	V ₄	Mean
N ₀	1946	1754	1365	859	1538	1550	1452	1384	1481
N ₁	2761	2428	1958	1464	2100	2218	2162	2131	2153
N ₂	3064	2774	2174	1600	2261	2483	2434	2434	2403
Mean	2590	2319	1833	1308	1966	2084	2016	1983	2012
V ₁	2364	2356	1829	1236					
V ₂	3006	2249	1853	1227					
V ₃	2545	2389	1870	1260					
V ₄	2446	2282	1779	1508					

- (i) C.D. for D marginal means=464.8 Kg/ha.
(ii) C.D. for N marginal means=121.2 Kg/ha.
(iii) C.D. for V means at the same level of D=345.3 Kg/ha.
(iv) C.D. for D means at the same level of V=550.9 Kg/ha.

Crop :- Raya (Rabi)

Ref :- Hr. 65(120).

Site :- Agri. Res. Stn., Gurgaon.

Type :- 'CMV'.

Object :- To study the effect of different levels of N along with different dates of sowing on different Varieties of Raya.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy Loam. (iii) As per treatments. (iv) (a) to (c) N.A. (v) Nil. (vi) As per treatments. (vii) Irrigated. (viii) and (ix) N.A. (x) Mid of March, 66.

2. TREATMENTS :

Main-plot treatments :

4 Varieties: $V_1=RG-1$, $V_2=RL-9$, $V_3=PL-18$ and $V_4=RG-3$.

Sub-Plot treatments :

3 Levels of N: $N_0=0$, $N_1=75$ and $N_2=112.5$ Kg/ha.

Sub-Sub-Plot treatments :

4 dates of sowing: $D_1=15.10.65$, $D_2=30.10.65$, $D_3=15.11.65$ and $D_4=30.11.65$.

3. DESIGN :

(i) Split-split-plot. (ii) (a) 4 Main-plots/replication, 3 sub-plots/main-plot, 4 sub-sub-plots/sub-plot. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 1/741.3 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) N.A. (ii) Nil. (iii) Yield of grains. (iv) (a) 1965—Only. (b) No (v) to (vii) Nil.

5. RESULTS:

(i) 1347 Kg/ha. (ii) (a) 239.2 Kg/ha. (b) 228.7 Kg/ha. (c) 361.7 Kg/ha. (iii) Main effects of V, N and D are highly significant. (iv) Av. Yield of Raya in Kg/ha.

	N_0	N_1	N_2	D_1	D_2	D_3	D_4	Mean
V_1	1094	1356	1386	1961	1328	840	984	1278
V_2	1012	1338	1483	1878	1356	1040	837	1278
V_3	1067	1362	1541	1952	1524	1060	758	1324
V_4	1286	1541	1703	2224	1871	1167	778	1510
Mean	1114	1399	1528	2004	1520	1027	839	1347
D_1	1668	2131	2112					
D_2	1360	1539	1660					
D_3	809	1033	1234					
D_4	621	890	1007					

C.D. for V marginal means=138.0 Kg/ha.

C.D. for N marginal means= 99.0 Kg/ha.

C.D. for D marginal means=170.5 Kg/ha.

Crop :- Napier Grass.

Ref :- Hr. 64(115).

Site :- Fodder Res. Stn., Sirsa.

Type :- 'C'.

Object : To study the effect of different spacings on the yield of Fodder crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loam. (iii) 17.3.64. (iv) (a) to (c) N.A. (d) As per treatments. (e) N.A. (v) N.A. (vi) Napier Hybrid. (vii) Irrigated. (viii) and (ix) N.A. (x) 1st Cutting on 30.6.64 to 7.7.64 and 2nd Cutting on 26.10.64 to 13.11.64.

2. TREATMENTS :

3 spacings : $S_1=61\text{ cm} \times 45\text{ cm}$, $S_2=61\text{ cm} \times 61\text{ cm}$ and $S_3=91\text{ cm} \times 61\text{ cm}$.

3. DESIGN :

(i) R.B.D. (ii) (a) 3. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/54.4 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of fodder. (iv) (a) 1964—Only. (b) No (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 534 Q/ha. (ii) 97.5 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of fodder is Q/ha.

Treatment	S_1	S_2	S_3
Av. Yield	551	565	512

Crop :- Napier Grass.

Ref :- Hr. 65(88).

**Site :- Punjab Agri. University (Hissar Campus),
Hissar.**

Type :- 'C'.

Object : To study the effect of different spacings on the yield of Napier grass.

1. BASAL CONDITIONS :

(i) (a) to (c) Nil. (ii) Loam. (iii) 22.2.65. (iv) (a) 4 Ploughings. (b) Transplanting. (c) 2700 roots slips/ha. (d) As per treatments. (e) Nil. (v) 101.6 Q/ha. (vi) Pusa giant. (vii) Irrigated. (viii) 1 hoeing after each cutting. (ix) N.A. (x) 6.10.65.

2. TREATMENTS :

4 Spacings : $S_1=60\text{ cm} \times 45\text{ cm}$, $S_2=60\text{ cm} \times 60\text{ cm}$, $S_3=60\text{ cm} \times 75\text{ cm}$ and $S_4=60\text{ cm} \times 90\text{ cm}$.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/57.2 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Endrine spray against jassid attack. (iii) Yield of green fodder. (iv) (a) 1965—Contd. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

Results of two cutting.

(i) 503 Q/ha. (ii) 68.6 Q/ha. (iii) The treatment differences are not significant. (iv) Av. yield of fodder is Q/ha.

Treatment	S ₁	S ₂	S ₃	S ₄
Av. yield	534	511	498	471

Crop :- Ber seem (Rabi).

Ref :- Hr. 60(66).

Site :- Fodder Res. Stn., Sirsa.

Type :- 'M'.

Object ; To study the effect of N and P on the yield of Berseem.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loam. (iii) 15.10.60. (iv) to (vi) N.A. (vii) Irrigated. (viii) to (ix) N.A.

2. TREATMENTS:

All combinations of (1) and (2)+2 extra treatments.

(1) 4 Levels of N as C/A/N: N₀=0, N₁=24.7, N₂=49.4 and N₃=74.1 Kg/ha.

(2) 2 Levels of P₂O₅ as Super: P₀=0 and P₁=49.4 Kg/ha.

Extra treatments are E₁=24.7 and E₂=74.1Kg/ha. of P₂O₅ and Super.

3. DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/197.7 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of fodder. (iv) (a) 1960—Only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 386.2 Q/ha. (ii) 95.1 Q/ha. (iii) None of the effect is significant. (iv) Av. yield of fodder in Q/ha.

E₁=401.5 and E₂=337.0 Q/ha.

	N ₀	N ₁	N ₂	N ₃	Mean
P ₀	359.7	380.3	358.2	345.3	360.9
P ₁	429.2	433.5	417.5	400.0	320.0
Mean	394.4	406.9	387.8	372.6	390.4

Crop :- Berseem (Rabi).

Ref :- Hr. 60(67).

Site :- Fodder Res. Stn. Sirsa.

Type :- 'M'.

Object : To study the effect of N and P on the yield of Berseem.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loam. (iii) 22.10.60. (iv) (a) to (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) 4.1 to 28.3.61.

2. TREATMENTS:

8 manurial treatments: M₀=Control, M₁=43 Kg/ha. of P₂O₅ as super, M₂=M₁+25 Kg/ha. of N as C/A/N, M₃=M₁+49 Kg/ha. of N as C/A/N, M₄=M₁+25 Kg/ha. of N as A/S, M₅=M₁+49 Kg/ha. of N as A/S, M₆=M₁+25 Kg/ha. of N as Urea, and M₇=49 Kg/ha. of N as Urea.

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/173 Q/ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Good. (ii) N.A. (iii) Yield of fodder. (iv) (a) 1960—Only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 683 Q/ha. (ii) 38.7 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of fodder in Q/ha.

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆	M ₇
Av. yield	654	652	675	683	695	690	692	715

Crop :- Berseem (Rabi).**Ref :- Hr. 63(118), 64(114).****Site :- Govt. Res. Stn., Sirsa.****Type :- 'M'.**

Object : To study the effect of N and P applied alone and in combination on the yield of Berseem.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loam. (iii) 28.9.63 ; 28.9.64. (iv) (a) to (b) N.A. (c) 27 Kg/ha. (d) and (e) N.A. (v) N.A. (vi) Masgavi ; N.A. (vii) to (ix) N.A. (x) 28.11.63 to 7.12.63 ; 2.1.64 to 4.1.64 ; 7.12.64, 14.12.64 to 16.1.65 and 24.2.65 to 4.3.65.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 2 Levels of N as C/A/N : N₀=0 and N₁=22.4 Kg/ha.(2) 4 Levels of P₂O₅ as super : P₀=0, P₁=22.4, P₂=44.8 and P₃=67.2 Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 8. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 20.12 m × 3.66 m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of fodder. (iv) (a) 1963—64. (b) No. (c) Nil. (v) N.A. (vi) Nil. (vii) Error Variances are heterogeneous and Treatments × years interaction is absent, therefore individual years results are presented under 5-Results.

5. RESULTS :

63(118)

(i) 438 Q/ha. (ii) 30.5 Q/ha. (iii) Main effect of P alone is highly significant. (iv) Av. yield of green fodder in Q/ha.

	P ₀	P ₁	P ₂	P ₃	Mean
N ₀	386	428	452	469	434
N ₁	374	450	451	494	442
Mean	380	439	452	481	438

C.D. for P marginal means = 25.3 Q/ha.

64(114)

- (i) 413 Q/ha. (ii) 44.7 Q/ha. (iii) Main effect of P is highly significant and interaction P×N is significant.
 (iv) Av. yield of fodder in Q/ha.

	P ₀	P ₁	P ₂	P ₃	Mean
N ₀	383	429	434	427	418
N ₁	374	404	417	438	408
Mean	378	416	426	432	413

C.D. for P marginal means=37.0 Q/ha.

C.D. for the body of N×P table=52.4 Q/ha.

Crop :- Lucerne (Rabi).

Ref :- Hr. 64(110).

Site :- Fodder Res. Stn., Sirsa.

Type :- 'M'.

Object : To study the effect of P₂O₅ and Boron on the yield of Lucerne.

1. BASAL CONDITIONS:

- (i) (a) to (c) N.A. (ii) Loam. (iii) 17.12.64. (iv) (a) and (b) N.A. (c) 12 Kg/ha. (d) and (e) N.A.
 (v) N.A. (vi) No. 9. (vii) Irrigated. (viii) and (ix) N.A. (x) 16.6.65.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 2 levels of Boron : B₀=0, and B₁=Boron (dose N.A.)

(2) 3 levels of P₂O₅ as Super : P₀=0, P₁=84 and P₂=112 Kg/ha.

3. DESIGN :

- (i) Fact. in R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/229 ha. (v) N.A. (vi) Yes.

4 GENERAL :

- (i) Normal. (ii) N.A. (iii) Yield of fodder. (iv) (a) 1964—Only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

- (i) 46 Q/ha. (ii) 10.6 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of fodder in Q/ha.

	P ₀	P ₁	P ₂	Mean
B ₀	43	47	35	42
B ₁	52	45	54	50
Mean	47	46	44	46

Crop :- Lucerene (Rabi).

Ref :- Hr. 64(113).

Site :- Fodder Res. Stn., Sirsa.

Type :- 'M'.

Object : To study the effect of N, P and K on the yield of Lucerne. crop.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Loam. (iii) 26.12.64. (iv) (a) and (b) N.A. (c) 12 Kg/ha. (d) and (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) 23.6.65.

2. TREATMENTS:

All combinations of (1), (2) and (3)

(1) 3 Levels of N : $N_0=0$, $N_1=22.4$, $N_2=44.8$ Kg/ha.

(2) 5 Levels of P_2O_5 : $P_0=0$, $P_1=28$, $P_2=56$, $P_3=84$, $P_4=112$ Kg/ha.

(3) 2 Levels of K_2O : $K_0=0$ and $K_1=56$ Kg/ha.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 30. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/445 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of green fodder. (iv) (a) 1963-64. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 76 Q/ha. (ii) 25.35 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of green fodder in Q/ha.

	N_0	N_1	N_2	P_0	P_1	P_2	P_3	P_4	Mean
K_0	73	76	73	66	85	75	67	83	75
K_1	75	81	74	77	80	82	74	69	77
Mean	76	78	73	72	82	78	71	76	76
P_0	72	73	71						
P_1	52	79	76						
P_2	72	77	87						
P_3	71	73	68						
P_4	76	89	64						

Crop :- Lucerne (Rabi).

Ref :- Hr. 64(112).

Site :- Fodder Res. Stn., Sirsa.

Type :- 'C'.

Object : To study the effect of different spacings on the yield of Lucerne crop.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Loam. (iii) 17.12.64. (iv) (a) and (b) N.A. (c) 12 Kg/ha. (d) and (e) N.A. (v) N.A. (vi) 9. (vii) Irrigated. (viii) and (ix) N.A. (x) 16.6.65.

2. TREATMENTS:

All combinations of (1) & (2)

(1) 2 spacings between row to row : $S_1=46$ and $S_2=61$ cm.

(2) 6 spacings between plant to plant : $T_1=flat$, $T_2=23$, $T_3=30$, $T_4=38$, $T_5=46$ and $T_6=61$ cm.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 9.14 m x 3.66 m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of fodder. (iv) (a) 1964—Only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 55 Q/ha. (ii) 18.9 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of Lucerne in Q/ha.

	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	Mean
S ₁	45	73	70	60	60	60	61
S ₂	48	46	50	50	40	60	49
Mean	46	60	60	55	50	60	55

Crop :- Sweet Sudan (Rabi).

Ref :- Hr. 64(111).

Site :- Fodder Res. Stn., Sirsa.

Type :- 'M'.

Object : To study the effect of different doses of N on the yield of Fodder crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loam. (iii) 6.5.64. (iv) (a) and (b) N.A. (c) 25 Kg/ha. (d) and (e) N.A. (v) N.A. (vi) (59—3) grass. (vii) Irrigated. (viii) and (ix) N.A. (x) 17.7.64 to 29.7.64.

2. TREATMENTS :

4 doses of N as C/A/N : N₁=62, N₂=124, N₃=185 and N₄=247 Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 4. (iv) (a) 1/98.8 ha. (b) 1/113.7 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of Fodder. (iv) (a) 1964—Only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 238 Q/ha. (ii) 34.8 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of fodder in Q/ha.

Treatment	N ₁	N ₂	N ₃	N ₄
Av. yield	230	233	227	262

Crop :- Sweet Sudan (Summer).

Ref :- Hr. 63(117).

Site :- Fodder Res. Stn., Sirsa.

Type :- 'C'.

Object : To study the effect of different dates of sowing on the yield of fodder.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loam. (iii) As per treatments. (iv) (a) and (b) N.A. (c) 35 Kg/ha. (d) and (e) N.A. (v) N.A. (vi) 59—3. (vii) Irrigated. (viii) and (ix) N.A. (x) 10.5.63, 22.5.63, 18.5.63 and 7.7.63 to 31.8.63.

2. TREATMENTS :

3 dates of sowing : D₁=2.3.63, D₂=17.3.63, D₃=1.4.63 (Resown on 18.4.63).

3. DESIGN:

(i) R.B.D. (ii) (a) 3. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/34.5 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of fodder. (iv) (a) 1963—Only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 123 Q/ha. (ii) 18.8 Q/ha. (iii) Treatment differences are significant. (iv) Av. yield of fodder in Q/ha.

Treatment	D ₁	D ₂	D ₃
Av. yield	108	103	118

C.D. for S marginal means=32.5 Q/ha.

Crop :- Teasinte (Summer).

Ref :- Hr. 63(115).

Site :- Fodder Res. Stn., Sirsa.

Type :- 'C'.

Object : To study the effect of different dates of sowing on the yield of Teasinte crop.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Loam. (iii) As per treatments. (iv) (a) and (b) N.A. (c) 49 Kg/ha. (d) and (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) 20.7.63 to 23.8.63.

2. TREATMENTS:

4 dates of sowing : D₁=13.3.63, D₂=20.3.63, D₃=27.3.63 and D₄=3.4.63.

3. DESIGN:

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/49.4 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of fodder. (iv) (a) 1963—Only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 277 Q/ha. (ii) 124.3 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of fodder in Q/ha:

Treatment	D ₁	D ₂	D ₃	D ₄
Av. yield	236	253	291	328

Crop :- Wheat and Raya (Rabi).

Ref :- Hr. 63(29), 64(17).

Site :- Oil Seed Sub-Stn., Gurgaon.

Type :- 'X'.

Object : To study the effect of mixed cropping of wheat and Raya under irrigated conditions.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 1.11.63; October, 64. (iv) (a) to (e) N.A. (v) Nil; N.A. (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) During the month of March.

2. TREATMENTS:

6 Mixed cropping treatments : C₁=Wheat pure, C₂=Raya pure, C₃=Wheat and Raya lines at 122 cm, C₄=Wheat and Raya lines at 244 cm, C₅=Wheat and Raya lines at 366cm, and C₆=Wheat and Raya lines at 488 cm.

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 6. (iv) (a) and (b) 1/247 ha. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Fair; Satisfactory. (ii) Nil; N.A. (iii) Yield of grain and monetary return. (iv) (a) 1963-64. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) Nil. (vi) Severe cold affected Raya crop in 63. (vii) Error variances are heterogeneous and Treatments×years interaction is present.

5. RESULTS :

Pooled results

(i) 1551 Rs/ha. (ii) 666.6 Rs/ha. (based on 5 d.f. made up of Treatments×years interaction). (iii) Treatment differences are not significant. (iv) Av. money value in Rs/ha.

Treatment	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆
Av. Yield	1480	1746	1542	1590	1613	1338

Individual results

Treatment	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	Sig.	G.M.	S.E./plot
Year									
1963	1055	1035	1051	1127	1135	424	**	971	153.2
1964	1904	2456	2034	2052	2091	2253	*	2132	269.3
Pooled	1480	1746	1542	1590	1613	1338	N.S.	1551	666.6

Crop :- Wheat and Raya (Rabi).

Ref :- Hr. 65(11).

Site :- Agri. Res. Farm, Gurgaon.

Type :- 'X'.

Object : To study the economy of mixed cropping of Raya and wheat.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy Loam. (iii) 10.11.65. (iv) (a) 4 to 5 ploughings. (b) Hand drill. (c) N.A. (d) As per treatments. (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) Last week of March, 66.

2. TREATMENTS :

4 mixed cropping treatments : T₁=Pure wheat, 22 cm row to row, T₂=Pure Raya, 30 cm row to row, T₃=6 rows of wheat+1 row of Raya, T₄=9 rows of wheat+1 row of Raya.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/218.3 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain and monetary return. (iv) (a) 1965-67 (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 1284 Rs/ha. (ii) 152.7 Rs/ha. (iii) Treatment differences are highly significant. (iv) Av. income in Rs/ha.

Treatment	T ₁	T ₂	T ₃	T ₄
Av. income	1396	950	1382	1409

C.D. =187.9 Rs/ha.

Crop :- Mixed fodder crops (Summer).

Ref :- Hr. 62(78), 63(119).

Site :- Fodder Res. Stn., Sirsa.

Type :- 'X'.

Object :- To study the effect of mixed fodder cropping for getting maximum fodder yield.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loam. (iii) 4.4.62 ; 14 to 16.3.63. (iv) (a) and (b) N.A. (c) Jowar at 27 kg/ha., Maize at 6 Kg/ha., Sweet Sudan at 3 Kg/ha., Bajra at 3 Kg/ha, Cowpea at 2 Kg/ha. (d) and (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) May and June.

2. TREATMENTS :

4 mixed croppings: T₁=Maize+Cowpea, T₂=Bajra+Cowpea, T₃=Jowar+Cowpea and T₄=Sweet Sudan+Cowpea.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 6. (iv) (a) 19.66 m. x 5.18 m. ; N.A. (b) 19.51 m. x 4.38 m. ; 1/74.7 ha. (v) 8 cm. x 15 cm. ; N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of fodder. (iv) (a) 1962-63. (b) No. (c) Results of combined analysis are presented under 5-results. (v) N.A. (vi) Nil. (vii) Error variances are heterogeneous and Treatments x years interaction is present.

5. RESULTS :

(i) 293 Q/ha. (ii) 169.4 Q/ha. (based on 3 d.f. made up of Treatments x years interaction. (iii) Treatment differences are not significant. (iv) Av. yield of fodder in Q/ha.

Treatment	T ₁	T ₂	T ₃	T ₄
Av. yield	328	306	224	316

Individual results

Treatment	T ₁	T ₂	T ₃	T ₄	Sig.	G.M.	S.E./plot
Year 1962	475	439	261	427	**	401	64.1
1963	181	172	186	205	N.S.	186	29.8
Pool:3	328	306	224	316	N.S.	293	169.4

Crop :- Gram and Raya (Rabi).

Ref :- Hr. 63(30), 64(18).

Site :- Oil seed sub Stn., Gurgaon.

Type :- 'X'.

Object :- To study the effect of mixed cropping on the yield of Gram and Raya.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) October, 63 ; October, 64. (iv) (a) to (e) N.A. (v) Nil ; N.A. (vi) N.A. (vii) Unirrigated. (viii) and (ix) N.A. (x) March, 64 ; March, 65.

2. TREATMENTS :

6 mixed cropping treatments: C₁=Gram pure, C₂=Raya pure, C₃=Gram and Raya lines at 122 cm, C₄=Gram and Raya lines 244 cm, C₅=Gram and Raya lines at 366 cm and C₆=Gram and Raya lines at 488 cm.

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 6. (iv) (a) and (b) 1/247 ha. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Fair ; Satisfactory. (ii) Nil ; N.A. (iii) Yield of grain and monetary return. (iv) (a) 1963 to 65 (1965 N.A). (b) No. (c) Results of combined analysis are presented under 5 results. (v) Nil. (vi) Severe cold destroyed affected the yield of crops in 63. (vii) Error variances are hetrogenous and Treatments \times years interaction is present.

5. RESULTS :

Pooled results

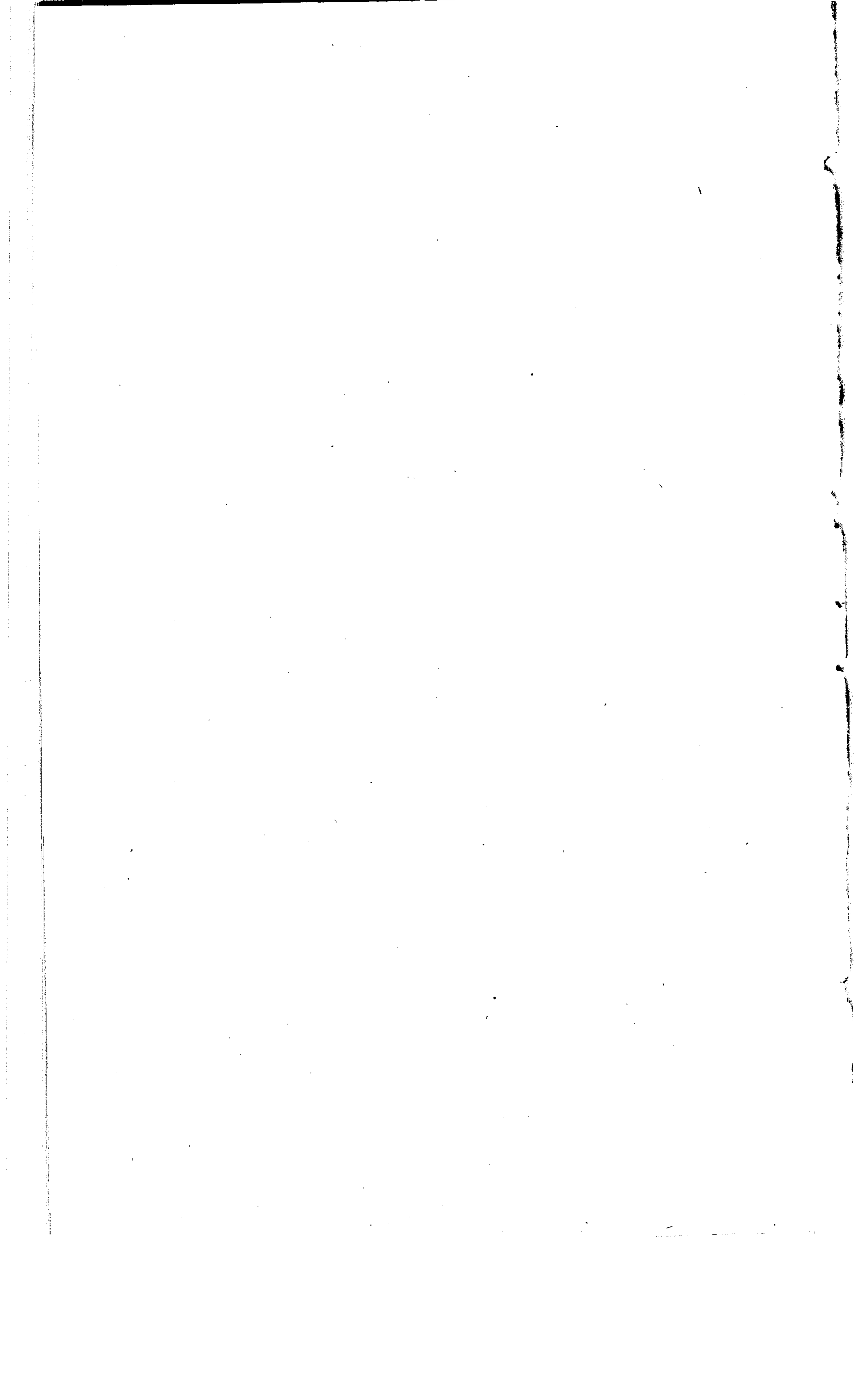
(i) 336 Rs/ha. (ii) 363.2 Rs/ha. (based on 5 d.f. made up of Treatments \times years interaction). (iii) Treatment differences are not significant. (iv) Av. value of produce in Rs/ha.

Treatment	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆
Av. value	231	318	492	336	330	307

Individual results

Treatment	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	Sig.	G.M.	S.E./plot
Year									
1963	144	168	111	217	169	154	N.S.	161	71.7
1964	317	468	874	454	491	460	*	511	242.2
Pooled	231	318	492	336	330	307	N.S.	336	363.2

HIMACHAL PRADESH



Crop :- Paddy (Kharif).**Ref :- H.P. 63(188).****Site :- Govt. Agri. Res. Stn., Dhaulakuan.****Type :- 'M'.**

Object : To study the effect of different times of application of N on the yield of Paddy.

1. BASAL CONDITIONS:(i) (a) Nil (b) Berseem. (c) N.A. (ii) clayey loam. (iii) 8.8.63. (iv) (a) 4 to 5 ploughings. (b) N.A. (c) 19.8 Kg/ha. (d) and (e) N.A. (v) 33.6 Kg/ha. of P_2O_5 + 22.4 Kg/ha. of K_2O . (vi) China 988. (vii) Irrigated. (viii) 1. Weeding. (ix) 185 cm (x) 11.11.63.**2. TREATMENTS :**5 times of application of 33.6 Kg/ha. of N as C/A/N : T_1 = 2/3rd at puddling and 1/3rd 15 days before flowering, T_2 = 1/3rd at puddling and 1/3rd one month after puddling and 1/3rd 15 days before heading, T_3 = 1/3rd at puddling and 2/3rd at one month after puddling, T_4 = 1/2 at puddling and 1/2 at 15 days before heading and T_5 = 1/2 at puddling and 1/2 at one month after puddling.**3. DESIGN :**

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) 9.75 m x 4.57 m. (b) 9.14 m x 3.66 m. (v) 30 cm x 46 cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1963—Only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 2525 Kg/ha. (ii) 539.4 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T_1	T_2	T_3	T_4	T_5
Av. yield	2456	2642	2134	2740	2654

Crop :- Paddy (Kharif).**Ref :- H.P. 63(190).****Site :- Govt. Agri. Res. Stn., Dhaulakuan.****Type :- 'M'.**

Object : To study the effects of different times of application of N on the yield of Paddy.

1. BASAL CONDITIONS:(i) (a) Nil. (b) Berseem. (c) N.A. (ii) Clayey Loam. (iii) 22.7.63. (iv) (a) 5 ploughings. (b) to (e) N.A. (v) 33.6 Kg/ha. of P_2O_5 + 22.4 Kg/ha. of K_2O . (vi) China 4. (Late). (vii) Irrigated. (viii) Weeding. (ix) 185 cm. (x) 25.10.63.**2. TREATMENTS:**

Same as in expt. no. 63(188) on page No. 160.

3. DESIGN :

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 8. (iv) (a) 3.20m x 11.89 m. (b) 2.29m x 10.06m. (v) 46 cm x 91 cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1963—Only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 3693 Kg/ha. (ii) 392.9 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T_1	T_2	T_3	T_4	T_5
Av. yield	3506	3755	3547	3915	3741

Crop :- Paddy (Kharif).**Ref H.P. :- 63(189).****Site :- Govt. Agri. Res. Stn., Dhaula Kuan.****Type :- 'M'.****Object :** To study the effect of different Sources of N on the yield of Paddy.**1. BASAL CONDITIONS :**

(i) (a) Nil. (b) Berseem. (c) N.A. (ii) Clayey Loam. (iii) 4.8.63. (iv) (a) 5 ploughings. (b) N.A. (c) 19.8 Kg/ha. (d) and (e) N.A. (v) Nil. (vi) China—4. (vii) Irrigated. (viii) Weeding. (ix) N.A. (x) 12.11.63.

2. TREATMENTS :

4 Sources of N at 44.8 Kg/ha. : S_0 =Control (No. N), S_1 =C/A/N, S_2 =A/S and S_3 = Urea.

3. DESIGN:

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 6. (iv) (a) 4.57m × 11.89m. (b) 3.66 m × 10.06 m. (v) 45 cm × 91cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1963—Only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 2723 Kg/ha. (ii) 368.6 Kg/ha. (iii) Treatment differences. are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	S_0	S_1	S_2	S_3
Av. yield	2062	2737	3159	2934

C.D. = 453.5 Kg/ha.

Crop :- Paddy (Kharif).**Ref :- H.P. 63(191).****Site :- Agri. Res. Stn., Dhaula Kuan.****Type :- 'M'.****Object :** To study the effect of N, P and K applied individually and in combination on the yield of Paddy.**1. BASAL CONDITIONS :**

(i) (a) Nil. (b) Berseem. (c) N.A. (ii) Sandy Loam. (iii) 26.7.63. (iv) (a) 4 to 5 ploughings. (b) Transplanting. (c) 20 Kg/ha. (d) and (e) N.A. (v) Nil. (vi) China—4. (vii) Irrigated (viii) Weeding. (ix) N.A. (x) 26.10.63.

2. TREATMENTS:

All combinations of (1), (2) and (3)

(1) 3 Levels of N as C/A/N : $N_0=0$, $N_1=44.8$ and $N_2=67.3$ Kg/ha.

(2) 3 Levels of P_2O_5 as Super : $P_0=0$, $P_1=16.8$ and $P_2=22.4$ Kg/ha.

(3) 3 Levels of K_2O as Mur. Pot : $K_0=0$, $K_1=22.4$ and $K_2=44.8$ Kg/ha.

3. DESIGN :

(i) 3³ Partially Contd. (NPK and NPK² are confd.) (ii) (a) 3 blocks/replication and 9 plots/block. (b) N.A. (iii) 2. (iv) 2.29 m × 10.36 m. (b) 1.83 m × 9.14 m. (v) 23 cm × 61 cm. (vi) Yes.

4. GENERAL :

(i) Good. (ii) Nil. (iii) yield of grain. (iv) (a) 1963—Only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 2582 Kg/ha. (ii) 517.9 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
N ₀	1980	2175	2242	2032	2290	2075	2132
N ₁	2740	2870	3020	2670	3110	2850	2877
N ₂	2700	2600	2908	3105	2618	2485	2736
Mean	2473	2548	2723	2602	2673	2470	2582
K ₀	2550	2585	2672				
K ₁	2530	2630	2858				
K ₂	2340	2430	2640				

C.D. for N marginal means = 351.0 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- H.P. 65(182).

Site :- Agri. Res. Stn., Dhaula Kuan.

Type :- 'M'.

Object : To study the effect of micronutrients on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loam. (iii) N.A. (iv) (a) N.A. (b) Line sowing by Japanese method. (c) to (e) N.A. (v) N.A. (vi) China—988 (improved). (vii) Irrigated (viii) to (x) N.A.

2. TREATMENTS :

8 Micronutrients treatments : M₀=Control, M₁=Cu. Sul 5.6 Kg/ha, M₂=Cu. Sul at 11.2 Kg/ha, M₃=Zn. Sul at 5.6 Kg/ha, M₄=Zn. Sul at 11.2 Kg/ha, M₅=Fe chelate at 5.6 Kg/ha, M₇=Mn. Sul at 5.6 Kg/ha, M₆=(M₁+M₃+M₅+M₆).

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3.66 m × 4.57 m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal (ii) Nil. (iii) Yield of grain. (iv) (a) 1965—Only. (b) No. (c) Nil. (v) to (vi) Nil.

5. RESULTS :

(i) 524 Kg/ha. (ii) 232.4 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆	M ₇
Av. yield	595	740	471	531	416	590	426	426

Crop :- Paddy (Kharif).

Ref :- H.P. 62(274).

Site :- Crop Res. Stn., Hasipura.

Type :- 'M'.

Object : To study the effect of different fertilizer doses on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) N.A. (iii) 23.7.62. (iv) (a) to (e) N.A. (v) N.A. (vi) T-21. (vii) to (x) N.A.

2. TREATMENTS :

All combinations of (1), (2) and (3)

(1) 2 Levels of N : N₀=0 and N₁=45 Kg/ha.

(2) 2 Levels of P₂O₅ : P₀=0 and P₁=34 Kg/ha.

(3) 2 Levels of K₂O : K₀=0 and K₁=22.5 Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3.20 m × 1.83 m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962 Only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 646 Kg/ha. (ii) 101.2 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	K ₀	K ₁	Mean
N ₀	725	720	760	685	723
N ₁	507	629	544	593	568
Mean	616	675	652	639	646
K ₀	580	723			
K ₁	652	626			

C.D. for N marginal means = 74.0 Kg/ha.

Crop :- Paddy (Kharif)

Ref :- H.P. 65(174).

Site :- Rice Res. Stn., Jogindernagar.

Type :- 'M'.

Object :—To study the effect of N, P and K on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) Paddy—Berseem—Paddy. (b) Berseem. (c) N.A. (ii) N.A. (iii) 21.7.65. (iv) (a) 3 ploughings with furrows. (b) 8. (c) 20 to 30 Kg/ha. (d) and (e) N.A. (v) N.A. (vi) Japonica SMG—1 (Local) (vii) Irrigated. (viii) 4 hand weedings. (ix) N.A. (x) 14.10.65.

2. TREATMENTS :

All combinations (1), (2) and (3)

(1) 3 levels of N : N₀=0, N₁=25.5, N₂=45 and N₃=67.5 Kg/ha.

(2) 3 levels of P₂O₅ : P₀=0, P₁=36 and P₂=72 Kg/ha.

(3) 3 levels of K₂O : K₀=0, K₁=45 and K₂=90 Kg/ha.

3. DESIGN :

(i) 3³ Confd. (ii) (a) 9 plots/block and 3 blocks/replication. (b) N.A. (iii) 2. (iv) (a) 3.64 m × 2.29 m. (b) 2.74 m × 1.83 m (v) 15 cm × 23 cm. (vi) Yes.

4. GENERAL :

(i) Medium; no lodging. (ii) Nil. (iii) Yield of grain. (iv) (a) 1965—Only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 3756 Kg/ha. (ii) 505.4 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
N ₀	2957	3056	3820	3023	3422	3389	3278
N ₁	3588	4056	3920	3754	4040	3771	3855
N ₂	4119	4252	4036	4102	4036	4070	4136
Mean	3555	3788	3925	3693	3833	3743	3756
K ₀	3339	3820	3920				
K ₁	3555	3790	4153				
K ₂	3771	3754	3704				

C.D. for N marginal means = 347.6 Kg/ha.

Crop :- Paddy (Kharif).**Ref :- H.P. 60(83)****Site :- Govt. Reclamation Farm, Kamma.****Type :- 'M'.**

Object :—To study the calcium requirements for the better yield of Paddy in Saline Alkaline soil.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Saline Alkaline soil. (iii) 24.7.60. (iv) (a) 4 to 5 ploughings. (b) to (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) 23.10.60.

2. TREATMENTS :**Main-plot treatments :**5 calcium requirements : T_0 =Control, (no calcium). T_1 =50%, T_2 =75%, T_3 =85% and T_4 =100% calcium requirement.**Sub-plot treatments :**5 levels of fertilizer : F_0 =Control, (no fertilizer), F_1 =56 Kg/ha. of N, F_2 = F_1 +28 Kg/ha. of P_2O_5 , F_3 = F_2 +56 Kg/ha. of K_2O , and F_4 = F_3 +Zinc and Magnese
Source of calcium N.A.**3. DESIGN :**

(i) Split-plot. (ii) (a) 5 main-plots/replication, 5 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/791 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1963—Only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 2561 Kg/ha. (ii) (a) 438.0 Kg/ha. (b) 384.0 Kg/ha. (iii) Main effect of F alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	F_0	F_1	F_2	F_3	F_4	Mean
T_0	1963	2728	2886	2692	2948	2643
T_1	1989	2457	2835	2702	2926	2582
T_2	1755	2293	2358	2936	2813	2431
T_3	1878	2386	2511	2920	2835	2506
T_4	2072	2633	2378	2898	3236	2643
Mean	1931	2499	2594	2830	2952	2561

C.D. for F marginal means = 240.4 Kg/ha.

Crop :- Paddy (Kharif).**Ref :- H.P. 60(84).****Site :- Govt. Reclamation Farm, Kamma.****Type :- 'M'.**

Object : To study the effect of dry leaf powder of organic materials on the reclamation of soil and yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Saline, Alkaline soil. (iii) July, 60. (iv) (a) 4 to 5 ploughings. (b) to (e) N.A. (v) Nil. (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) Oct., 60.

2. TREATMENTS :10 organic manurial treatments : T_0 =Control (no manure), T_1 =Agrison mexicana dry powder at 5.02 Q/ha., T_2 =Pobli dry powder at 5.02 Q/ha., T_3 =Dry leaves dry powder at 5.02 Q/ha., T_4 =Impomea correa dry powder at 5.02 Q/ha., T_5 =Rice husk dry powder 5.02 Q/ha., T_6 =Sarson straw chopped dry powder at 5.02 Q/ha., T_7 =Rice chopped dry powder at 5.02 Q/ha., T_8 =Dhaircha (green plants) 25.10 Q/ha and T_9 =Recommended Method.

Treatments were applied Month before transplanting.

3. DESIGN :

(i) R.B.D. (ii) (a) 10 (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/494 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain (iv) (a) 1960 -Only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 1419 Kg/ha. (ii) 328.0 Kg/ha. (iii) Treatment differences are significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	1037	1321	1538	1257	1446	1300	1218	1354	1835	1888

C.D.=476.0 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- H.P. 60(161).

Site :- Govt. Reclamation Farm, Kamma.

Type :- 'M'.

Object :-To study the residual effect of different soil amendments on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) Paddy (Kharif)-Paddy (Kharif). (b) Paddy (Kharif). (c) As per treatments. (ii) Saline soil. (iii) 30.7.60. (iv) (a) 4 to 5 ploughings. (b) to (e) and (v) N.A. (vi) N.A. (vii) Irrigated. (viii) 2 Weedings. (ix) N.A. (x) 27.10.60.

2. TREATMENTS:

11 manurial treatments : T₀=Control, T₁=Gypsum at 100 Q/ha., T₂=Sulphur at 900 Kg/ha., T₃=H₂SO₄ at 3153 Litres/ha., T₄=HNO₃ at 5219 Litres/ha., T₅=Hcl. at 3865 Litres/ha., T₆=A/S at 6160 Kg/ha., T₇=F×M at 370 Q/ha., T₈=T₇+Press mud at 100 Q/ha., T₉=T₇+Mollases at 100 Q/ha. and T₁₀=Press mud at 300 Q/ha.+ Mollases at 100 Q/ha. Manures applied during 1958 Kharif season.

3. DESIGN :

(i) R.B.D. (ii) (a) 11. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 1/747.5 ha. (v) N.A. (vi) Yes.

4. DESIGN :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1958-60. (b) Yes. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 1987 Kg/ha. (ii) 344.7 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀
Av yield	1739	2165	1712	1971	2068	1789	1704	2332	2203	2302	1814

Crop :- Paddy (Kharif).

Ref : H.P. 60(87)

Site :- Govt. Reclamation Farm, Kamma.

Type :- 'M'.

Object : To study the residual effect of manures at different levels of leaching on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 19.7.60. (iv) (a) 4 to 5 ploughings. (b) to (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) 18.10.60.

2. TREATMENTS :

Main-plot treatments :

All combinations of (1) and (2)

(1) 2 levels of Gypsum : G₀=Control (no Gypsum) and G₁=15.06 Q/ha.

(2) 3 levels of leaching : L₀=Control (no leaching), L₁=30 cm. and L₂=61 cm.

Sub-plot treatments :

2 levels of fertilizer: F_0 —Control (No fertilizer) and F_1 —56 Kg/ha. of N+28 Kg/ha. of P_2O_5 .
Source of fertilizer is N.A.

3. DESIGN :

(i) Split-plot. (ii) (a) 6 main-plots/replication and 2 sub-plots/main-plot. (b) N.A. (iii) 3. (iv) (a) N. .
(b) 1/897 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 1883 Kg/ha. (ii) (a) 435 Kg/ha. (b) 366 Kg/ha. (iii) Main effect of F alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	L_0	L_1	L_2	G_0	G_1	Mean
F_0	1444	1164	1282	1301	1293	1297
F_1	2584	2316	2510	2440	2500	2470
Mean	2014	1740	1896	1870	1896	1883
G_0	2006	2011	1594			
G_1	2021	1469	2198			

C.D. for F marginal means=265.8 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- H.P. 60(159).

Site :- Govt. Reclamation Farm, Kamma.

Type :- 'M'.

Object : To study the effect of high doses of N on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) Dhaincha—Paddy—Barley—wheat. (b) Dhaincha. (c) N.A. (ii) Saline Sodic soil. (iii) 19.7.64.
(iv) (a) 4 to 5 ploughings. (b) to (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) 18.10.60.

2. TREATMENTS :**Main-plot treatments :**

5 manurial treatments: T_0 —Control, T_1 —224 Kg/ha. of N as A/S+224 Kg/ha. of P_2O_5 as Super.,
 T_2 —224 Kg/ha. of N as A/C+224 Kg/ha. of P_2O_5 as Super, T_3 — T_2 +152.4
Q/ha. of Gypsum and T_4 — T_2 +152.4 Q/ha. of Press mud.

Sub-plot treatments :

2 levels of fertilizer: F_0 —Control and F_1 —56 Kg/ha. of N+28 Kg/ha. of P_2O_5 +28 Kg/ha. of K_2O .

3. DESIGN :

(i) Split-plot. (ii) (a) 5 main-plots/replication and 2 sub-plots/main-plot. (b) N.A. (iii) 3 (iv) (a) N.A.
(b) 1/469.5 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) No. (vi) and (vii) Nil.

5. RESULTS :

- (i) 2438 Kg/ha. (ii) (a) 822.6 Kg/ha. (b) 480.8 Kg/ha. (iii) Main effect of F alone is highly significant.
 (iv) Av. yield of grain in Kg/ha.

	T ₀	T ₁	T ₂	T ₃	T ₄	Mean
F ₀	1753	2113	1487	1878	2191	1884
F ₁	3052	3036	2614	2723	3537	2992
Mean	2402	2574	2050	2300	2864	2438

C.D. for F marginal means=391.0 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- H.P. 60 and 61(SFT) for Kangra, 61(SFT) for Chamba.

Site :- District : Kangra and Chamba.

Type :- 'M'.

Object :- Type A: To study the response of Paddy to different levels of N, P and K applied individually and in combination.

1. BASAL CONDITIONS :

- (i) (a) to (c) N.A. (ii) Hilly. (iii) to (x) N.A.

2. TREATMENTS:

8 manurial treatments :

- O=Control (no manure),
 N=22.4 Kg/ha. of N,
 P=22.4 Kg/ha. of P₂O₅,
 K=22.4 Kg/ha. of K₂O,
 NP=22.4 Kg/ha. of N+22.4 Kg/ha. of P₂O₅,
 NK=22.4 Kg/ha. of N+22.4 Kg/ha. of K₂O,
 PK=22.4 Kg/ha. of P₂O₅+22.4 Kg/ha. of K₂O and
 NPK=22.4 Kg/ha. of N+22.4 Kg/ha. of P₂O₅+22.4 Kg/ha. of K₂O.

3. DESIGN :

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle/thana is changed once in two years within the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on *Kharif* cereal, 8 on a *Rabi* cereal, 8 on cash crop, 4 on an oilseed crop and 3 on a leguminous crop. Half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. The three trials on legumes are of type C. Residual effects of phosphate application are studied on type C trials in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98.8 ha. (b) 1/197.7 ha. (iv) Yes.

4. GENERAL :

- (i) and (ii) N.A. (iii) Yield of grain. (iv) (a) to (c) N.A. (v) to (vii) N.A.

5. RESULTS:

Av. response in Kg/ha.

60(SFT)

District	No. of trials	Control yield in Kg/ha.	N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Kangra	9	1580	480	390	300	34.0	-20	20	50	10	33.0

61(SFT)

Chamba	5	1250	70	150	170	60.0	100	—	10	—	18.0
Kangra	7	2450	760	510	370	39.0	70	70	-80	-40	29.0

Crop :- Paddy (Kharif).**Ref :- H.P. 60 and 61(SFT).****Site :- District : Kangra.****Type :- 'M'.**

Object :—Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Hilly tract. (iii) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (no manure),

 $N_1=22.4$ Kg/ha. of N as A/S, $N_2=44.8$ Kg/ha. of N as A/S, $N_1'=22.4$ Kg/ha. of N as Urea, $N_2'=44.8$ Kg/ha. of N as Urea, $N_1''=22.4$ Kg/ha. of N as C/A/N, $N_2''=44.8$ Kg/ha. of N as C/A/N,**3. DESIGN :**

Same as in type A conducted on Paddy crop on Page No. 170.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—61. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :**60(SFT)**

Av. response in Kg/ha.

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			N_1	N_2	N_1'	N_2'	N_1''	N_2''	
Kangra	8	1480	440	950	310	780	380	830	61.0

61(SFT)

Kangra	14	1830	340	1030	450	550	460	620	99.0
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Crop :- Paddy (Kharif).**Ref :- H.P. 61 (SFT).****Site :- District : Chamba.****Type :- 'M'.**

Object :—Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Hilly. (iii) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (no manure),

 $N_1=22.4$ Kg/ha. of N as A/S $N_2=44.8$ Kg/ha. of N as A/S $N_1'=22.4$ Kg/ha. of N as A/S/N $N_2'=44.8$ Kg/ha. of N as A/S/N $N_1''=22.4$ Kg/ha. of N as C/A/N $N_2''=44.8$ Kg/ha. of N as C/A/N

3 DESIGN :

Same as in type A Conducted on Paddy crop on Page No. 169.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) to (vii) N.A.

5. RESULTS :

61(SFT)

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			N ₁	N ₂	N ₁ '	N ₂ '	N ₁ ''	N ₂ ''	
Chamba	6	1150	150	150	170	250	320	370	53.0

Crop :- Paddy (Kharif).

Ref :- H.P. 63 to 65(SFT).

Site :- District : Kangra.

Type :- 'M'.

Object :- Type A₁ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

- O=Control (no manure),
- N₁=35 Kg/ha. of N,
- N₂=70 Kg/ha. of N,
- P₁=35 Kg/ha. of P₂O₅,
- N₁P₁=35 Kg/ha. of N+35 Kg/ha. of P₂O₅,
- N₂P₁=70 Kg/ha. of N+35 Kg/ha. of P₂O₅,
- N₂P₂=70 Kg/ha. of N+70 Kg/ha. of P₂O₅ and
- N₂P₂K₁=70 Kg/ha. of N+70 Kg/ha. of P₂O₅+35 Kg/ha. of K₂O,

N applied as A/S, P₂O₅ as Super and K₂O as Mur. Pot.

3. DESIGN :

(i) and (ii) A selected district is divided into four agriculturally homogeneous zones based on climate, soil, cropping pattern etc. In each zone one block is selected at random. A block normally consists of a group of 50--100 villages. In each block 36 experiments are conducted in a year out of which 11 are of type A₁, 11 of type A₂, 11 of type A₃ and 3 are of type C. The eleven experiments under type A₁, A₂ and A₃ are distributed as 3 on a kharif cereal, 3 on a rabi cereal, 3 on a cash crop and 2 on oil seed. All the three type-C experiments are conducted on a legume crop. For the purpose of conducting the A₁, A₂ and A₃ experiments 11 villages are randomly selected in each block and in each village 3 experiments one each of type A₁, A₂ and A₃ are laid out. For conducting the experiments, three villages are randomly selected in each block. (iii) (a) 1/100 ha. (b) 1/200 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962--66. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Kangra

63(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	462	746	166	820	1038	1283	1473	163.7

Control yield=2508 Kg/ha. ; No. of trials=10

64(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha	433	770	204	609	892	1122	1219	107.5

Control yield=2061 Kg/ha. ; No. of trials=9

65(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	306	659	114	471	832	965	1040	127.2

Control yield=1485 Kg/ha. ; No. of trials=8

Crop :- Paddy (Kharif)

Ref :- H.P. 62 (SFT)

Site :- District : Kangra

Type :- 'M'

Object :- Type A₁ : To study the response curves of important cereal, cash and oilseed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

Same as in type A₁ conducted on Paddy crop under unirrigated conditions on page No. 170.

3. DESIGN

Same as in type A₁ conducted on Paddy crop under unirrigated conditions on page No. 170.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962 to 66 for Kangra (1963 to 65 N.A.) (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

62(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	303	306	119	402	402	659	673	361.2

Control yield=1845 Kg/ha. ; No. of trials=4

Crop :- Paddy (Kharif).

Ref :- H.P. 62(SFT).

Site :- District : Kangra.

Type :- 'M'

Object :- Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O—Control (no manure),

 $N_1=35$ Kg/ha. of N, $P_1=35$ Kg/ha. of P_2O_5 , $P_2=70$ Kg/ha. of P_2O_5 , $N_1P_1=35$ Kg/ha. of N+35 Kg/ha. of P_2O_5 , $N_1P_2=35$ Kg/ha. of N+70 Kg/ha. of P_2O_5 , $N_2P_2=70$ Kg/ha. of N+70 Kg/ha. of P_2O_5 and $N_2P_2K_2=70$ Kg/ha. of N+70 Kg/ha. of P_2O_5 +70 Kg/ha. of K_2O .N applied as A/S, P_2O_5 as Super and K_2O as Mur. Pot.

3. DESIGN :

Same as in type A_1 conducted under unirrigated conditions on Paddy crop on page No. 170.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—66 (1963 to 65 N.A.) (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

62(SFT)

Treatment	N_1	P_1	P_2	N_1P_1	N_1P_2	N_2P_2	$N_2P_2K_2$	S.E.
Av. response of grain in Kg/ha.	408	198	408	672	825	1151	1255	170.2

Control yield=1649 Kg/ha. ; No of trials=5

Crop :- Paddy (*Kharif*).

Ref :- H.P. 62 to 65 (SFT).

Site :- District : Kangra.

Type :- 'M'.

Object :—Type A_2 : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

Same as in type A_2 conducted on Paddy crop under irrigated conditions as above.

3. DESIGN :

Same as in type A_1 conducted under unirrigated conditions on Paddy crop on page No. 170.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—66. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

62(SFT)

Treatment	N_1	P_1	P_2	N_1P_1	N_1P_2	N_2P_2	$N_2P_2K_2$	S.E.
Av. response of grain in Kg/ha.	21	—78	85	87	121	261	239	1.6

Control yield=1063 Kg/ha. ; No. of trials=2

63(SFT)

Treatment	N_1	P_1	P_2	N_1P_1	N_1P_2	N_2P_2	$N_2P_2K_2$	S.E.
Av. response of grain in Kg/ha.	780	356	428	981	1225	1508	1544	127.2

Control yield=2236 Kg/ha. ; No. of trials=12

64(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	545	208	391	752	839	1214	1429	117.8

Control yield=2070 Kg/ha. ; No. of trials=9

65(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	299	206	233	578	646	863	1101	216.6

Control yield=1542 Kg/ha. ; No. of trials=9

Crop :- Paddy (*Kharif*).

Ref :- H.P. 62, 64(SFT).

Site :- District : Kangra.

Type :- 'M'.

Object :—Type A₃ : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

Same as in type A₁ conducted on Paddy crop under unirrigated conditions on page No. 174.

3. DESIGN :

Same as in type A₁ conducted under unirrigated conditions on Paddy crop on page No. 170.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962 to 66 (1963 and 1965 N.A.) (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

62(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	317	8	94	398	368	581	1106	208.4

Control yield=1574 Kg/ha. ; No. of trials=3

64(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	595	295	469	728	903	1398	1098	89.7

Control yield=1951 Kg/ha. ; No. of trials=9

Crop :- Paddy (Kharif).

Ref :- H.P. 62, 63, 65 (SFT)

Site :- District : Kangra

Type :- 'M'

Object :-Type A₂ : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Un-irrigated. (viii) to (x) N.A.

2. TREATMENTS:

8 manurial treatments :

O=Control (no manure),

N₁=35 Kg/ha. of N,

K₁=35 Kg/ha. of K₂O,

K₂=70 Kg/ha. of K₂O,

N₁K₁=35 Kg/ha. of N+35 Kg/ha. of K₂O,

N₁K₂=35 Kg/ha. of N+70 Kg/ha. of K₂O,

N₂K₂=70 Kg/ha. of N+70 Kg/ha. of K₂O and

N₁P₁K₁=35 Kg/ha. of N+35 Kg/ha. of P₂O₅+35 Kg/ha. of K₂O,

N applied as A/S, P₂O₅ as Super and K₂O as Mur. Pot.

3. DESIGN:

Same as in type A₁ conducted under unirrigated conditions on Paddy crop on page No. 172.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962 to 66 (1964 N.A.) (b) and (c) N.A. (v) to (vii) N.A.

62(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	30	271	-16	89	277	425	166	247.6

Control yield=1086 Kg/ha. ; No. of trials=12

63(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	688	171	170	835	882	1357	1291	77.7

Control yield=2151 Kg/ha. ; No. trials=12

65(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	593	254	454	758	939	1075	1015	90.7

Control yield=1843 Kg/ha. ; No. of trials=9

Crop :- Paddy (Kharif)

Ref :- H.P. 65(177).

Site :- Crop Res. Stn., Dhaula Kuan.

Type :- 'CV'.

Object :-To find out the optimum date of transplanting, age of seedlings for different varieties of paddy under low hill conditions :

1. BASAL CONDITIONS:

(i) (a) Paddy Berseem. (b) Berseem for seed. (c) 67.2 Kg/ha. of P₂O₅ as super applied before sowing

(ii) Sandy loam. (iii) As per treatments. (iv) (a) Improved transplanted cultivation. (b) Transplanting. (c) 29.6 Kg/ha. (d) 23 cm × 15 cm. (e) 2. (v) 22.4 Kg/ha. of N, 35.8 Kg/ha. of P₂O₅ and 22.4 Kg/ha. of K₂O at puddings and 22.4 Kg/ha. of N topdressed one month after transplanting. (vi) As per treatments. (vii) Irrigated. (viii) 2 weedings by hand *Khurples* and Rotary weeders. (ix) N.A. (x) 5.10.65 to 10.11.65.

2. TREATMENTS :

Main-plot treatments :

3 dates of transplanting : D₁=10th, D₂=20th and D₃=30th July.

Sub-plot treatments :

5 ages of seedlings : A₁=20, A₂=25, A₃=30, A₄=35 and A₅=40 days.

Sub-sub-plot treatments :

2 varieties ; V₁=CH-4 & V₂=CH-988.

3. DESIGN :

(i) Split-split-plot. (ii) (a) 3 main-plots/replication ; 5 sub-plots/main-plot ; 2 sub-sub-plots/sub-plot. (b) N.A. (iii) 4. (iv) (a) 5.49 m × 3.81 m. (b) 4.57 m × 2.74 m. (v) 46 cm × 54 cm. (vi) yes.

4 GENERAL :

(i) Normal. (ii) Blast attack in plots with CH-4. (iii) Yield of grain. (iv) (a) 1964—only. (b) No. (c) Nil. (v) N.A. (vi) Nil. (vii) Dry spell and low temperature during early November and late October affected the CH-4 plants.

5. RESULTS :

(i) 3020 Kg/ha. (ii) (a) 550.8 Kg/ha. (b) 344.8 Kg/ha. (c) 375.2 Kg/ha. (iii) Main effects of D, A and A × V interaction are highly significant. (iv) Av. yield of grain in Kg/ha.

	A ₁	A ₂	A ₃	A ₄	A ₅	V ₁	V ₂	Mean
D ₁	3231	3793	3908	3797	3716	3373	4004	3689
D ₂	2866	3332	3796	3881	3821	3644	3435	3539
D ₃	1802	1824	1847	1919	1768	2021	1644	1832
Mean	2633	2983	3184	3199	3101	3013	3028	3020
V ₁	2734	3096	3198	3132	2904			
V ₂	2532	2871	3170	3267	3299			

C.D. for D marginal means = 301.2 Kg/ha.

C.D. for A marginal means = 202.0 Kg/ha.

C.D. for V means at the same level of A = 308.8 Kg/ha.

C.D. for A means at the same level of V = 297.4 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- HP. 61(42).

Site :- Rice Breeding Sub-Stn., Nagrota-Bagwan.

Type :- 'CV'.

Object :- To study the effect of different cultural practices on different varieties of Paddy.

1. BASAL CONDITIONS :

(i) (a) Paddy-wheat for C₁ and Paddy-fallow for C₂. (b) Wheat for C₁ and fallow for C₂. (c) Nil. (ii) Clay loam. (iii) 9.5.61; 10.6.61 for C₁ and 26.6.61 for C₂. (iv) (a) 2 *Suhagas* and 3 ploughings for C₁ and 2 ploughings for C₂. (b) Broad casting and transplanting. (c) N.A. (d) 23 cm × 15 cm. (e) 2. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) C₁ on 24.10.61 and C₂ on 27.10.61.

2. TREATMENTS :

All combinations of (1) and (2).

(1) 8 Varieties: $V_1=R \times NS-5$, $V_2=R \times NS-10$, $V_3=R \times NS-7$, $V_4=A \times RS-2$, $V_5=A \times RS-9$,
 $V_6=A \times RS-8$, $V_7=A \times RS-4$, and $V_8=RJ-100$.

(2) 2 cultural practices: C_1 =Vatter broadcasting and C_2 =Transplanting.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 16. (b) N.A. (iii) 4. (iv) (a) and (b) 4.57 m x 3.66 m for C_1 and 7.62 m x 2.29 m for C_2 . (v) Nil. (vi) yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 2435 Kg/ha. (ii) 401.1 Kg/ha. (iii) Main effect of C alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	V_1	V_2	V_3	V_4	V_5	V_6	V_7	V_8	Mean
C_1	2230	2318	2082	2144	2144	1838	2492	2414	2208
C_2	2618	2714	2656	2886	2538	2564	2530	2789	2662
Mean	2424	2516	2369	2515	2341	2201	2511	2602	2435

C.D. for C marginal means=202.2 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- H.P. 61(45).

Site :- Rice Breeding Sub-Stn., Nagrota, Bagwan.

Type :- 'CV'.

Object :- To study the effect of different cultural practices on the yield of different varieties of Paddy.

1. BASAL CONDITIONS :

Same as in expt. No. 61 (42) on page No. 177.

2. TREATMENTS:

All combinations of (1) and (2).

(1) 6 varieties: $V_1=P \times NS-3$, $V_2=A \times PS-6$, $V_3=A \times NS-2$, $V_4=A \times PS-7$, $V_5=N \times PS-I$ and
 $V_6=PP-72$.

(2) 2 cultural practices: C_1 =Vatter broadcasting and C_2 =Transplanting.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) and (b) 4.57 m x 3.66 m for C_1 and 7.62 m x 2.29 m for C_2 . (v) Nil. (vi) yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961—only. (b) No. (c) Nil. (v) and (vi) Nil. (vii) No.

5. RESULTS :

(i) 2333 Kg/ha. (ii) 344.0 Kg/ha. (iii) Main effect of V is highly significant, and interaction $V \times C$ is significant. (iv) Av. yield of grain in Kg/ha.

	V ₁	V ₂	V ₃	V ₄	V ₅	V ₆	Mean
C ₁	2923	2431	1734	1699	2640	2152	2263
C ₂	2948	2610	1865	2614	2284	2096	2403
Mean	2936	2520	1800	2156	2462	2124	2333

C.D. for V marginal means=350.2 Kg/ha.

C.D. for the body of V x C table=495.2 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- H.P. 61(46).

Site :- Rice Breeding Sub-Stn., Nagrota, Bagwan.

Type :- 'CV'.

Object :- To study the effect of different cultural practices on the yield of different varieties of Paddy.

1. BASAL CONDITIONS :

(i) (a) Paddy—wheat for C₁ and Paddy—fallow for C₂. (b) Wheat for C₁ and fallow for C₂. (c) Nil. (ii) Clay Loam. (iii) C₁ on 10.6.61 and C₂ on 8.5.61/6.7.61. (iv) (a) 2 *Suhagas* and 2 ploughings for C₂ and 2 ploughings for C₂. (b) Broadcasting and Transplanting. (c) N.A. (d) 23 cm x 15 cm. (e) 2. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) C₁ on 23/24.10.61 and C₂ on 20.10.61.

2. TREATMENTS :

All combinations of (1) and (2).

(1) 7 varieties : V₁=CP 99-5-7 ; V₂=CP 23-5-6 ; V₃=CP 6-7 ; V₄=CP 33-3 ; V₅=CP 11-5-2 and V₆=PP-72.

(2) 2 cultural practices : C₁=Vatter broadcasting C₂=Transplanting.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) and (b) 4.57 m x 3.66 m for C₁ and 7.62 m x 2.29 m for C₂. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 1303 Kg/ha. (ii) 304.1 Kg/ha. (iii) Main effects of V and C are highly significant. (iv) Av. yield of grain in Kg/ha.

	V ₁	V ₂	V ₃	V ₄	V ₅	V ₆	Mean
C ₁	673	1000	807	945	870	1150	907
C ₂	1332	1328	1769	2178	1577	2009	1699
Mean	1002	1164	1288	1566	1224	1580	1303

C. D. for V marginal means=310.2 Kg/ha.

C. D. for C marginal means=178.7 Kg/ha.

Crop :- Paddy (Kharif).**Ref :- H.P. 61(47).****Site :- Rice Breeding Sub-Stn., Nagrota, Bagwan.****Type :- 'GV'.****Object :-**To study the effect of different cultural practices on the yield of different varieties of Paddy.**1. BASAL CONDITIONS :**

(i) (a) Paddy-wheat for C₁ and Paddy-fallow for C₂. (b) Wheat for C₁ and fallow for C₂. (c) Nil. (ii) Clay loam. (iii) C₁ on 8.5.61/10.6.61 and C₂ on 1.7.61. (iv) (a) 2 *Suhagas* and 2 Ploughings for C₂. (b) Broadcasting and Transplanting. (c) N.A. (d) 23 cm × 15 cm. (e) 2. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) C₁ on 31.10.61 and C₂ on 25.10.61.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 6 varieties : V₁=NRI-8-4-1 ; V₂=NR 1-8-5 5 ; V₃=NR-1-8-5-2 ; V₄=NR-1-8-3 ; V₅=NR-4-14-2 4 and V₆=RJ-100.

(2) 2 cultural practices : C₁=Vatter broadcasting and C₂=Transplanting.

3. DESIGN:

(i) Fact in R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) 4.57 m × 3.66 m for C₁ and 7.62 m × 2.29 m. for C₂. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 1980 Kg/ha. (ii) 402.1 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	V ₁	V ₂	V ₃	V ₄	V ₅	V ₆	Mean
C ₁	1660	1798	1706	1981	1974	2417	1923
C ₂	2021	2213	1969	1695	2196	2126	2037
Mean	1840	2006	1838	1838	2085	2272	1980

Crop :- Paddy (Kharif).**Ref :- H.P. 61(49).****Site :- Rice Breeding Sub-Stn., Nagrota, Bagwan.****Type :- 'GV'.****Object :-**To study the effect of different cultural practices on the different varieties of Paddy.**1. BASAL CONDITIONS :**

(i) (a) Paddy-Wheat for C₁ and fallow for C₂. (b) Wheat for C₁ and fallow for C₂. (c) Nil. (ii) Clay loam. (iii) 9.5.61/24.6.61 for C₂ and 22.6.61 for C₁. (iv) (a) 2 *Suhagas* and 2 ploughings for C₁ and 2 ploughings for C₂. (b) Broadcasting for C₁ and Transplanting for C₂. (c) N.A. (d) 23 cm × 15 cm for C₁. (e) 2. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) C₁ on 16.10.61 and C₂ on 7.10.61.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 4 Varieties : V₁=Hybrid No. 23 ; V₂=Hybrid No. 27 ; V₃=Hybrid No. 51 and V₄=RJ-100.

(2) 2 methods of sowing : C₁=Vatter broadcasting and C₂=Transplanting.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 4.57m × 3.66m for C₁ and 7.62m × 2.28m for C₂. (v) N.A. (vi) yes.

4. GENERAL

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1961-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 1725 Kg/ha. (ii) 258.9 Kg/ha. (iii) Main effects of V and C are highly significant. (iv) Av. yield of grain in Kg/ha.

	V ₁	V ₂	V ₃	V ₄	Mean
C ₁	1342	1695	1403	1664	1526
C ₂	1777	2041	1602	2275	1924
Mean	1560	1868	1502	1970	1725

C. D. for V marginal means=269.4 Kg/ha.

C. D. for C marginal means =190.4 Kg/ha.

Crop :- Paddy (Kharij).

Ref :- H.P. 61(43), 62(55).

Site :- Rice Breeding Sub-Stn., Nagrota, Bagwan.

Type :- 'CV'.

Object :—To study the effect of different cultural practices on different varieties of Paddy.

1. BASAL CONDITIONS:

(i) (a) Paddy—Wheat for C₁ and Paddy—fallow for C₂. (b) Wheat for C₁ and Fallow for C₂. (c) Nil. (ii) Clay loam. (iii) 2nd week of June for C₁ and 3rd week of June for C₂. (iv) (a) 2 ploughings and 2 *Suhagas*. (b) As per treatments. (c) N.A. (d) 23 cm × 15 cm. (e) 2. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) Mid of Oct. for C₁, and 7.10.61 and 20.10.62 for C₂

2. TREATMENTS:

All combinations of (1) and (2)

(1) 4 varieties: V₁=NR 2—12—2, V₂=NR 4—7, V₃=NR 5—27—3 and V₄=RJ—100.

(2) 2 cultural practices: C₁=Vattar broadcasting and C₂=Transplanting.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) and (b) 4.57m × 3.66m for C₁ and 7.62m × 2.29m for C₂. (v) Nil. (vi) yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961—62. (b) No. (c) Results of combined analysis are presented under 5—Results. (v) and (vi) Nil. (vii) Error variances are homogeneous and Treatments × years interaction is present.

5. RESULTS:

Pooled results

(i) 2852 Kg/ha. (ii) 994.0 Kg/ha. (based on 7 d.f. made up of Treatments × years interaction). (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	V ₁	V ₂	V ₃	V ₄	Mean
C ₁	2634	2618	2732	2431	2604
C ₂	3184	3042	3338	2834	3099
Mean	2909	2830	3035	2633	2852

Individual results

Treatment	V ₁	V ₂	V ₃	V ₄	Sig.	C ₁	C ₂
Year 1961	2654	2582	2733	2504	N.S.	2686	2550
1962	3164	3078	3336	2762	**	2521	3649
Pooled	2909	2830	3035	2633	N.S.	2604	3099

Sig.	G.M.	S.E./plot
N.S.	2618	327.5
**	3085	304.5
N.S.	2852	994.0

Crop :- Paddy (*Kharif*).Ref :- H.P. 61(44), 62(52),
63(67).

Site :- Rice Breeding Sub-Stn., Nagrota, Bagwan. Type :- 'CV'.

Object :- To study the effect of different cultural practices on different varieties of Paddy.

1. BASAL CONDITIONS:

(i) (a) Paddy-Wheat for C₁ and Paddy-fallow for C₂. (b) Wheat for C₁ and fallow for C₂. (c) Nil. (ii) Clay loam. (iii) 10.6.61, 7.6.62 and 3.6.63 for C₁ and 28.6.61, 30.6.62 and 26.6.63 for C₂. (iv) (a) 3 ploughings and 2 *Suhagas*. (b) As per treatments. (c) N.A. (d) 23 cm × 15 cm. (e) 2. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) 24.10.61, 10.10.62 and 22.10.63 for C₁, 20.10.61, 24.10.62 and 19.10.63 for C₂.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 3 varieties: V₁=Ashi, V₂=Norin-18 and V₃=R-7-100.(2) 2 cultural practices: C₁=Vatter broadcasting and C₂=Transplanting.

3. DESIGN:

(i) Fact. in R.B.D. (ii)(a) 6. (b) N.A. (iii) 4. (iv) (a) and (b) 3.66m × 4.57m for C₁ and 7.62m × 1.83m for C₂. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain, (iv) (a) 1961-63. (b) No. (c) Results of combined analysis are presented under 5 Results. (v) and (vi) Nil. (vii) Error variances are heterogeneous and Treatments × years interaction is present.

5. RESULTS:

Pooled results:

(1) 3235 Kg/ha. (ii) 672.0 Kg/ha. (based on 10 d.f. made up of Treatments × years interaction). (iii) Main effect of C is highly significant and interaction C × V is significant. (iv) Av. yield of grain in Kg/ha.

	V ₁	V ₂	V ₃	Mean
C ₁	1752	1673	2396	1940
C ₂	4599	4745	4246	4530
Mean	3176	3209	3321	3235

C. D. for C marginal means=351.9 Kg/ha.

C. D. for the body of C × V table=611.2 Kg/ha.

Individual results

Treatment	V ₁	V ₂	V ₃	Sig.	C ₁	C ₂
Year						
1961	3058	3384	3251	N.S.	2218	4243
1962	3011	3120	3237	N.S.	1760	4485
1963	3458	3124	3475	**	1842	4862
Pooled	3176	3239	3321	N.S.	1940	4530

Sig.	G.M.	S.E./plot
**	3231	470.1
**	3123	539.0
**	3352	89.9
**	3235	672.0

Crop :- Paddy (*Kharif*).Ref :- H.P. 61(48), 62(51),
63(66).

Site :- Rice Breeding Sub-Stn., Nagrota, Bagwan. Type :- 'CV'.

Object :—To study the effect of different cultural practices on different varieties of Paddy.

1. BASAL CONDITIONS :

(i) (a) Paddy-Wheat for C₁ and Paddy-fallow for C₂. (b) Wheat for C₁ and fallow for C₂. (c) N.A. (ii) Clay loam. (iii) 9.5.61 ; 8.5.62 ; 8.5.63. (iv)(a) 3 ploughings and 2 *Suhagas*. (b) As per treatments. (c) N.A. (d) 23 cm × 15 cm. (e) 2. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) 27.10.61 2.11.62 and 21.10.63 for C₂; 24.10.61, 21.10.62 and 22.10.63 for C₁.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 3 varieties : V₁=T-23, V₂=T-21 and V₃=Local.(2) 2 cultural practices : C₁=Vatter broadcasting and C₂=Transplanting.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) and (b) 4.57m × 3.66m for C₁ and 7.62 m × 1.83 m for C₂. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961-63. (b) No. (c) Results of combined analysis are presented under 5-Results. (v) and (vi) N.A. (vii) Error variances are heterogeneous and Treatments × years interaction is present.

5. RESULTS :

Pooled results.

(i) 1946 Kg/ha. (ii) 1504.6 Kg/ha (based on 10 d.f. made up of Treatments × years interaction). (iii) Main effect of C alone is significant. (iv) Av. yield of grain in Kg/ha.

	V ₁	V ₂	V ₃	Mean
C ₁	1954	1432	1216	1534
C ₂	2654	2184	2236	2358
Mean	2304	1808	1726	1946

C, D. for C marginal means = 790.0 Kg/ha.

Individual results

Treatment	V ₁	V ₂	V ₃	Sig.	C ₁	C ₂	Sig.	G.M.	S.E./plot
Year									
1961	2609	1918	2021	**	2442	1923	**	2183	151.1
1962	2532	1622	1298	**	1234	2401	**	1817	357.8
1963	1770	1884	1861	**	926	2751	**	1838	651.1
Pooled	2304	1808	1726	*	1534	2358	*	1946	1504.6

Crop :- Paddy (Kharif).

Ref :- H.P. 62 (50).

**Site :- Rice Breeding Sub-Stn., Nagrota, Bagwan,
Hissar.**

Type :- 'CV'.

Object :- To study the effect of different cultural practices on the different varieties of Paddy.

1. BASAL CONDITIONS :

(i)(a) Paddy-wheat for C₁ and paddy-fallow for C₂. (b) Wheat for C₁ and Fallow for C₂. (c) Nil. (ii) Clay loam. (iii) C₁ on 8.5.62/6.6.62 and C₂ on 28.6.62. (iv)(a) 2 *Suhagas* and 3 Ploughings for C₁ and 2 Ploughings for C₂. (b) Broadcasting and Transplanting. (c) N.A. (d) 23 cm × 15 cm. (e) 2. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) C₁ on 16.10.62 and C₂ on 20.10.62

2. TREATMENTS :

All combinations of (1) and (2)

(1) 4 varieties : V₁=Hybrid-14 ; V₂=Hybrid-27 ; V₃=NR-2-12-2 and V₄=2-27-3.

(2) 2 cultural practices : C₁=Vattar broadcasting and C₂=Transplanting.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) and (b) 4.57m × 3.66m for C₁ and 7.62 m × 1.83 m for C₂. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962 -only. (b) No. (c) Nil. (v) and (vi) Nil. (vii) No.

5. RESULTS :

(i) 2786 Kg/ha. (ii) 244.5 Kg/ha. (iii) All effects are highly significant. (iv) Av. yield of grain in Kg/ha.

	V ₁	V ₂	V ₃	V ₄	Mean
C ₁	1821	2500	2396	2588	2326
C ₂	2540	3090	3690	3664	3246
Mean	2180	2795	3643	3126	2786

C. D. for V marginal means =254.3 Kg/ha.

C. D. for C marginal means =179.8 Kg/ha.

C. D. for the body of V × C table=359.6 Kg/ha.

Crop :- Paddy (Kharif).**Ref :- H.P. 62(57).****Site :- Rice Breeding Sub-Stn., Nagrota, Bagwan.****Type :- 'CV'.**

Object :—To study the effect of different cultural practices on the yield of different varieties of Paddy.

1. BASAL CONDITIONS:

(i) (a) Paddy-wheat for C_1 and Paddy-fallow for C_2 . (b) Wheat for C_1 and fallow for C_2 . (c) Nil. (ii) Clay loam. (iii) C_1 on 24.5.62/6.6.62 and C_2 on 3.7.62. (vi) (a) 2 *Suhagas* and 3 ploughings for C_1 and 2 ploughings for C_2 . (b) As per treatments. (c) For vattar plots 5 Kg/kanal; For transplanting $1\frac{1}{2}$ to $1\frac{1}{2}$ Kg/kanal. (d) 23 cm \times 15 cm for C_2 . (e) 2 for C_2 . (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) C_1 on 13.10.62 and C_2 on 21.10.62.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 6 varieties : V_1 =Hybrid—27 ; V_2 =Hybrid—23 ; V_3 =Hybrid—37 ; V_4 =Hybrid—51 ; V_5 =Hybrid—14 and V_6 =R—J—100.

(2) 2 cultural practices : C_1 =Vattar broadcasting and C_2 =Transplanting.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) and (b) 4'57m \times 3'66m for C_1 and 7'62m \times 1'83m for C_2 . (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) No. (c) Nil. (v) and (vi) Nil. (vii) No.

5. RESULTS:

(i) 2291 Kg/ha. (ii) 390.7 Kg/ha. (iii) Main effects of V and C are highly significant. (iv) Av. yield of grain in Kg/ha.

	V_1	V_2	V_3	V_4	V_5	V_6	Mean
C_1	1856	1621	1255	1542	1006	1646	1488
C_2	3544	3053	2708	2844	2740	3674	3094
Mean	2700	2337	1982	2193	1873	2660	2291

C. D. for V marginal means = 397.7 Kg/ha.

C. D. for C marginal means = 229.6 Kg/ha.

Crop :- Paddy (Kharif).**Ref :- H.P. 62(56).****Site :- Rice Breeding Sub-Stn., Nagrota, Bagwan.****Type :- 'CV'.**

Object :—To study the effect of different cultural practices on the different varieties of Paddy.

1. BASAL CONDITIONS:

(i) (a) Paddy-wheat for C_1 and Paddy-fallow for C_2 . (b) Wheat for C_1 and fallow for C_2 . (c) Nil. (ii) Clay loam. (iii) C_1 on 8.5.62/7.6.62 and C_2 on 27.6.62. (iv) (a) 2 *Suhagas* and 3 ploughings for C_1 and 2 ploughings for C_2 . (b) Broadcasting and Transplanting. (c) N.A. (d) 23 cm \times 15 cm. (e) 2. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) C_1 on 10.10.62 and C_2 on 22.10.62.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 5 varieties : V_1 =R \times N—5 ; V_2 =R \times N—10 ; V_3 =R \times N—4 ; V_4 =R \times N—2 and V_5 =RJ—100.

(2) 2 cultural practices : C_1 =Vattar broadcasting and C_2 =Transplanting.

3 DESIGN :

(i) Fact. in R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) and (b) 4.57m×3.66m for C₁ and 7.62m×1.83m for C₂. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) No. (c) Nil. (v) and (vi) Nil. (vii) No.

5. RESULTS :

(i) 2570 Kg/ha. (ii) 611.0 Kg/ha. (iii) Main effect of C alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	V ₁	V ₂	V ₃	V ₄	V ₅	Mean
C ₁	1969	1847	1830	1298	2309	1851
C ₂	3597	3142	3189	2011	3508	3289
Mean	2783	2494	2510	2154	2908	2570

C. D. for C marginal means=396.5 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- H.P. 62(54).

Site :- Rice Breeding Sub-Stn., Nagrota, Bagwan.

Type :- 'CV'.

Object : To study the effect of different cultural practices on different varieties of Paddy.

1. BASAL CONDITIONS :

(i) (a) Paddy-wheat for C₁ and Paddy—fallow for C₂. (b) Wheat for C₁ and fallow for C₂. (c) Nil. (ii) Clay loam. (iii) C₁ on 8.5.62/7.6.62 and C₂ on 1.6.62. (iv) (a) 2 *Suhagas* and 3 ploughings for C₁; 2 ploughings for C₂. (b) Broadcasting and Transplanting. (c) N.A. (d) 23 cm×15 cm. (e) 2. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) C₁ on 17.10.62 and C₂ on 21.10.62.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 4 varieties : V₁=N×R-1-8-5-5; V₂=N×R-1-8-5-2; V₃=N×R-4-14-2-4 and V₄=RJ-100.

(2) 2 cultural practices : C₁=Vatter broadcasting and C₂=Transplanting.

3. DESIGN :

(i) Fact. in R.B.D. (ii)(a) 8. (b) N.A. (iii) 4. (iv) (a) and (b) 4.57m×3.66m for C₁ and 7.62m×1.83m for C₂. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv)(a) 1962—only. (b) No. (c) Nil. (v) and (vi) Nil. (vii) No.

5. RESULTS:

(i) 2610 Kg/ha. (ii) 300.6 Kg/ha. (iii) All effects are highly significant. (iv) Av. yield of grain in Kg/ha.

	V ₁	V ₂	V ₃	V ₄	Mean
C ₁	1412	2152	2431	1960	1989
C ₂	2907	3158	3011	3848	3231
Mean	2160	2655	2721	2904	2610

C. D. for V marginal means = 312.6 Kg/ha.
 C. D. for C marginal means = 221.0 Kg/ha.
 C. D. for the body of V x C table = 442.0 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- H.P. 62(53).

Site :- Rice Breeding Sub-Stn., Nagrota, Bagwan.

Type :- 'CV'.

Object : To study the effect of different cultural Practices on different varieties of Paddy.

1. BASAL CONDITIONS :

(i) (a) Paddy—wheat for C_1 and Paddy—fallow for C_2 . (b) Wheat for C_1 and fallow for C_2 . (c) Nil. (ii) Clay loam. (iii) C_1 on 6.6.62 and C_2 on 8.5.62. (iv) 2 *Suhagas* and 3 ploughings for C_1 and 2 ploughings for C_2 . (b) Broadcasting and transplanting. (c) N.A. (d) 23 cm x 15 cm. (e) 2. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 to 3 weeding. (ix) N.A. (x) C_1 on 13.12.62 and C_2 on 24.10.62.

2. TREATMENTS:

All combinations of (1) and (2)

- (1) 4 varieties: $V_1=C \times P$ 23.5.6, $V_2=C \times P$ 99-5-7, $V_3=C \times P$ 33-3 and $V_4=PP-72$.
 (2) 2 cultural practices: $C_1=V$ atter broadcasting, $C_2=$ Transplanting.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) and (b) 4.57 m x 3.66 m for C_1 and 6 10 m x 2.26 m for C_2 . (v) Nil (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) N.A. (c) Nil. (v) and (vi) Nil. (vii) No.

5. RESULTS :

(i) 1365 Kg/ha. (ii) 314.8 Kg/ha. (iii) Main effect of V and interaction $C \times V$ are highly significant. (iv) Av. yield of grain in Kg/ha.

	V_1	V_2	V_3	V_4	Mean
C_1	985	845	1359	1969	1289
C_2	1556	1472	1238	1497	1441
Mean	1270	1158	1298	1733	1365

C.D. for V marginal means = 327.4 Kg/ha.
 C.D. for the body of V x C table = 463.0 Kg/ba.

Crop :- Paddy (Kharif).

Ref :- H.P. 63(62).

Site :- Rice Breeding Sub-Stn., Nagrota, Bagwan.

Type :- 'CV'.

Object : To study the effect of different cultural practices on different varieties of Paddy.

1. BASAL CONDITIONS :

(i) (a) Paddy—wheat—for C_1 and Paddy—fallow for C_2 . (b) Wheat for C_1 and fallow for C_2 . (c) Nil. (ii) Clay loam. (iii) C_1 on 31.5.63 and C_2 on 8.5.63 to 27.6.63. (iv) (a) 2 *Suhagas* and 3 Ploughings for C_1 and 2 Ploughings—for C_2 . (b) Broad casting & transplanting. (c) N.A. (d) 23 cm x 15 cm. (e) 2. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 to 3 weeding. (ix) N.A. (x) C_1 on 2.10.63 and C_2 on 16-10-63.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 7 varieties : $V_1=C \times B 24-11$, $V_2=C \times B 11-7$, $V_3=C \times B 25-2$, $V_4=C \times B 25 \times 3$, $V_5=C \times B 21-2$, $V_6=C \times B 5-10$ and $V_7=Baseati T-23$.

(2) 2 cultural practices : $C_1=Vatter$ broadcasting and $C_2=Transplanting$.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 14. (b) N.A. (iii) 4. (iv) (a) and (b) $6.10m \times 2.74m$ for C_1 and $7.62m \times 1.83m$ for C_2 . (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1963-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 2022 Kg/ha. (ii) 300.3 Kg/ha. (iii) Main effect of C and interaction $C \times V$ are highly significant. (iv) Av. yield of grain in Kg/ha.

	V_1	V_2	V_3	V_4	V_5	V_6	V_7	Mean
C_1	1830	1377	1925	1838	1864	1656	1690	1740
C_2	2091	2718	1819	2206	2750	2321	2227	2305
Mean	1960	2047	1872	2022	2307	1989	1958	2022

C.D. for C marginal means = 162.4 Kg/ha.

C.D. for the body of $V \times C$ table = 429.6 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- H.P. 63(63).

Site :- Rice Breeding Sub-Stn., Nagrota, Bagwan

Type :- 'CV'.

Object: To study the effect of different cultural practices on different varieties of Paddy.

1. BASAL CONDITIONS:

(i) Paddy-wheat for C_1 and Paddy-fallow for C_2 . (b) Wheat for C_1 and fallow for C_2 . (c) Nil. (ii) Clay loam. (iii) C_1 on 2.6.63 and C_2 on 8.5.63/18.6.63. (iv) (a) 2 *Suhagas* and 3 ploughings for C_1 and 2 ploughings for C_2 . (b) Broadcasting and transplanting. (c) N.A. (d) $23cm \times 15cm$. (e) 2. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) C_1 on 10.10.63. and C_2 on 1.10.63.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 7 varieties : $V_1=NR-1-8-5-2$, $V_2=NR-5-27-3$, $V_3=NR-2-12-2$, $V_4=Hybrid-27$, $V_5=NR-5$, $V_6=RJ-100$ and $V_7=NR-4-14-2.4$.

(2) 2 cultural practices : $C_1=Vatter$ broadcasting and $C_2=Transplanting$.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 11. (b) N.A. (iii) 4. (iv) (a) and (b) $6.10m \times 2.74m$ for C_1 and $7.92m \times 1.83m$ for C_2 . (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1963-only. (b) No. (c) Nil. (v) and (vi) Nil. (vii) No.

5. RESULTS:

(i) 2723 Kg/ha. (ii) 143.5 Kg/ha. (iii) All the effects are highly significant. (iv) Av. yield of grain in Kg/ha

	V ₁	V ₂	V ₃	V ₄	V ₅	V ₆	V ₇	Mean
C ₁	2274	2570	2492	2422	2448	2291	1673	2310
C ₂	3351	3659	3158	2337	3419	3356	2676	3137
Mean	2812	3114	2825	2380	2933	2823	2174	2723

C.D. for V marginal means = 145.2 Kg/ha.

C.D. for C marginal means = 77.6 Kg/ha.

C.D. for the body of V x C table = 205.4 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- H.P. 63(64).

Site :- Rice Breeding Sub-Stn., Nagrota, Bagwan

Type :- 'CV'.

Object : To study the effect of different cultural practices on different varieties of Paddy.

1. BASAL CONDITIONS:

(i) (a) Paddy—wheat for C₁ and Paddy—fallow for C₂. (b) Wheat for C₁ and fallow for C₂. (c) Nil. (ii) Clay loam. (iii) 2.6.63 for C₁ and 8. .63 to 20.6.63 for C₂ (iv) (a) 2 *Suhagas* and 3 ploughings for C₁ and 2 ploughings for C₂. (b) Broadcasting and transplanting. (c) N.A. (d) 23 cm x 15 cm. (e) 2. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) C₁ on 11.10.63 and C₂ on 4.10.63.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 7 Varieties: V₁=China 988, V₂=LN-41, V₃=AL-12-7, V₄=AL-1-16, V₅=AL-3-2, V₆=AL-32-13 and V₇=AL-14-5.

(2) 2 cultural practices: C₁=Vatter broadcasting and C₂=Transplanting.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 14. (b) N.A. (iii) 4. (iv) (a) and (b) 6.10 m x 2.74 m for C₁ and 7.62 m x 1.83 m for C₂. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1963—only. (b) No. (c) Nil. (v) and (vi) Nil. (vii) No.

5. RESULTS:

(i) 1925 Kg/ha. (ii) 538.2 Kg/ha. (iii) Main effect of C alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	V ₁	V ₂	V ₃	V ₄	V ₅	V ₆	V ₇	Mean
C ₁	1777	1838	1472	1324	2300	1368	967	1578
C ₂	2300	2310	1694	2049	2703	2645	2206	2272
Mean	2038	2079	1583	1686	2502	2006	1586	1925

C.D. for C marginal means = 291.0 Kg/ha.

Crop :- Paddy (Kharif).**Ref :- H.P. 63(65).****Site :- Rice Breeding Sub-Stn., Nagrota, Bagwan.****Type :- 'CV'.****Object :** To study the effect of different cultural practices on different varieties of Paddy.**1. BASAL CONDITIONS :**

(i) (a) Paddy—wheat for C_1 and Paddy—fallow for C_2 . (b) Wheat for C_1 and fallow for C_2 . (c) Nil. (ii) Clay loam. (iii) 8.5.63 for C_1 and 21.6.63 for C_2 . (iv) (a) 2 *Suhagas* and 3 ploughings for C_1 and 2 ploughings for C_2 . (b) Broadcasting and transplanting. (c) Nil. (d) 23 cm × 15 cm. (e) 2. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) C_1 on 9.10.63 and C_2 on 7.10.63.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 7 varieties : $V_1=N \times P-13$, $V_2=N \times P-12$, $V_3=N \times P-9$, $V_4=N \times P-8$, $V_5=N \times P-41$, $V_6=Asahi$ and $V_7=PP-72$.(2) 2 cultural practices : $C_1=Vatter$ broadcasting and $C_2=Transplanting$.**3. DESIGN :**(i) Fact. in R.B.D. (ii) (a) 14. (b) N.A. (iii) 4. (iv) (a) and (b) 6.10 m × 2.74 m for C_1 and 7.62 m × 1.83 for C_2 . (v) Nil. (vi) Yes.**4. GENERAL :**

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1963—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :(i) 2245 Kg/ha. (ii) 518.9 Kg/ha. (iii) Main effect of C is highly significant and Interaction $V \times C$ is significant. (iv) Av. yield of grain in Kg/ha.

	V_1	V_2	V_3	V_4	V_5	V_6	V_7	Mean
C_1	1917	1760	1124	1699	1481	1612	2405	1714
C_2	2823	2394	3236	3310	2760	2216	2697	2777
Mean	2370	2077	2180	2505	2120	1914	2551	2245

C.D. for C marginal means = 280.5 Kg/ha

C.D. for the body of $V \times C$ table = 742.3 Kg/ha.**Crop :- Paddy (Kharif).****Ref :- H.P. 64(49).****Site :- Rice Breeding Sub-Stn., Nagrota, Bagwan.****Type :- 'CV'.****Object :** To study the effect of different cultural practices on different varieties of Paddy.**1. BASAL CONDITIONS :**

(i) (a) Paddy—wheat for C_1 and Paddy—fallow for C_2 . (b) Wheat for C_1 and fallow for C_2 . (c) Nil. (ii) Clay loam. (iii) 10.6.64 for C_1 and 17.5.64/1.7.64 for C_2 for vatter treatments B.C. on 10.6.64. (iv) (a) 2 *Suhagas* and 3 ploughings for C_1 and 2 ploughings for C_2 . (b) Broadcasting and transplanting. (c) Nil. (d) 23 cm × 15 cm. (e) 2. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) C_1 on 29.10.64 and C_2 on 26.10.64.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 6 varieties : $V_1=N \times P-3$, $V_2=N \times P-13$, $V_3=A \times P-41$, $V_4=C \times B-5$, $V_5=C \times B-23-5-6$ and $V_6=PP72$.(2) 2 cultural practices : $C_1=Vatter$ broadcasting and $C_2=Transplanting$.

3. GENERAL:

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 3. (iv) (a) and (b) 4.57m×3.66m for C₁ and 7.62m×1.83m for C₂. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1964—only. (b) No. (c) Nil. (v) and (vi) Nil. (vii) No.

5. RESULTS:

(i) 1888 Kg/ha. (ii) 444.1 Kg/ha. (iii) Main effects of V and C are highly significant. (iv) Av. yield of grain in Kg/ha,

	V ₁	V ₂	V ₃	V ₄	V ₅	V ₆	mean
C ₁	1236	1624	1574	1066	1674	2312	1581
C ₂	1997	1889	2452	2213	1698	2918	2194
Mean	1617	1757	2013	1640	1686	2615	1888

C.D. for V marginal means=531.8 Kg/ha.

C.D. for C marginal means=307.0 Kg/ha.

Crop :- Paddy (*Kharif*).

Ref :- H.P. 64(50).

Site :- Rice Breeding Sub-Stn., Nagrota, Bagwan.

Type :- 'CV'.

Object : To study the effect of different cultural practices on different varieties of Paddy.

1. BASAL CONDITIONS :

(i) (a) Paddy—wheat for C₁ and Paddy—fallow for C₂. (b) Wheat for C₁ and fallow for C₂. (c) Nil. (ii) Clay loam. (iii) 10.6.64 for C₁ and 17.5.64/30.6.64 for C₂. (iv) (a) 2 *Suhagas* and 3 ploughings for C₁ and 2 ploughings for C₂. (b) Broadcasting and transplanting. (c) Nil. (d) 23 cm×15 cm. (e) 2. (v) N.A. (vi) As per treatments. (vii) Irrigate. (viii) 2 to 3 weeding. (ix) N.A. (x) C₁ on 29.10.64 and C₂ on 25.10.64.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 6 varieties: V₁=N×R—8-37-3, V₂=N×R—20-6-3, V₃=N×R—23-5-7 V₄=N×R—2-12-2, V₅=N×R—1-8-5-2 and V₆=RJ—100.

(2) 2 cultural practices: C₁=Vatter broadcasting and C₂=Transplanting.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 3. (iv) (a) and (b) 4.57m×3.66m for C₁ and 7.62m×1.83m for C₂. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1964—only. (b) No. (c) Nil. (v) and (vi) Nil. (vii) No.

5. RESULTS :

(i) 2366 Kg/ha. (ii) 367.2 Kg/ha. (iii) Main effects of V and C are highly significant. Interaction V×C is significant. (iv) Av. yield of grain in Kg/ha.

	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	Mean
C ₁	1117	1824	2163	2033	957	1934	1671
C ₂	2237	2332	3588	3313	3062	3839	3061
Mean	1677	2078	2875	2673	2009	2886	2366

C.D. for V marginal means =439.7 Kg/ha.

C.D. for C marginal means =253.8 Kg/ha.

C.D. for the body of V × C table=622.1 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- H.P. 64(51).

Site :- Rice Breeding Sub-Stn., Nagrota, Bagwan.

Type :- 'CV'.

Object: To study the effect of different cultural practices on different varieties of Paddy.

1. BASAL CONDITIONS:

(i) (a) Paddy—wheat for C₁ and Paddy—fallow for C₂. (b) Wheat for C₁ and fallow for C₂. (c) il. (ii) Clay loam. (iii) 17.5.64 for C₁ and 2.7.64 for C₂. (iv) (a) 2 *Suhagas* and 3 ploughings for C₁ and 2 ploughings for C₂. (b) Broadcasting and transplanting. (c) N.A. (d) 23 cm × 15 cm. (e) 2. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 to 3 weedings. (ix) N.A. (x) C₁ on 29.10.64 and C₂ on 25.10.64.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 9 varieties : V₁=AL 1-16-1, V₂=AL 1-16-2, V₃=AL-3-2-3, V₄=AL 3-2, V₅=AL 3-2-1, V₆=AL 32-13-3, V₇=AL 32-13, V₈=China 988, and V₉=LN 41.

(2) 2 cultural practices : C₁=Vatter broadcasting and C₂=Transplanting.

3. DESIGN:

(i) Fact, in R.B.D. (ii) (a) 18. (b) N.A. (iii) 3. (iv) (a) and (b) 4.57m × 3.66m and 7.62m × 1.83m for C₂. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1964—only. (b) No. (c) Nil. (v) and (vi) Nil. (vii) No.

5. RESULTS:

(i) 2156 Kg/ha. (ii) 373.4 Kg/ha. (iii) Main effect of C is highly significant and that of V is significant. (iv) Av. yield of grain in Kg/ha.

	V ₁	V ₂	V ₃	V ₄	V ₅	V ₆	V ₇	V ₈	V ₉	Mean
C ₁	1126	1156	2083	1754	1973	1156	1276	2093	1953	1619
C ₂	2823	2368	2823	3337	3026	2069	2691	2368	2739	2694
Mean	1974	1762	2453	2545	2500	1612	1984	2230	2346	2156

C.D. for V marginal means=438.6 Kg/ha.

C.D. for C marginal means=206.7 Kg/ha.

Crop : Paddy (Kharif).**Ref :- H.P. 64(52).****Site :- Rice Breeding Sub-Stn., Nagrota, Bagwan.****Type :- 'CV'.****Object :—To study the effect of different cultural practices on different varieties of Paddy.****1. BASAL CONDITIONS :**

(i) (a) Paddy-wheat for C_1 and Paddy-fallow for C_2 . (b) Wheat for C_1 and fallow for C_2 . (c) Nil. (ii) Clay loam. (iii) C_1 on 7.6.64./11.6.64 and 3.7.64 for C_2 . (iv) (a) 2 *Suhagas*, 3 ploughings, for C_1 and 2 ploughings for C_2 . (b) As per treatments. (c) N.A. (d) 23cm×15 cm. (e) 2. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 to 3 weeding. (ix) N.A. (x) C_1 on 28.10.64 and C_2 on 26.10.64.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 5 Varieties: $V_1=N \times P-3$, $V_2=Norin 18$, $V_3=Hybrid 27$, $V_4=Asahi$, and $V_5=RJ-100$.(2) 2 cultural practices : $C_1=Vatter$ broadcasting and $C_2=Transplanting$.**3. DESIGN :**

(i) Fact. in R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) and (b) 4'57m×3'66m for C_1 and 7'62m×1'43m for C_2 . (v) Nil. (vi) Yes.

4. GENERAL.

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1964 - only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 2024 Kg/ha. (ii) 394.3 Kg/ha. (iii) Main effect of C and interaction $C \times V$ are highly significant and that of V is significant. (iv) Av. yield of grain in Kg/ha.

	V_1	V_2	V_3	V_4	V_5	Mean
C_1	478	135	1211	284	1517	725
C_2	2888	3947	3050	3265	3462	3322
Mean	1683	2041	2130	1774	2490	2024

C.D. for V marginal means =404.6 Kg/ha.

C.D. for C marginal means =255.9 Kg/ha.

C.D. for the body of $V \times C$ table =572.1 Kg/ha.**Crop :- Paddy (Kharif).****Ref :- H.P. 64(54)****Site :- Rice Breeding Sub-Stn., Nagrota, Bagwan.****Type :- 'CV'.****Object :—To study the effect of different cultural practices on different varieties of Paddy.****1. BASAL CONDITIONS :**

(a) (i) Paddy-wheat for C_1 and Paddy-fallow for C_2 . (b) Wheat for C_1 and fallow for C_2 . (c) Nil. (ii) clay loam. (iii) 7.5.64 ; 12.6.64 for C_1 and 4.7.64 for C_2 . (iv) (a) 2 *Suhagas*, 3 ploughings for C_1 and 2 ploughings for C_2 . (b) Broadcasting and transplanting. (c) N.A. (d) 23 cm×15 cm. (e) 2. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 to 3 weeding. (ix) N.A. (x) C_1 on 27.10.64 and C_2 on 26.10.64.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 8 varieties: $V_1=C \times B-11-7$, $V_2=C \times B-21-2$, $V_3=C \times B-5-10$, $V_4=C \times B-24-11$, $V_5=C \times B-25-2$, $V_6=C \times B-25-3$, $V_7=T-21$ and $V_8=T-23$.(2) 2 cultural practices : $C_1=Vattar$ broadcasting and $C_2=Transplanting$.

3. DESIGN

(i) Fact. in R.B.D. (ii) (a) 16. (b) N.A. (iii) 3. (iv) (a) and (b) 4.57m × 3.66m for C₁ and 6.10m × 1.83m for C₂. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1964—only. (b) No. (c) Nil. (v) and (vi) Nil. (vii) No.

5. RESULTS :

(i) 1922 Kg/ha. (ii) 385.7 Kg/ha. (iii) Main effect of C alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	V ₁	V ₂	V ₃	V ₄	V ₅	V ₆	V ₇	V ₈	Mean
C ₁	1365	1754	1904	1565	1904	1674	1655	1504	1666
C ₂	2257	2377	2063	2063	2198	2063	1928	2482	2179
Mean	1811	2066	1984	1814	2051	1868	1792	1993	1922

C. D. for C marginal means = 227.4 Kg/ha.

Crop :- Paddy (Kharif).

**Ref :- H.P. 62(184), 63(192),
64(175).**

Site :- Agri. Res. Stn., Dhaula Kuan.

Type :- 'CM'.

Object :- To study the effect of spacings, fertilizers and number of plants per hill on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Berseem. (c) 22.4 Kg/ha of N; N.A.; 67.3 Kg/ha. of P₂O₅. (ii) Sandy loam. (iii) 20.7.62; 15.6.63; 31.7.64. (iv) (a) 4 to 5 ploughings. (b) Transplanting. (c) 20 Kg/ha. (d) and (e) As per treatments. (v) Nil. (vi) China-4. (vii) Irrigated. (viii) 2 weedings. (ix) 86 cm for 64 (175); N.A. for others. (x) 4.11.62; 4.11.63; 28.10.64.

2. TREATMENTS :

Main-plot treatments :

2 levels of fertilizers : F₀ = No fertilizer and F₁ = 44.8 Kg/ha. of N + 33.6 Kg/ha. of P₂O₅ + 11.2 Kg/ha. of K₂O.

Sub-plot treatments :

3 row spacings : R₁ = 15, R₂ = 23 and R₃ = 30 cm.

Sub-sub-plot treatments:

3 plant spacings : S₁ = 8, S₂ = 15 and S₃ = 23 cm.

Sub-sub-sub-plot treatments:

No. of plants per hill : P₁ = 1, P₂ = 2 and P₃ = 3 plants/hill
N as C/A/N, P₂O₅ as Super and K₂O as Mur. Pot.

3. DESIGN :

(i) Split-split-split-Plot. (ii) (a) 2 main-plots/replication; 3 sub-plots/main-plot; 3 sub-sub-plots/sub-plot; and 3 sub-sub-sub-plots/sub-sub-plot. (b) N.A. (iii) 3 for 62 and 4 for others. (iv) (a) 3.66 m × 2.29 m. (b) 2.74m × 1.83m. (v) 46 cm × 23 cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1962—64. (b) No. (c) Nil. (v) and (vi) Nil. (vii) As sub-sub-plot error variances are heterogeneous, results of individual years are presented below.

R × S mean table is N.A. for 64 (175)

5. RESULTS:

62(184)

(i) 2854 Kg/ha. (ii) (a) 383 Kg/ha. (b) 656 Kg/ha. (c) 437 Kg/ha. (d) 418 Kg/ha. (iii) Main effect of F, R and S are highly significant, while effect of P and interaction R×S and S×P are significant. (iv) Av. yield of grain in Kg/ha.

	P ₁	P ₂	P ₃	S ₁	S ₂	S ₃	R ₁	R ₂	R ₃	Mean
F ₀	2346	2630	2574	2691	2532	2327	2835	2415	2301	2517
F ₁	3069	3305	3200	3494	3273	2906	3501	3060	3011	3191
Mean	2707	2968	2887	3043	2902	2617	3168	2738	2656	2854
R ₁	2977	3226	3301	3431	3348	2726				
R ₂	2627	2904	2682	2784	2714	2715				
R ₃	2518	2773	2678	2914	2646	2409				
S ₁	2899	3266	2962							
S ₂	2892	2873	2942							
S ₃	2331	2763	2756							

C.D. for F marginal means=258.6 Kg/ha.

C.D. for R marginal means=291.0 Kg/ha.

C.D. for S marginal means=173.8 Kg/ha.

C.D. for P marginal means=160.5 Kg/ha.

C.D. for S means at the same level of R=300.9 Kg/ha.

C.D. for P means at the same level of S=278.2 Kg/ha.

C.D. for S means at the same level of P=286.0 Kg/ha.

C.D. for R means at the same level of S=380.3 Kg/ha.

63(192)

(i) 3342 Kg/ha. (ii) (a) 913 Kg/ha. (b) 940 Kg/ha. (c) 765 Kg/ha. (d) 571 Kg/ha. (iii) Main effects of R, P and interaction S×P are significant. (iv) Av. yield of grain in Kg/ha.

	P ₁	P ₂	P ₃	S ₁	S ₂	S ₃	R ₁	R ₂	R ₃	Mean
F ₀	3161	3238	3317	3262	3353	3102	3700	3052	2964	3239
F ₁	3248	3399	3688	3310	3533	3492	3584	3447	3304	3445
Mean	3204	3319	3502	3286	3443	3297	3642	3249	3134	3342
R ₁	3616	3464	3845	3542	3836	3548				
R ₂	3171	3272	3306	3300	3273	3176				
R ₃	2826	3220	3355	3015	3220	3167				
S ₁	3056	3136	3664							
S ₂	3238	3501	3590							
S ₃	3319	3319	3253							

C.D. for R marginal means=361.4 Kg/ha.

C.D. for P marginal means=188.0 Kg/ha.

C.D. for P means at the same level of S=325.2 Kg/ha.

C.D. for S means at the same level of P=370.6 Kg/ha.

64(175)

(i) 2804 Kg/ha. (ii) (a) 712 Kg/ha. (b) 1081 Kg/ha. (c) 550 Kg/ha. (d) 315 Kg/ha. (iii) Main effects of S and P are highly significant. (iv) Av. yield of grain in Kg/ha.

	P ₁	P ₂	P ₃	S ₁	S ₂	S ₃	R ₁	R ₂	R ₃	Mean
F ₀	2641	2803	2963	3017	2749	2642	2965	2856	2587	2803
F ₁	2701	2884	2929	3061	2777	2576	3021	2800	2593	2805
Mean	2671	2844	2896	3039	2763	2609	2993	2828	2590	2804
R ₁	2796	3082	3101							
R ₂	2710	2844	2929							
R ₃	2507	2605	2658							
S ₁	2929	3121	3067							
S ₂	2686	2779	2824							
S ₃	2399	2631	2796							

C.D. for S marginal means=185.9 Kg/ha.

C. D. for P marginal means=103.4 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- H.P. 60(163).

Site :- Govt. Reclamation Farm, Kama.

Type :- 'CM'.

Object :- To study the effect of fertilizer at different depths of ploughing on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Saline Alkaline soil. (iii) 23.7.60. (iv) (a) 4 to 5 ploughings (b) to (c) N.A. (v) As per treatments. (vi) N.A. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 21.10.60.

2. TREATMENTS :

Main-plot treatments :

3 ploughings : P₁=Shallow ploughings (15 cm to 23 cm deep), P₂=Deep ploughing (23 cm to 30 cm deep), P₃=Sub-soil ploughing (30 cm to 46 cm deep).

Sub-plot treatments :

2 levels of fertilizers : F₀=0 and F₁=56 Kg/ha. of N + 28 Kg/ha. of P₂O₅+28 Kg/ha. of K₂O.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication ; 2 sub-plots/main-plot. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 1/207 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960-61. (b) No. (c) Nil. (v)(a) Nilokheri (b) Nil. (vi) and (vii) Nil.

5. RESULTS :

(i) 1805 Kg/ha. (ii)(a) 414.6 Kg/ha. (b) 283.3 Kg/ha. (iii) Main effect of P alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	P ₁	P ₂	P ₃	Mean
F ₀	1793	1672	1044	1503
F ₁	2355	2332	1632	2106
Mean	2074	2002	1338	1805

C. D. for F marginal means—326.7 Kg/ha

Crop :- Paddy (Kharif).

Ref. :- H.P. 65(179).

Site :- Crop Res. Stn., Dhaulakuan.

Type :- 'CMV'.

Object :-To find out optimum spacing and levels of N for different varieties of Paddy.

1. BASAL CONDITIONS :

(1) (a) Wheat-Paddy. (b) Wheat. (c) 44.8 Kg/ha. of N as C/A/N+22.4 Kg/ha. of P₂O₅ as super. (ii) Lomay (iii) 27.7.65. (iv) (a) N.A. (b) Transplanting (Improved). (c) 24.7 Kg/ha. (d) As per treatments. (e) N.A. (v) 53.7 Kg/ha. of P₂O₅+44.8 Kg/ha. of K₂O. (vi) As per treatments. (vii) Irrigated. (viii) One hand weeding with *Khurpi*. (ix) and (x) N.A.

2. TREATMENTS :

All combinations of (1), (2) and (3)

(1) 3 varieties : V₁=SNG-1, V₂=Norum-8 and V₃=CH-4.

(2) 3 spacings : S₁=15 cm × 15 cm, S₂=23 cm × 15 cm and S₃=23 cm × 23 cm.

(3) 3 levels of N : N₁=56, N₂=112 and N₃=168 Kg/ha.

3. DESIGN :

(i) 3³ partially confd. VS²N and VS²N² are confd. (ii) (a) 9 plots/block ; 3 blocks/replication. (b) N.A. (iii) 2. (iv) (a) 7.32 m × 3.66 m. (b) 6.86 m × 2.74 m (v) 23 cm × 46 cm. (vi) Yes.

4. GENERAL :

(i) Normal, slight lodging in CH-4 plot with high level of N (ii) Medium blast attack in CH-4 plots. (iii) Height panicle length and yield of grain. (iv) (a) 1965—only. (b) No. (c) Nil. (v) Sundernagar. (vi) Nil. (vii) Dry spell during September and October affected grain formulation in CH-4.

5. RESULTS :

(i) 2998 Kg/ha. (ii) 264.3 Kg/ha. (iii) Main effect of V and interaction V × N are highly significant while main effects of S and N are significant. (iv) Av. yield of grain in Kg/ha.

	S ₁	S ₂	S ₃	N ₁	N ₂	N ₃	Mean
V ₁	3189	3000	2625	2600	2970	3243	2938
V ₂	2880	2793	2725	2527	2858	3014	2800
V ₃	3309	3217	3247	3393	3287	3092	3258
Mean	3126	3003	2866	2840	3038	3116	2998
N ₁	2982	2898	2642				
N ₂	3215	3035	2865				
N ₃	3182	3077	3090				

C.D. for V or S or N marginal means—182.7 Kg/ha.

C.D. for the body of V × N table —316.5 Kg/ha.

Crop :- Paddy (Kharif).**Ref :- H.P. 65(173).****Site :- Seed Multiplication Farm, Jogindranagar.****Type :- 'CMV'.**

Object :- To study the response of different levels of N, varieties and plant population on the yield of Paddy.

1. BASAL CONDITIONS :

(i)(a) Paddy-wheat-paddy. (b) Wheat. (c) N.A. (ii) N.A. (iii) 24.7.65. (iv) (a) 4 ploughings with furrow turning. (b) Transplanting. (c) 8 to 12 Kg/ha. (d) N.A. (e) As per treatments. (v) 53.7 Kg/ha. of P_2O_5 + 44.8 Kg/ha. of K_2O . (vi) As per treatments. (vii) Irrigated. (viii) 3 weedings. (ix) N.A. (x) 4.11.65.

2. TREATMENTS :

All combinations (1), (2) and (3)

Same as in expt. No. 65(179) presented on page No. 197.

3. DESIGN :

(i) 3^3 confd. (ii) (a) 9 plots/block ; 3 blocks/replication. (b) N.A. (iii) 2. (iv) (a) and (b) 2.74m x 1.83 m. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Good. (ii) Nil. (iii) Yield of grain. (iv) (a) 1965—only. (b) No. (c) Nil. (v) Dhaula kuan. (vi) Nil. (vii) Crop suffered up to 20% due to abnormal weather.

5. RESULTS :

(i) 1027 Kg/ha. (ii) 407.0 Kg/ha. (iii) Main effect of V alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	S ₁	S ₂	S ₃	N ₁	N ₂	N ₃	Mean
V ₁	8310	1422	1345	1096	1222	1219	1199
V ₂	1156	1163	1345	1083	1435	1146	1221
V ₃	688	389	904	873	545	462	660
Mean	892	991	1198	1051	1067	962	1027
N ₁	811	1030	1312				
N ₂	967	1106	1130				
N ₃	897	837	1153				

C.D. for V marginal means = 280.0 Kg/ha.

Crop :- Paddy (Kharif).**Ref :- H.P. 60(191).****Site :- Govt. Agri. Farm, Bhangrota.****Type :- 'D'.**

Object :- To study the effect of different fungicides against Paddy blast.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

12 Fungicidal treatments : F₀ = Control, F₁ = Agro-san lime dust, F₂ = Tillox, Tale dust, F₃ = Ceresan Tale dust, F₄ = Shell Copper, F₅ = Kirti copper W x P 50, F₆ = Flit-406, F₇ = Fytolan, F₈ = Coppesan, F₉ = Caproxol, F₁₀ = Vitigram and F₁₁ = Blitox.

3. DESIGN :

(i) R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 7.32m x 4.88m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) N.A. (ii) Blast attack ; Control measures as per treatments. (iii) Neck-rot infection and yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

Yield of grain :

(i) 1555 Kg/ha. (ii) 181.9 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	F ₀	F ₁	F ₂	F ₃	F ₄	F ₅	F ₆	F ₇	F ₈	F ₉	F ₁₀	F ₁₁
Av. yield	1684	1725	1704	1774	1484	1402	1152	1598	1782	1819	1144	1394

Neck—rot infection:

(i) 24.02 degrees. (ii) 5.78 degrees. (iii) Treatment differences are not significant. (iv) Neck-rot infection in degrees.

Treatment	F ₀	F ₁	F ₂	F ₃	F ₄	F ₅	F ₆	F ₇	F ₈	F ₉	F ₁₀	F ₁₁
Mean angle	20.80	25.94	23.25	16.36	22.33	25.37	21.93	26.97	25.76	22.14	30.78	26.62

Crop :- Paddy (Kharif).

Ref :- H.P. 61(194).

Site :- Agri. Res. Stn., Dhaula Kuan.

Type :- 'D'.

Object :- To find out efficacy of different fungicides for the control of blast of Paddy.

1. BASAL CONDITIONS:

(i) to (x) N.A.

2. TREATMENTS :

15 fungicidal treatments : F₀=Control, F₁=Agrosan lime dust, F₂=Agrosan Talac dust, F₃=Ceresan Talax dust, F₄=Tillaex Talc dust, F₅=Agrosan seed dressing, F₆=Ceresan wet seed dressing, F₇=Shell copper, F₈=Kirti copper W×P 50, F₉=Blitox, F₁₀=Fytolan, F₁₁=Coppesan, F₁₂=Caproxal, F₁₃=Blue copper and F₁₄=Flit-406.

3. DESIGN :

(i) R.B.D. (ii) (a) 15. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 5.94m×4.88m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) Nil. (iii) Yield of grain. (iv) (a) 1961—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

Yield of grain :

(i) 3602 Kg/ha. (ii) 273.1 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	F ₀	F ₁	F ₂	F ₃	F ₄	F ₅	F ₆	F ₇	F ₈	F ₉	F ₁₀	F ₁₁	F ₁₂	F ₁₃	F ₁₄
Av. yield	3148	3960	4043	3848	3767	3666	3630	3588	3681	3222	3505	3686	3146	3936	3261

Neck rot infection:

(i) 10.5 degree. (ii) 3.65 degree. (iii) Treatment differences are not significant. (iv) Neck rot infection in degrees.

Treatment	F ₀	F ₁	F ₂	F ₃	F ₄	F ₅	F ₆	F ₇	F ₈	F ₉	F ₁₀	F ₁₁	F ₁₂	F ₁₃	F ₁₄
Mean Angle	15.52	6.80	6.95	11.57	9.31	11.13	10.69	11.31	8.76	11.02	11.17	9.60	12.47	10.37	11.05

Crop :- Wheat (Rabi).

Ref :- H.P. 60(187), 62 (268).

Site :- Potato Develop. Stn., Bhagpashog.

Type :- 'M'.

Object : To find out the optimum level of fertilizer and best time of application to get the maximum yield of Wheat.

1. BASAL CONDITIONS :

(i) and (ii) N.A. (iii) Oct., 60; N.A. (iv) (a) 4 ploughings. (b) Kera in furrows. (c) 92 Kg/ha. (d) 23 cm. (e) Nil. (v) 36 Kg/ha. of P_2O_5 as super. (vi) NP-770. (vii) to (ix) N.A. (x) June, 61; June, 63.

2. TREATMENTS:

All combinations of (1) and (2)+one control

(1) 3 levels of N : $N_1=17$, $N_2=34$ and $N_3=51$ Kg/ha.

(2) 3 times of application : T_1 =full dose at sowing, T_2 =full dose in 1st week of March and $T_3=1/2$ at sowing+1/2 at 1st week of March.

N_0 =Control.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3.05 m x 2.74 m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) N.A. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960 to 62 (1961 is N.A.). (b) N.A. (c) Nil. (v) and (vi) No. (vii) Error variances are heterogeneous and Treatments x years interaction is absent. Hence individual year results are presented below.

5. RESULTS:

60(187)

(i) 2068 Kg/ha. (ii) 378.0 Kg/ha. (iii) Main effect of N alone is significant. (iv) Av. yield of grain in Kg/ha.

$N_0=2231$ Kg/ha.

	T_1	T_2	T_3	Mean
N_1	1813	1604	2057	1825
N_2	2336	1848	2458	2214
N_3	2092	2231	2005	2109
Mean	2080	1894	2173	2049

C.D. for N marginal means=311.7 Kg/ha.

62(268)

(i) 2864 Kg/ha. (ii) 732.1 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

$N_0=2541$ Kg/ha.

	T_1	T_2	T_3	Mean
N_1	3319	2153	3050	2840
N_2	3199	2810	3169	3060
N_3	2960	2781	2661	2800
Mean	3159	2581	2960	2900

Crop :- Wheat (Rabi).

Ref :- H.P. 62(269).

Site :- Potato Develop. Stn., Bhagpurahog.

Type :- 'M'.

Object : To find out a suitable manurial schedule for the important variety of Wheat.

1. BASAL CONDITIONS :

(i) to (iii) N.A. (iv) (a) to (c) N.A. (d) 25 cm x 23 cm. (e) N.A. (v) Nil. (vi) NP-770. (vii) to (ix) N.A. (x) June, 63.

2. TREATMENTS :

All combinations of (1), (2) and (3)

(1) 3 levels of N as A/S : $N_0=0$, $N_1=22.4$ and $N_2=44.8$ Kg/ha.(2) 3 levels of P_2O_5 as Super : $P_0=0$, $P_1=16.8$ and $P_2=33.6$ Kg/ha.(3) 3 levels of K_2O as Potash : $K_0=0$, $K_1=11.2$ and $K_2=22.4$ Kg/ha.

3. DESIGN :

(i) 3³ Confd. (ii) (a) 9 plots/block, 3 blocks/replication. (b) N.A. (iii) 1. (iv) (a) & (b) 3.05m x 2.74 m. (v) Nil. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 2724 Kg/ha. (ii) 977.9 Kg/ha. (iii) None of the effects is significant. (v) Av. yield of grain in Kg/ha.

	P_0	P_1	P_2	K_0	K_1	K_2	Mean
N_0	1674	2392	2830	1953	2791	2153	2299
N_1	1914	3070	2791	2193	2751	2830	2591
N_2	2711	3508	3628	3309	2631	3907	3282
Mean	2100	2990	3083	2485	2774	2963	2724
K_0	1953	2591	2910				
K_1	2113	2990	3070				
K_2	2232	3389	3269				

Crop :- Wheat (Rabi)

Ref :- H.P. 63(265).

Site :- Seed Multiplication Farm, Bhanota,
(Dist. Chamba).

Type : 'M'.

Object : To study the effect of different levels of P on the yield of Wheat.

1. BASAL CONDITIONS :

(i) to (iv) N.A. (v) 56 Kg/ha. of N as C/A/N. (vi) to (x) N.A.

2. TREATMENTS :

5 levels of P_2O_5 : $P_0=0$, $P_1=28$, $P_2=56$, $P_3=84$ and $P_4=112$ Kg/ha.
Other details are not available.

3. DESIGN :

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) 1/247.15 ha. (b) 1/395.37 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1963—only (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 1968 Kg/ha. (ii) 89.9 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	P ₀	P ₁	P ₂	P ₃	P ₄
Av. yield	1581	1779	1828	2140	2511

C.D.=138.5 Kg/ha.

Crop :- Wheat (Rabi).

Ref :- H.P. 60(198).

Site :- Auhar Farm, Bilaspur.

Type :- 'M'.

Object : To study the effect of urea spray on the yield of Wheat.

1. BASAL CONDITIONS :

(i) to (v) N.A. (vi) NP—809. (vii) to (x) N.A.

2. TREATMENTS :

4 levels of N as urea applied as foliar spray : N₀=0, N₁=22.4, N₂=33.6 and N₃=44.8 Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 3.35 m × 10.06 m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1950—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 1772 Kg/ha. (ii) 59.2 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	N ₀	N ₁	N ₂	N ₃
Av. yield.	1628	1625	1833	2003

C.D.=72.8 Kg/ha.

Crop :- Wheat (Rabi).

Ref :- H.P. 62(188), 63(187), 64(171).

Site :- Agri. Res. Stn., Dhaula Kuan.

Type :- 'M'.

Object : To study the effect of N, P and K applied in combination on the yield of Wheat.

1. BASAL CONDITIONS :

(i) (a) Fallow—wheat—sunhemp—wheat. (b) sunhemp (G.M.). (c) N.A. (ii) Sandy loam. (iii) N.A., 15.1.63; 19.11.64. (iv) (a) and (b) N.A. (c) 86 Kg/ha. (d) Rows 23 cm apart. (e) N.A. (v) Nil. (vi) NP—829. (vii) Unirrigated. (viii) 2 weedings. (ix) N.A. ; 16 cm; 23 cm. (x) 3rd week of April.

2. TREATMENTS :

All combinations of (1), (2) and (3)

(1) 3 levels of N as CIA/N : N₁=22.4, N₂=44.8 and N₃=67.2 Kg/ha.

(2) 3 levels of P₂O₅ as Super : P₁=22.4, P₂=44.8 and P₃=67.2 Kg/ha.

(3) 3 levels of K₂O as Mur. Pot : K₁=11.2, K₂=22.4 and K₃=33.6 Kg/ha.

3. DESIGN :

(i) 3³ Fact. Partially confd. (ii) (a) 9 plots/block, 3 blocks/replication. (b) N.A. (iii) 4. (iv) (a) 2.74 m × 7.31 m for 62 and 63; 6.10 m × 3.20 m. for 64 (b) 2.28 m × 6.71 m for 62 and 63; 6.10 m × 2.74 m, for 64 (v) 23 cm × 30 cm for 62 & 63; 23 cm on either side for 64. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1962—64. (b) No. (c) Results of combined analysis are presented under 5-Results. (v) and (vi) Nil. (vii) Error variances are homogeneous and Treatments \times years interactions are present.

5. TREATMENTS :

Pooled results

(i) 1762 Kg/ha. (ii) 353.7 Kg/ha. (based on 36 d.f. made up of Treatments \times years interaction) (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	P ₁	P ₂	P ₃	K ₁	K ₂	K ₃	Mean
N ₁	1681	1739	1753	1724	1719	1730	1724
N ₂	1748	1780	1848	1751	1802	1822	1792
N ₃	1794	1686	1830	1737	1819	1753	1770
Mean	1741	1735	1810	1737	1780	1768	1762
P ₁	1684	1764	1765				
P ₂	1760	1772	1808				
P ₃	1779	1669	1857				

Individual results

Treatment	N ₁	N ₂	N ₃	Sig	P ₁	P ₂	P ₃	Sig	K ₁	K ₂	K ₃	Sig	G.M.	S.E./plot
year														
1962	2023	2015	1825	N.S.	1968	1846	2049	N.S.	1992	1958	1913	N.S.	1954	191.1
1963	1352	1386	1460	**	1379	1416	1403	N.S.	1361	1438	1399	N.S.	1399	177.6
1964	1798	1976	2025	**	1876	1944	1979	*	1860	1845	1994	**	1933	175.2
Pooled	1724	1792	1770	N.S.	1741	1735	1810	N.S.	1737	1780	1768	N.S.	1762	353.7

Crop :- Wheat (Rabi).

Ref :- 63(184).

Site :- Govt. Agri. Res. Stn., Dhaula Kuan.

Type :- 'M'.

Object : To test the efficiency of different types of P on the yield of Wheat.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) Maize. (c) 112 Kg/ha. of N+44.8 Kg/ha. of P₂O₅. (ii) (a) Clayey loam. (b) N.A. (iii) 16.11 63. (iv) (a) 4 ploughings. (b) N.A. (c) 86.5 Kg/ha. (d) and (e) N.A. (v) Nil. (vi) C—286. (vii) Irrigated. (viii) 2 weedings. (ix) 15.4 cm. (x) 30.4.64

2. TREATMENTS :

4 sources of P₂O₅ at 44.8 Kg/ha : S₀=control (no manure), S₁=Super ordinary, S₂=Super 2.5% zincated and S₃=Super 5.0% zincated.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 6. (iv) (a) 7.32 m \times 2.74 m. (b) 6.70 m \times 2.28 m. (x) 31 cm \times 23 cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1963—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. TREATMENTS :

(i) 1676 Kg/ha. (ii) 510.2 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	S ₀	S ₁	S ₂	S ₃
Av. yield	1625	1805	1544	1729

Crop :- Wheat (Rabi).

Ref :- 63(185).

Site :- Govt. Agri. Res. Stn., Dhaula Kuan.

Type :- 'M'.

Object : To find the optimum time of application of fertilizers to Wheat crop.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) Mixture of Mesh, Maize & Guar for fodder. (c) N.A. (ii) Clayey loam. (iii) 22.11.63. (iv) (a) 5 ploughings. (b) N.A. (c) 86.5 Kg/ha. (d) Rows 23 cm apart. (e) N.A. (v) Nil. (vi) C-286. (vii) Unirrigated. (viii) 1 weeding. (ix) 15.4 cm. (x) 30.4.64.

2. TREATMENTS :

6 times and methods of application of fertilizers : T₁=Whole broadcast before last sowing, T₂=Whole drilled at sowing, T₃=Whole applied by Kera in furrow's T₄=Whole P, K and half N drilled at sowing and half N top dressed with winter rain, T₅=Whole P and K drilled at sowing, half N with early winter rain and half N at flag leaf stage with rain and T₆=Whole P, K and $\frac{1}{2}$ N at sowing, $\frac{3}{8}$ th of N with first winter rain and $\frac{3}{8}$ th of N at flag leaf stage.

Dose of fertilizers is 44.8 Kg/ha. of N+44.8 Kg/ha. of P₂O₅+22.4 Kg/ha. of K₂O.

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 6. (iv) (a) 7.32 m × 2.74 m. (b) 6.70 m × 2.28 m. (v) 31 cm × 23 cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1963—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 2134 Kg/ha. (ii) 351.4 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	2120	2153	1973	2180	2343	2033

Crop :- Wheat (Rabi).

Ref :- H.P. 65(183).

**Site :- Govt. Agri. Res. Stn. (Chemistry Section),
Dhaulta Kuan.**

Type :- 'M'.

Object :- To study the effect of different combinations of N, P and K on the yield of Wheat crop.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Castor. (c) N.A. (ii) Sandy loam. (iii) 23.11.65. (iv) (a) and (b) N.A. (c) 79 Kg/ha. (d) and (e) N.A. (v) N.A. (vi) C-286. (vii) Irrigated. (viii) N.A. (ix) V.A. (x) 12.4.66.

2. TREATMENTS:

All combinations of (1) and (2) + one control

(1) 2 levels of N : $N_1=50$ and $N_2=75$ Kg/ha.

(2) 2 levels of P_2O_5 : $P_1=50$ and $P_2=75$ Kg/ha.

(3) 2 levels of K_2O : $K_1=50$ and $K_2=75$ Kg/ha.

Other details are not available.

3. DESIGN

(i) R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) N.A. (b) $10m \times 3m$. (v) N.A. (vi) Yes.

4. GENERAL:

(i) No lodging. (ii) Nil. (iii) Yield of grain. (iv) (a) 1965—contd. (b) No (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 1273 Kg/ha. (ii) 166.3 Kg/ha. (iii) Control Vs. others is highly significant. (iv) Av. yield of grain in Kg/ha.

Control=1054 Kg/ha.

	P_1	P_2	K_1	K_2	Mean
N_1	1356	1289	1327	1319	1323
N_2	1219	1337	1302	1254	1278
Mean	1287	1314	1314	1286	1300
K_1	1304	1325			
K_2	1271	1302			

C.D. for control vs. others=182.0 Kg/ha.

Crop :- Wheat (Rabi).

Ref :- H.P. 65(184).

Site :- Agri. Res. Stn., Dhaula Kuan.

Type :- 'M'.

Object :- To study the efficiency of N, P and K in different combinations on the yield of Wheat.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) Maize. (c) N.A. (ii) Sandy loam. (iii) 19.11.65. (iv) (a) and (b) N.A. (c) 79 Kg/ha. (d) and (e) N.A. (v) N.A. (vi) C-286. (vii) Irrigated. (viii) and (ix) N.A. (x) 25.4.66.

2. TREATMENTS:

6 Manurial treatments : M_0 =Control, M_1 =60 Kg/ha of N, M_2 = M_1 +60 Kg/ha. of P_2O_5 , M_3 = M_1 +60 Kg/ha. of K_2O , M_4 =60 Kg/ha. of P_2O_5 +60 Kg/ha. of K_2O and M_5 =60 Kg/ha. of N+60 Kg/ha. of P_2O_5 +60 Kg/ha. of K_2O .

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 6. (iv) (a) N.A. (b) $10.00 m \times 3.00 m$. (v) N.A. (vi) Yes.

4. GENERAL :

(i) No lodging. (ii) Nil. (iii) Yield of grain. (iv) (a) 1965—Contd. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 1198 Kg/ha. (ii) 50.8 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	M_0	M_1	M_2	M_3	M_4	M_5
Av. yield	1189	1208	1158	1219	1125	1289

Crop :- Wheat (Rabi).**Ref :- H.P. 61(203).****Site :- Crop Res. Sub-Strn., Gopalpur.****Type :- 'M'.****Object :-**To study the effect of different methods of N and P placement on the yield of Wheat.**1. BASAL CONDITIONS :**

(i) and (ii) N.A. (iii) 23.10.61. (iv) and (v) N.A. (vi) N.P-770. (vii) to (x) N.A.

2. TREATMENTS :

7 manurial treatments : $M_0=0$, $M_1=18$ Kg/ha. of N+17 Kg/ha. of P_2O_5 in rows, $M_2=18$ Kg/ha. of N+17 Kg/ha. of P_2O_5 broadcasted, $M_3=18$ Kg/ha. of N+17 Kg/ha. of P_2O_5 applied between rows, $M_4=36$ Kg/ha. of N+17 Kg/ha. of P_2O_5 applied in rows, $M_5=36$ Kg/ha. of N+17 Kg/ha. of P_2O_5 broadcasted and $M_6=36$ Kg/ha. of N+17 Kg/ha. of P_2O_5 applied in rows.
N as A/S and P_2O_5 as super.

3. DESIGN :

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3.35 m × 6.70 m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1961—only. (b) No. (c) Nil. (v) to (vii) No.

5. RESULTS :

(i) 2768 Kg/ha. (ii) 112.8 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	M_0	M_1	M_2	M_3	M_4	M_5	M_6
Av. yield	1860	2982	2721	2796	3107	3032	2875

C.D.=167.6 Kg/ha.

Crop :- Wheat (Rabi).**Ref :- H.P. 61(176).****Site :- Crop Res. Sub-Strn., Gopalpur.****Type : 'M'.****Object :-**To study the effect of mulching on the yield of Wheat crop.**1. BASAL CONDITIONS :**

(i) and (ii) N.A. (iii) 10.11.61. (iv) to (ix) N.A. (x) 20.6.62.

2. TREATMENTS :

5 mulching treatments : M_0 =Control, M_1 =Compost, M_2 =Raw F.Y.M., M_3 =Sheep manure and M_4 =forest manure.

3. DESIGN :

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) 3.05m × 6.70m. (b) N.A. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1961—only. (b) No. (c) Nil. (v) and (vi) Nil. (vii) As net plot size is N.A., the results have been given in Kg/plot.

5. RESULTS :

(i) 5.96 Kg/plot. (ii) 0.49 Kg/plot. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/plot.

Treatment	M_0	M_1	M_2	M_3	M_4
Av. yield	6.86	5.84	6.09	5.71	5.30

Crop :- Wheat (Rabi).**Ref :- H.P. 61(205).****Site :- Crop Res. Sub-Stn., Gopalpur.****Type :- 'M'.****Object :- To study the effect of F.Y. M and compost on Spopy soils and yield of Wheat.****1. BASAL CONDITIONS:**

(i) to (ix) N.A. (x) 27.6.62.

2. TREATMENTS :3 manurial treatments: $M_0=0$, $M_1=30.58$ Q/ha. of F.Y. M and $M_2=30.58$ Q/ha. of Compost.**3. DESIGN :**

(i) R.B.D. (ii) (a) 3. (b) N.A. (iii) 4. (iv) (a) 3.35m x 6.70m. (b) N.A. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Good. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961—only. (b) No. (c) Nil. (v) and (vi) N.A. (vii) As net plot size is N.A., the results have been given in Kg/plot.

5. RESULTS:

(i) 5.56 Kg/plot. (ii) 0.63 Kg/plot. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/plot.

Treatment	M_0	M_1	M_2
Av. yield	6.03	5.42	5.22

Crop :- Wheat (Rabi).**Ref :- H.P. 62(259), 63(256).****Site : Crop Res. Sub-Stn., Gopalpur.****Type :- 'M'.****Object :- To find out the suitable dose of P for Wheat crop.****1. BASAL CONDITIONS :**

(i) (a) N.A. (b) Oglia ; N.A. (c) N.A. (ii) Light loam. (iii) and (iv) N.A. (v) 56 Kg/ha of N as C/A/N. (vi) NP-770 (Medium). (vii) Unirrigated ; N.A. (viii) and (ix) N.A. (x) 16.6.63 ; N.A.

2. TREATMENTS:5 levels of P_2O_5 as super: $P_0=0$, $P_1=28$, $P_2=56$, $P_3=84$ and $P_4=112$ Kg/ha.**3. DESIGN :**

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) 3.66m x 6.71m. (b) 3.20m x 6.25m. (v) 23 cm x 23 cm. (vi) Yes.

4. GENERAL :

(i) Very good ; N.A. (ii) Attack of rust ; N.A. (iii) Yield of grain. (iv) (a) 1962—63. (b) No. (c) Results of combined analysis are presented under 5-Results. (v) No. (vi) N.A. (vii) Error variances are heterogeneous and Treatments x years interaction is present.

5. RESULTS:**Pooled results**

(i) 2151 Kg/ha. (ii) 735.0 Kg/ha. (based on 4. d.f. made up of Treatments x years interaction.) (iii) Treatment differences are significant. (iv) Av. yield of grain in Kg/ha.

Treatment	P_0	P_1	P_2	P_3	P_4
Av yield	1053	2026	2495	2369	2813

C.D. = 1020.2 Kg/ha.

Individual results

Treatment	P ₀	P ₁	P ₂	P ₃	P ₄	Sig.	G.M.	S.E./plot
year 1962	1438	2766	3407	3235	3892	*	2948	781.6
1963	668	1285	1583	1503	1735	*	1355	318.8
Pooled	1053	2026	2495	2369	2813	*	2151	735.0

Crop :- Wheat (Rabi).**Ref :- H.P. 62(276).****Site :- Seed Multiplication Farm, Jogindernagar.****Type :- 'M'**Object :—To study the effect of different levels of P₂O₅ on the yield of Wheat crop.**1. BASAL CONDITIONS:**

(i) and (ii) N.A. (iii) 18/19.11.62. (iv) (a) to (e) N.A. (v) 56 Kg/ha. of N as C/A/N. (vi) to (x) N.A.

2. TREATMENTS:

Same as in expt. No. 62 (259), 63 (256) and presented on page no. 207

3. DESIGN:

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 4.88m × 3.66m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) No. (c) Nil. (v) Gopalpur, Sunder Nagar, Phuladhar. (vi) and (vii) Nil.

5. RESULTS:

(i) 1801 Kg/ha. (ii) 91.4 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	P ₀	P ₁	P ₂	P ₃	P ₄
Av. yield	1477	1874	1542	2292	1820

C.D. = 140.8 Kg/ha.

Crop :- Wheat (Rabi).**Ref : H.P. 60(156).****Site :- Govt. Res. Farm, Kama.****Type :- 'M'**

Object :—To study the effect of high doses of N on the yield of Wheat.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Saline Alk. soil. (iii) 17.11.60 (iv) (a) 4 to 5 ploughings. (b) Kera. (c) to (e) N.A. (v) N.A. (vi) C-273. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) May, 61.

2. TREATMENTS:**Main-plot treatments :**5 (basal) manurial treatments : T₀=control, T₁=224 Kg/ha. of N as A/C, T₂=224 Kg/ha. of N as A/S, T₃=224 Kg/ha. of N as A/C+161 Kg/ha. of Press-mud and T₄=214 Kg/ha. of N as A/C+161 Kg/ha. of Gypsum.**Sub-plot treatments :**2 levels of N as top-dressing : N₀=0 and N₁=45 Kg/ha.

3. DESIGN :

(i) Split-plot. (ii)(a) 5 main-plots/replication, 2 sub-plots/main-plot. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 1/4695.07 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960-61. (b) No. (c) Nil. (v) No. (vi) and (vii) Nil.

5. RESULTS:

(i) 1189 Kg/ha. (ii) (a) 320.6 Kg/ha. (b) 171.3 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	T ₀	T ₁	T ₂	T ₃	T ₄	Mean
N ₀	782	782	939	782	939	845
N ₁	1565	1252	1565	1565	1721	1534
Mean	1174	1017	1252	1174	1330	1189

C.D. for N marginal means=393.6 Kg/ha.

Crop :- Wheat (Rabi).

Ref :- H.P. 60(181).

Site :- Potato Develop. Stn., Kheradhar.

Type :- 'M'.

Object : To study the effect of different levels of N on the yield of Wheat.

1. BASAL CONDITIONS :

(i) and (ii) N.A. (iii) 3rd week of October, 60. (iv) and (v) N.A. (vi) N.P.-770. (vii) to (ix) N.A. (x) 5th June, 61.

2. TREATMENTS :

4 levels of N as A/S: N₀=0, N₁=22, N₂=33 and N₃=44 Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3.36 m × 10.06 m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 732 Kg/ha. (ii) 38.3 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	N ₀	N ₁	N ₂	N ₃
Av. yield	709	700	748	770

Crop :- Wheat (Rabi).

Ref :- H.P. 62(263).

Site :- Potato Res. Stn., Kheradhar.

Type :- 'M'.

Object : To find out the best time of application of N fertilizers for Wheat crop.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

All combinations of (1) and (2)+one control

(1) 3 levels of N as A/S : $N_1=17$, $N_2=34$ and $N_3=51$ Kg/ha.

(2) 3 times of application of N : A_1 =Full dose at sowing, $A_2=1/2$ at sowing+1/2 after snow melts and A_3 =Full dose after snow melts.

3. DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) $2.74 \text{ m} \times 1.37 \text{ m}$. (b) $2.13 \text{ m} \times 1.14 \text{ m}$. (v) $30.5 \text{ cm} \times 11.5 \text{ cm}$. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) No. (c) Nil. (v) Phula Dhar. (vi) and (vii) Nil.

5. RESULTS :

(i) 2363 Kg/ha. (ii) 946.7 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

Control=2102 Kg/ha.

	A_1	A_2	A_3	Mean
N_1	1538	2768	2358	2221
N_2	2870	2358	2255	2494
N_3	2768	2460	2153	2460
Mean	2392	2529	2255	2393

Crop :- Wheat (Rabi).

Ref :- H.P. 60(177).

Site : Kunihar Farm, (District : Mahasu).

Type : 'M'.

Object : To study the effect of different levels of N on the yield of Wheat crop.

1. BASAL CONDITIONS :

(i) to (v) N.A. (vi) N.P.-809. (vii) to (x) N.A.

2. TREATMENTS :

4 levels of N : $N_0=0$, $N_1=22.4$, $N_2=33.6$ and $N_3=44.8$ Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 6. (iv) (a) N.A. (b) $3.35 \text{ m} \times 10.06 \text{ m}$. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 1993 Kg/ha. (ii) 53.4 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	N_0	N_1	N_2	N_3
Av. yield	1942	2006	2002	1021

Crop :- Wheat (Rabi).**Ref : H.P. 62(156).****Site :- Soil Res. Sub-Stn., Nagrota, Bagwan.****Type : 'M'.****Object :** To study the effect of different micronutrients on the yield of Wheat.**1. BASAL CONDITIONS :**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 6.12.62. (iv)(a) 5 to 6 ploughings. (b) to (c) N.A. (v) 67.2 Kg/ha. of N+33.6 Kg/ha. of P_2O_5 +33.6 Kg/ha. of P_2O_5 applied at sowing. (vi) & (vii) N.A. (viii) 2 weedings. (ix) N.A. (x) 20.4.63.

2. TREATMENTS :

Micronutrients sprayed when crop was 1 to 2 months old.

7 micronutrient treatments: T_0 =Control, T_1 =Borax at 2.3 Kg/ha. in 454.6 litre of water, T_2 =Copper Sul. at 4.6 Kg/ha.+2.3 Kg/ha. of hydrated lime in 454.6 litre of water, T_3 =Iron Sul. at 4.6 Kg/ha.+2.3 Kg/ha. of hydrated lime in 454.6 litres of water, T_4 =Magnese Sul. at 6.9 Kg/ha.+4.6 Kg/ha. hydrated lime in 454.6 litre of water, T_5 =Zinc Sul. at 6.9 Kg/ha.+4.6 Kg/ha. of hydrated lime in 454.6 litre of water and T_6 =Magnesium at 11.5 Kg/ha. 454.6 litre of water as foliar spray.

3. DESIGN:

(i) R.B.D. (ii)(a) 7. (b) N.A. (iii) 4. (iv)(a) N.A. (b) 1/717 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) As per treatments. (iii) Yield of grain. (iv) (a) 1962—only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) N.A.

5. RESULTS

Grain yield.

(i) 543 Kg/ha. (ii) 65.0 Kg/ha. (iii) Treatment differences are significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6
Av. yield	432	604	617	531	545	520	551

C.D.=97.9 Kg/ha.

Crop : Wheat (Rabi).**Ref :- H.P. 60(188).****Site : Potato Develop. Stn., Phuladhar (Jogindernagar).****Type :- 'M'.****Object :** To find out the optimum time of application of Nitrogeous fertilizers to Wheat crop.**1. BASAL CONDITIONS :**

(i) and (ii) N.A. (iii) 24th oct., 60. (iv) (a) to (c) N.A. (d) 23 cm. (e) N.A. (v) 36 Kg/ha. of P_2O_5 on 18th March, 61. (vi) NP-770. (vii) to (ix) N.A. (x) 30th June, 61.

2. TREATMENTS :

Same as in Expt. No. 62(263) on wheat conducted at Kheradhar and presented on page No. 209.

3. DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) N.A.(b) 3.05 m×2.74 m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) N.A. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) Kheradhar. (vi) & (vii) Nil.

5. RESULTS:

(i) 1206 Kg/ha. (ii) 212.9 Kg/ha. (iii) Control Vs others is highly significant. (i) Av. yield of grain in Kg/ha.

Extra treatment=837 Kg/ha.

	A ₁	A ₂	A ₃	Mean
N ₁	1067	1181	1175	1141
N ₂	1477	1226	1127	1277
N ₃	1393	1217	1357	1322
Mean	1312	1208	1220	1247

C. D. for control vs. others=230.2 Kg/ha.

Crop :- Wheat (*Rabi*).

Ref :- H.P. 60(189).

Site :- Potato Develop. Stn., Phula Dhar (Jogindernagar). Type :- 'M'.

Object :- To study the effect of N, P, K on the yield of Wheat crop.

1. BASAL CONDITIONS :

(i) and (ii) N.A. (iii) 22/23.10.60. (iv) (a) N.A. (b) In furrows. (c) N.A. (d) 23 cm x 15 cm. (e) N.A. (v) to (ix) N.A. (x) 30.6.61.

2. TREATMENTS :

All combinations of (1), (2) and (3)

(1) 3 levels of N as A/S : N₀=0, N₁=22.5 and N₂=45 Kg/ha.(2) 3 levels of P₂O₅ as super : P₀=0, P₁=18 and P₂=36 Kg/ha.(3) 3 levels of K₂O as Pot. sul. : K₀=0, K₁=11 and K₂=22.5 Kg/ha.

3. DESIGN :

(i) 3³ confd. (ii) (a) 9 plots/block ; 3 blocks/replication. (b) N.A. (iii) 2. (iv) (a) N.A. (b) 6'10m x 2'74m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 806 Kg/ha. (ii) 33.9 Kg/ha. (iii) Main effect of P alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
N ₀	409	788	900	688	816	593	699
N ₁	524	919	1240	1004	766	914	894
N ₂	389	940	1141	693	819	958	824
Mean	441	882	1094	795	800	822	806
K ₀	469	808	1109				
K ₁	408	919	1074				
K ₂	446	921	1098				

C. D. for P marginal means=230.4 Kg/ha.

Crop :- Wheat (Rabi).**Ref :- H.P. 60(195).****Site :- Potato Develop. Stn. Phula Dhar (Jhatangiri).****Type :- 'M'.**

Object :-To assess the efficacy of soil and spray application of Nitrogenous fertilizers on the yield of Wheat.

1. BASAL CONDITIONS :

(i) and (ii) N.A. (iii) 25.10.60. (iv) (a) to (c) N.A. (d) 23 cm. (v) 35.9 Kg/ha. of P_2O_5 and a spraying of 1% Urea sol. in 454.6 litre of water/ac on 15.3.61. (vi) N.P. 770. (vii) to (ix) N.A. (x) 30.6.61.

2. TREATMENTS:

9 Methods of application of Urea : M_0 —Control. M_1 —22.4 Kg/ha. of N at sowing time soil app., M_2 —22.4 Kg/ha. of N at sowing+22.4 Kg/ha. as top dressing, M_3 —22.4 Kg/ha. of N+2 sprayings of 1% Urea, M_4 —22.4 Kg/ha. of N+4 sprayings of 1% Urea, M_5 —11.2 Kg/ha. of N+2 sprayings of 1% Urea, M_6 —11.2 Kg/ha. of N+4 sprayings of 1% Urea, M_7 —No soil application of N+2 sprayings of 1% Urea and M_8 —No soil application+4 sprayings of 1% Urea.

3. DESIGN:

(i) R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3.05m×2.74m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 1170 Kg/ha. (ii) 112.4 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	M_0	M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8
Av. yield	1006	1289	1477	1276	1269	1079	1073	960	1103

Crop :- Wheat (Rabi).**Ref :- H.P. 63(261).****Site :- Potato Develop. Stn., Phula Dhar (Jhatangiri).****Type :- 'M'.**

Object :-To find the suitable dose of P for Wheat crop.

1. BASAL CONDITIONS :

(i) to (iv) N.A. (v) 56 Kg/ha. of N as C/A/N. (vi) to (x) N.A.

2. TREATMENTS :

Some as in expt. no. 62 (259) 63 (256), on wheat-conducted at Gopalpura and presented on page no. 207

3. DESIGN:

(i) R.B.D. (ii) 5. (b) N.A. (iii) 4. (iv) (a) 1/247-10 ha. (b) 1/395-378 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) (a) 1963—only. (b) No. (c) Nil. (v) Gopalpura, Sundernagar.

5. RESULTS :

(i) 491 Kg/ha. (ii) 64.2 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	P_0	P_1	P_2	P_3	P_4
Av. yield	423	407	569	412	642

Crop :- Wheat (Rabi).**Ref :- H.P. 62(272).****Site :- Crop Res. sub-Stn., Sunder Nagar (Mandi).****Type :- 'M'.****Object :-** To determine the response of phosphate application on Wheat.**1. BASAL CONDITIONS:**

(i) (a) Nil. (b) Maize. (c) N.A. (ii) Sandy loam. (iii) 7.11.62. (iv) (a) N.A. (b) N.A. (c) 98.8 Kg/ha. (d) 23 cm between rows. (e) Nil. (v) 83.61 Q/ha. of F.Y.M. + 44.8 Kg/ha. of P_2O_5 + 22.4 Kg/ha. of K_2O and 89.6 to 268.8 Kg/ha. of N (vi) NP-829. (vii) Unirrigated. (viii) 1 weeding. (ix) Normal. (x) 14.5.63.

2. TREATMENTS :

Same as in expt. no. 62 (259) 63 (256) conducted at Gopalpur and presented on page no. 207.

3. DESIGN :

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) 5.79m x 2.29m. (b) 5.18m x 1.83m. (v) 30.5 cm x 23 cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil (iii) Yield of grain. (iv) (a) 1962—only. (b) No. (c) Nil. (v) Gopalpur, Phula Dhar. (vi) Nil.

5. RESULTS :

(i) 2760 Kg/ha. (ii) 298.2 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	P_0	P_1	P_2	P_3	P_4
Av. yield	2604	3224	2712	2691	2570

Crop :- Wheat (Rabi).**Ref :- H.P. 61(SFT).****Site :- District : Kangra.****Type :- 'M'.****Object :-**Type A : To study the response of Wheat to levels of N, P and K applied individually and in combination.**1. BASAL CONDITIONS :**

(i) (a) to (c) N.A. (ii) Hilly tract. (iii) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure)

N=22.4 Kg/ha. of N,

P=22.4 Kg/ha. of P_2O_5 ,

K=22.4 Kg/ha. of K_2O ,

NP=22.4 Kg/ha. of N+22.4 Kg/ha. of P_2O_5 ,

NK=22.4 Kg/ha. of N+22.4 Kg/ha. of K_2O ,

PK=22.4 Kg/ha. of P_2O_5 +22.4 Kg/ha. of K_2O ,

NPK=22.4 Kg/ha. of N+22.4 Kg/ha. of P_2O_5 +22.4 Kg/ha. of K_2O .

3. DESIGN :

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle/thana is changed once in two years within the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on Kharif cereal, 8 on a Rabi cereal, 8 on cash crop, 4 on an oilseed crop and 3 on a leguminous crop. Half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. The three trials on legumes are of type C. Residual effects of phosphates application are studied on Type C trials in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98.8 ha (b) 1/197.7 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-61. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

Av. response in Kg/ha.

60 (SFT)											
District	No. of trials	Control yield in Kg/ha.	N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Kangra	2	1460	530	330	220	42.0	70	20	-20	-20	29.0
61 (SFT)											
Kangra	5	1590	840	120	40	312.0	-170	-120	-140	370	205.0

Crop :- Wheat (Rabi)**Ref :- H.P. 60 and 61 (SFT).****Site :- District : Mahasu, Mandi, Chamba and Kangra.****Type :- 'M'.**

Object :- Type A : To study the response of Wheat to levels of N, P and K applied individually and in combination.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

Same as in wheat-crop conducted under irrigated condition on page No. 214.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-61. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

Av. response in Kg/ha.

60(SFT)											
District	No. of trials	Control yield in Kg/ha.	N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Mahasu	26	1250	250	190	100	22.0	60	-40	60	20	21.0
Mandi	19	930	180	100	70	74.0	-10	-40	30	60	38.0
Chamba	24	830	160	150	100	12.0	10	0	20	-10	13.0
Kangra	15	1010	410	330	190	52.0	10	-50	-10	40	32.0
61(SFT)											
Mahasu	26	1450	240	190	150	44.0	20	20	80	100	38.0
Mandi	22	980	150	110	70	13.0	30	0	40	40	110.0
Chamba	22	960	170	170	60	22.0	-10	20	20	0	22.0
Kangra	9	1070	320	150	190	37.0	-80	60	10	-10	28.0

Crop :- Wheat (Rabi).**Ref :- H.P. 60(SFT) Mahasu, Mandi and Chamba and 61(SFT) for Mahasu.****Site :- District : Mahasu, Mandi and Chamba.****Type :- 'M'.**

Object :- Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS:

7 manurial treatments :

O=Control (no manure),
 $N_1=22.4$ Kg/ha. of N as A/S,
 $N_2=44.8$ Kg/ha. of N as A/S,
 $N_1'=22.4$ Kg/ha. of N as A/S/N,
 $N_2'=44.8$ Kg/ha. of N as A/S/N,
 $N_1''=22.4$ Kg/ha. of N as C/A/N and
 $N_2''=44.8$ Kg/ha. of N as C/A/N.

3. DESIGN :

Same as in type A conducted under irrigated condition on Wheat-crop on page No. 214.

4. GEERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) and (b) N.A. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

Av. response in Kg/ha.

60(SFT)									
District	No. of trials	Control yield in Kg/ha.	N_1	N_2	N_1'	N_2'	N_1''	N_2''	S.E.
Mahasu	22	1190	420	450	360	450	510	620	75.0
Mandi	22	860	170	270	320	280	170	300	40.0
Chamba	22	890	120	200	200	260	110	290	32.0
61(SFT)									
Mahasu	8	1650	630	530	680	540	550	1160	142.0

Crop :- Whea (Rabi).

Ref :- H.P. 60(SFT) for Kangra and 61(SFT) for Mahasu, Chamba and Kangra.

Site :- District : Mahasu, Mandi, Chamba and Kangra.

Type :- 'M'.

Object :- Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS:

7 manurial treatments :

O=Control (no manure),
 $N_1=22.4$ Kg/ha. of N as A/S,
 $N_2=44.8$ Kg/ha. of N as A/S,
 $N_1'=22.4$ Kg/ha. of N as A/S/N,
 $N_2'=44.8$ Kg/ha. of N as A/S/N,
 $N_1''=22.4$ Kg/ha. of N as A/S/N, and
 $N_2''=44.8$ Kg/ha. of N as A/S/N.

3. DESIGN :

Same as in type A conducted under irrigated conditions on Wheat-crop on page No. 214.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) and (b) N.A. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

Av. response in Kg/ha.

60(SFT)

District	No. of trials	Control yield in Kg/ha.	N ₁	N ₂	N ₁ '	N ₂ '	N ₁ '	N ₂ '	S.E.
Kangra	16	840	500	690	270	500	450	670	77.0

61(SFT)

Mahasu	21	1460	320	440	260	320	320	450	85.0
Mandi	28	1090	140	240	130	180	170	310	33.0
Chamba	30	950	150	300	180	260	220	360	32.0
Kangra	12	1000	420	650	270	490	410	630	59.0

Crop :- Wheat (*Rabi*).

Ref :- H.P. 62(SFT).

Site :- District : Kangra.

Type :- 'M'.

Object :- Type A₁: To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS:

8 manurial treatments:

O = Control (no manure).

N₁ = 35 Kg/ha. of N.N₂ = 70 Kg/ha. of N.P₁ = 35 Kg/ha. of P₂O₅.N₁P₁ = 35 Kg/ha. of N + 35 Kg/ha. of P₂O₅.N₂P₁ = 70 Kg/ha. of N + 35 Kg/ha. of P₂O₅.N₂P₂ = 70 Kg/ha. of N + 70 Kg/ha. of P₂O₅ andN₂P₂K₁ = 70 Kg/ha. of N + 70 Kg/ha. of P₂O₅ + 35 Kg/ha. of K₂O.

3. DESIGN:

(i) and (ii) A selected district is divided into four agriculturally homogenous zones based on climate, soil, cropping pattern etc. In each zone one block is selected at random. A block normally consists of a group of 50-100 villages. In each block 36 experiments are conducted in a year of which 11 are of type A₁, 11 are of type A₂, 11 are of type A₃ and 3 are of type C. The eleven experiments under type A₁, A₂ and A₃ each are distributed as 3 on a *Kharif* cereal, 3 on a *Rabi* cereal, 3 on a cash crop and 2 on oil seed. All the three type-C experiments are conducted on a legume crop. For the purpose of conducting the A₁, A₂ and A₃ experiments 11 villages are randomly selected in each block and in each village 3 experiments one each of type A₁, A₂ and A₃ are laid out. For conducting the three type-C trials three villages are randomly selected in each block. (iii) (a) 1/100 ha. (b) 1/200 ha. (iv) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-66 (62-65 N.A.) (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

Kangra

62(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha	651	699	153	892	886	1060	1279	72.5

Control yield = 919 Kg/ha. ; No. of trials = 4

Crop :- Wheat (*Rabi*).Ref :- H.P. 62 to 65(SFT) for Chamba,
62 to 65(SFT) for Mahasu, 62 to
65(SFT) for Mandi and 62 to 65
(SFT) for Kangra.Site :- District : Chamba, Mahasu, Type :- 'M'.
Mandi and Kangra.Object :- Type A₁ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS

Treatments and 3 design are same as in type A₁ on wheat-crop under irrigated conditions on page No. 217.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-66 for every district. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS

Chamba

62(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	134	240	170	259	313	284	388	47.9

Control yield=781 Kg/ha. ; No. of trials=19

63(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	153	298	179	279	325	436	503	41.9

Control yield=1109 Kg/ha. ; No. of trials=20

64(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	95	199	88	214	249	382	499	30.3

Control yield=1144 Kg/ha. ; No. of trials=17

65(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	181	321	173	297	385	482	560	34.1

Control yield=1285 Kg/ha. ; No. of trials=13

Mahasa

62(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	458	453	261	719	575	643	680	131.3

Control yield=1079 Kg/ha. ; No. of trials=11

63(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	144	268	66	299	459	551	750	78.1

Control yield=990 Kg/ha. ; No. of trials=18

64(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	270	512	213	397	485	720	857	105.4

Control yield=1046 Kg/ha. ; No. of trials=10

65(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha	126	259	87	291	358	457	584	50.7

Control yield = 640 Kg/ha. ; No. of trials=N.A.

Mandi

62(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	192	327	120	200	300	348	434	55.3

Control yield=8161 Kg/ha. ; No. of trials=17

63(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	179	169	177	355	448	502	588	59.3

Control yield=671 Kg/ha. ; No. of trials=23

64(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	192	271	127	370	492	621	764	42.6

Control yield=834 Kg/ha. ; No. of trials=23

65(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	33	76	30	226	274	498	476	48.9

Control yield=471 Kg/ha. ; No. of trials=11

Kangra

62(S:F.T)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	233	326	115	222	334	449	495	54.0

Control yield=675 Kg/ha. ; No. of trials=17

63(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	289	411	86	379	582	760	758	42.2

Control yield=787 Kg/ha. ; No. of trials=14

64(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	415	582	267	662	791	993	1023	23.4

Control yield=1071 Kg/ha ; No. of trials=13

65(S.F.T.)

Treatment	N	N ₁	P ₂	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	107	214	108	329	346	496	580	46.5

Control yield=762 Kg/ha. ; No. of trials=11

Crop :- Wheat (*Rabi*).

Ref :- H.P. 62 to 65(SFT) for Chamba, Mahasu, Mandi and Kangra.

Site :- District : Chamba, Mahasu, Mandi and Kangra.

Type :- 'M'.

Object :—Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

Treatments are same as in type A₂ conducted under irrigated conditions on Wheat-crop on page No. 222.

3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Wheat crop on page No. 217.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—66 for each district. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

Chamba

62(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	138	171	151	280	186	345	381	36.4

Control yield=856 Kg/ha. ; No. of trials=14

63 (SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	156	134	246	279	239	368	518	29.5

Control yield=1045 Kg/ha. ; No. of trials=19

64(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	132	57	123	215	261	381	509	32.2

Control yield=1142 Kg/ha. ; No. of trials=16

65(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	180	123	135	310	362	505	504	31.9

Control yield=1219 Kg/ha. ; No. of trials=12

Mahasu

62(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	388	449	350	157	426	594	664	117.6

Control yield=1112 Kg/ha. ; No. of trials=13

63(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
response of yield in Kg/ha.	170	250	503	553	570	701	864	74.3

Control yield=844 Kg/ha. ; No. of trials=17

64(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	408	239	374	378	567	748	895	87.0

Control yield=971 Kg/ha. ; No. of trials=15

65(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	144	92	199	256	335	476	559	41.2

Control yield=683 Kg/ha. ; No. of trials=22

Maadi

62(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	164	134	158	201	205	14	307	53.0

Control yield=818 Kg/ha. ; No. of trials=17

63(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	183	158	247	369	308	455	539	51.5

Control yield=575 Kg/ha. ; No. of trials=21

64(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	165	99	184	335	450	556	684	34.9

Control yield=822 Kg/ha. ; No. of trials=21

65(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	53	15	98	240	297	428	533	40.2

Control yield=407 Kg/ha. ; No. of trials=21

Kangra

62(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield to Kg/ha.	-62	83	170	579	603	804	841	66.3

Control yield=740 Kg/ha. ; No. of trials=17

Kangra

63(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	372	99	177	502	614	706	860	44.9

Control yield=711 Kg/ha. ; No. of trials=13

64(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	483	198	321	675	776	979	1115	54.4

Control yield=1012 Kg/ha. ; No. of trials=17

65(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	214	113	153	270	306	453	573	43.8

Control yield=1012 Kg/ha. ; No. of trials=13

Crop :- Wheat (*Rabi*).

Ref :- H.P. 62(SFT).

Site :- District : Kangra.

Type :- 'M'.

Object :-Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure).

N₁=35 Kg/ha. of N,P₁=35 Kg/ha. of P₂O₅,P₂=70 Kg/ha. of P₂O₅,N₁P₁=35 Kg/ha. of N+35 Kg/ha. of P₂O₅,N₁P₂=35 Kg/ha. of N+70 Kg/ha. of P₂O₅,N₂P₂=70 Kg/ha. of N+70 Kg/ha. of P₂O₅ andN₂P₂K₂=70 Kg/ha. of N+70 Kg/ha. of P₂O₅+70 Kg/ha. of K₂O.

3. DESIGN :

Same as in Type A₁ Conducted under irrigated conditions on wheat crop on page No. 217.

4. GENERAL

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

62(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	376	-8	190	490	552	719	913	119.1

Control yield=1044 Kg/ha. ; No. of trials=3

Crop :- Wheat (*Rabi*).

Ref :- H.P. 62(SFT) for Kangra.

Site :- District : Kangra.

Type :- 'M'.

Object :—A₂ : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

N₁=35 Kg/ha. of N,K₁=35 Kg/ha. of K₂O,K₂=70 Kg/ha. of K₂O,N₁K₁=35 Kg/ha. of N + 35 Kg/ha. of K₂O,N₁K₂=35 Kg/ha. of N + 70 Kg/ha. of K₂O,N₂K₂=70 Kg/ha. of N + 70 Kg/ha. of K₂O andN₁P₁K₁=35 Kg/ha. of N + 35 Kg/ha. of P₂O₅ + 35 Kg/ha. of K₂O.

3. DESIGN :

Same as in type A, conducted under irrigated conditions on wheat crop on page 217.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Kangra

62(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	449	144	252	549	604	830	788	156.3

Control yield=956 Kg/ha. ; No. of trials=4

Crop :- Wheat (*Rabi*).Ref :- H.P. 62 to 65(SFT) for Kangra,
Chamba, Mahasu and Mandi.Site :- District : Kangra, Chamba,
Mahasu and Mandi.

Type :- 'M'.

Object :—Type A₂ : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

Treatments are same as in type A₂ on wheat crop conducted under irrigated conditions on page No. 223.

3. DESIGN :

Same as in type A₁ conducted under irrigated conditions on wheat crop on page No. 217.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) 1962—66 for each district. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Kangra

62(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	239	-4	88	267	263	381	488	55.9

Control yield=697 Kg/ha. ; No. of trials=17

63(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	556	89	177	649	592	882	793	82.5

Control yield=895 Kg/ha. ; No. of trials=15

64(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	434	176	303	578	600	732	811	64.1

Control yield=1292 Kg/ha. ; No. of trials=14

65(SFF)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	104	-14	42	229	262	400	428	42.3

Control yield=699 Kg/ha. ; No. of trials=13

Chamba

62(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	142	53	105	205	303	328	322	41.2

Control yield=755 Kg/ha. ; No. of trials=14

63(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	164	147	231	305	251	382	412	25.7

Control yield=970 Kg/ha. ; No. of trials=19

64(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	165	49	83	134	193	318	377	22.8

Control yield=1067 Kg/ha. ; No. of trials=19

65(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	181	199	234	289	328	418	486	23.5

Control yield=1176 Kg/ha ; No. of trials=12

Mahasu

62(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	179	81	258	206	360	448	595	95.2

Control yield=811 Kg/ha. ; No. of trials=11

63(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	419	132	229	363	377	421	677	79.5

Control yield=796 Kg/ha. ; No. of trials=17

64(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	164	16	126	255	318	487	431	79.5

Control yield=1032 Kg/ha. ; No. of trials=12

65(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	210	81	133	231	302	399	518	37.9

Control yield=511 Kg/ha. ; No. of trials=22

Mandi

62(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	218	117	134	279	235	330	328	37.5

Control yield=771 Kg/ha. ; No. of trials=17

63(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	267	153	129	306	307	404	495	50.0

Control yield=597 Kg/ha. ; No. of trials=21

64(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	170	92	98	306	357	472	420	57.0

Control yield=694 Kg/ha. ; No. of trials=20

65(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	79	-35	71	1.81	228	357	499	41.8

Control yield=376 Kg/ha. ; No. of trials=10

Crop :- Wheat (Rabi).**Ref. - H.P. 60(86).****Site :- Govt. Reclamation Farm, Kama.****Type :- 'X'.**

Object :—To study the effect of rotational crops with N, P, K application on the yield of Wheat crop.

1. BASAL CONDITIONS :

(i) (a) and (b) As per treatments. (c) N.A. (ii) Saline Alkaline soil. (iii) 8.11.60. (iv) and (v) N.A. (vi) C-273. (vii) Irrigated. (viii) and (ix) N.A. (x) 9.5.61.

2. TREATMENTS :

Main-plot treatments :

6 crop rotations: T_1 = Dhaincha (G.M.)—Rice—Gram, T_2 = Dhaincha (G.M.)—Rice—Berseem, T_3 = Dhaincha (G.M.)—Rice—Cotton, T_4 = Dhaincha (G.M.)—Rice—Wheat, T_5 = Dhaincha (G.M.)—Rice—Barley and T_6 = Dhaincha (G.M.)—Rice—S. cane.

Sub-plot treatments :

2 levels of fertilizers: F_0 = No Fertilizer and F_1 = 44.8 Kg/ha. of N + 22.4 Kg/ha. of P_2O_5 as Super + 22.4 Kg/ha. of K_2O as Mur. Pot.**3. DESIGN :**

(i) Split-plot. (ii) (a) 6 main-plots/replication, 2 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/340 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) (a) and (b) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 1061 Kg/ha. (ii) (a) 129 Kg/ha. (b) 75 Kg/ha. (iii) Main effects of T and F are highly significant. (iv) Av. yield of grain in Kg/ha.

	T_1	T_2	T_3	T_4	T_5	T_6	Mean
F_0	756	914	882	672	756	819	800
F_1	1281	1580	1302	1281	1197	1299	1323
Mean	1018	1247	1092	976	976	1059	1061

C.D. for T marginal means = 137.4 Kg/ha.

C.D. for F marginal means = 45.5 Kg/ha.

Crop :- Wheat (Rabi).**Ref :- H.P. 61(180).****Site :- Shillaro (District Mahasul).****Type :- 'D'.**

Object :—To test the efficacy of different seed dressing on the control of Hill burnt of Wheat at Shillaro Rabi 1961-62.

1. BASAL CONDITIONS:

(i) to (x) N.A.

2. TREATMENTS :15 seed dressing chemicals: C_0 = Control, C_1 = Tillex, C_2 = Lunasan, C_3 = Thiram, C_4 = Agrosan, C_5 = Hexasan, C_6 = Copper carbonate, C_7 = Cerasan dry, C_8 = Shell seed dresser, C_9 = Shell seed dresser, C_{10} = Sulphur, C_{11} = Cerasan, C_{12} = P.C.N.B. (Seed.), C_{13} = P.C.N.B. Soil, C_{14} = Control (Diseased) or located with the burnt spores.

3. DESIGN :

(i) R.B.D. (ii) (a) 15. (b) N.A. (iii) 4. (iv) (a) and (b) 3.66m × 1.83m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv)(a) 1961—only. (b) No. (c) Nil (v) to (vii) Nil.

5. RESULTS :

(i) 1115 Kg/ha. (ii) 191.6 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	C ₀	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉	C ₁₀	C ₁₁	C ₁₂	C ₁₃	C ₁₄
Av. yield	1203	1383	1043	974	1039	945	1145	1215	1142	927	1018	1031	1166	1398	1091

Crop :- Barley.**Ref :- H.P. 63(195).****Site :- Agri. Res. Stn., Dhaula Kuan.****Type :- 'M'.**

Object: - To find the effect of N, P and K applied individually and in combination for high yield of Barley.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) Paddy. (c) 85 Kg/ha. of N, 202 Kg/ha. of Super and 37 Kg/ha. of Mur Pot. (ii) Sandy loam. (iii) 29.11.63. (iv) (a) Ploughings and Suhagas. (b) N.A. (c) 74 Kg/ha. (d) Rows 23 cm apart. (v) Nil. (vi) C-141. (vii) Unirrigated. (viii) Nil. (ix) 10 cm. (x) 6/7.5.64.

2. TREATMENTS :

All combinations of (1), (2) and (3)

(1) 3 levels of N as C/A/N: N₀=0, N₁=22.4 and N₂=44.8 Kg/ha. of N(2) 3 levels of P₂O₅ as Super: P₀=0, P₁=17.9 and P₂=35.9 Kg/ha. of P₂O₅(3) 3 levels of K₂O as Mur. Pot: K₀=0, K₁=11.2 and K₂=22.4 Kg/ha. of K₂O

Fertilizers applied at the time of sowing.

3. DESIGN :

(i) 3³ Fact. Partially confd. (ii) 3 blocks/replication and 9 plots/block. (b) N.A. (iii) 4. (iv) (a) 11.07m × 2.29m. (b) 10.06m × 1.82m. (v) 50 cm × 23 cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1962—contd. (b) No. (c) Nil. (v) Nil. (vi) N.A. (vii) 60% loss due to frost in winter season.

5. RESULTS :

(i) 474 Kg/ha. (ii) 162.7 Kg/ha. (iii) None of the effects is significant. (iv) (a) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	Mean
K ₀	489	439	499	460	462	505	476
K ₁	462	442	448	520	400	431	450
K ₂	431	460	595	465	511	510	495
Mean	461	447	514	482	457	482	474
P ₀	473	462	510				
P ₁	420	431	521				
P ₂	489	447	510				

Crop :- Barley (Rabi).**Ref :- H.P. 60(82).****Site :- Govt. Reclamation Farm, Kama.****Type :- 'M'.****Object :-**To study the effect of N, P, K and calcium on the yield of Barley.**1. BASAL CONDITIONS :**

(i) (a) to (c) N.A. (ii) Saline—Alkaline soil. (iii) 11.12.60. (iv) to (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) 12.4.61.

2. TREATMENTS:**Main-plot treatments:**5 calcium applications : T_0 =Control (No calcium applied), T_1 =50%, T_2 =75%, T_3 =85% and T_4 =100% application of calcium requirements.**Sub-plot treatments :**5 manures : F_0 =Control (No manure), F_1 =N, F_2 =NP, F_3 =NPK and F_4 =NPK+micronutrients. N=56 Kg/ha., P=28 Kg/ha., K=26 Kg/ha. and Micronutrients are Magnesium Sul. + Zinc. Sul.**3. DESIGN :**

(i) Split-plot. (ii)(a) 5 main-plots/replication, 5 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/791 ha. (v) N.A. (vi) Yes.

4 GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 1383 Kg/ha. (ii) (a) 653.0 Kg/ha. (b) 266.0 Kg/ha. (iii) Main effect of F alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	T_0	T_1	T_2	T_3	T_4	Mean
F_0	672	969	1475	1336	1447	1180
F_1	1087	994	1566	1374	1574	1319
F_2	1186	1153	1678	1408	1690	1423
F_3	1336	1350	1625	1289	1560	1432
F_4	1336	1390	1900	1631	1556	1560
Mean	1123	1171	1649	1408	1565	1383

C.D. for F marginal means=168.2 Kg/ha.

Crop :- Barley (Rabi).**Ref :- H.P. 60(88).****Site :- Govt. Reclamation Farm, Kama.****Type :- 'M'.****Object :-**To study the effect of dry leaves powder.**1. BASAL CONDITIONS:**

(i) (a) to (c) N.A. (ii) Saline Alkaline soil. (iii) 18.11.60. (iv) to (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) 14.4.61.

2. TREATMENTS:10 manurial treatments : T_0 =Control (no application), T_1 =Agrosan maxicon dry powder 50 Q/ha. T_2 =Pobli maxicon dry powder 50 Q/ha., T_3 =Dry leaves maxicon dry powder 50 Q/ha., T_4 =Impornea corneas maxicon dry powder 50 Q/ha., T_5 =Rice Husk maxicon dry powder 50 Q/ha., T_6 =Sarson straw chapped at 50 Q/ha. T_7 =Rice straw chapped at 50 Q/ha., T_8 =Dhaincha (G. plant) at 251 Q/ha. and T_9 =Recommended Method.

3. DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/495 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 438 Kg/ha. (ii) 209 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	358	463	482	340	457	477	262	340	582	618

Crop :- Barley (Rabi).**Ref :- H.P. 60(157).****Site :- Govt. Reclamation Farm, Kama.****Type :- 'M'.**

Object :—To study the residual effect of different combinations of N, P and K.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) (a) Saline Alk. Soil. (iii) 1.12.60. (iv) (a) 4 to 5 ploughings. (b) to (c) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 6.5.61.

2. TREATMENTS :

All combinations of (1), (2) and (3)

Main-plot treatments :

- (1) 2 levels of N as C/A/N : N₀=0 and N₁=45 Kg/ha.
- (2) 2 levels of P₂O₅ as super : P₀=0 and P₁=22.5 Kg/ha.
- (3) 2 levels of K₂O as Mur. Pot : K₀=0 and K₁=22.5 Kg/ha.

Sub-plot treatments :

2 levels of gypsum : G₀=0 and G₁=152.4 Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 8 main-plots/replication, 2 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/1581.5 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 1077 Kg/ha. (ii) (a) 432.2 Kg/ha. (b) 254.1 Kg/ha. (iii) Main effect of G alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	K ₀	K ₁	G ₀	G ₁	Mean
P ₀	909	1186	978	1117	889	1206	1048
P ₁	1176	1038	1127	1087	959	1255	1107
Mean	1042	1112	1052	1102	924	1230	1077
G ₀	860	988	860	988			
G ₁	1225	1236	1245	1216			
K ₀	1087	1018					
K ₁	998	1206					

C.D. for G marginal means=131.1 Kg/ha.

Crop :- Barley (Rabi).**Ref :- H.P. 60(160).****Site :- Govt. Reclamation Farm, Kama.****Type :- 'CM'.**

Object : To study the residual effects of soil amendments, applied to the paddy crop, on the yield of Barley.

1. BASAL CONDITIONS:

(i) (a) Paddy-Barley. (b) Paddy. (c) As per treatments. (ii) Saline Alk. soil. (iii) 27.11.60. (iv) (a) 4 to 5 ploughings. (b) to (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 6.5.61.

2. TREATMENTS :11 manurial treatments : (Treatments were applied during 1958-59 kharif season). T_0 = Control, T_1 = Gypsum at 101.6 Q/ha., T_2 = Sulphur at 896 Kg/ha., T_3 = H_2SO_4 at 3153 litre/ha., T_4 = HNO_3 at 5219 litre/ha., T_5 = HCL at 3865 litre/ha., T_6 = Al. sul. at 6160 Kg/ha. T_7 = F.Y.M. at 375.9 Q/ha., T_8 = Press-mud at 101.6 Q/ha., T_9 = Mollases mud at 101.6 Q/ha., and T_{10} = Mollases at 304.8 Q/ha. + Press-mud at 101.6 Q/ha.**3. DESIGN :**

(i) R.B.D. (ii) (a) 11. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 1/747.5 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1959-60. (b) Yes. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 904 Kg/ha. (ii) 242.2 Kg/ha. (iii) Treatment differences are significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}
Av. yield.	698	897	1146	847	424	797	822	872	1221	1271	947

C.D. = 412.5 Kg/ha.

Crop :- Barley (Rabi).**Ref :- H.P. 61(SFT) for Mahasu and Mandi.****Site :- District : Mahasu and Mandi.****Type :- 'M'.**

Object :- Type A : To study the response of Barley to levels of N, P and K applied individually and in combination.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Hilly tract. (iii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O = Control (no manure)

N = 22.4 Kg/ha. of N,

P = 22.4 Kg/ha. of P_2O_5 ,K = 22.4 Kg/ha. of K_2O ,NP = 22.4 Kg/ha. of N + 22.4 Kg/ha. of P_2O_5 ,NK = 22.4 Kg/ha. of N + 22.4 Kg/ha. of K_2O ,PK = 22.4 Kg/ha. of P_2O_5 + 22.4 Kg/ha. of K_2O andNPK = 22.4 Kg/ha. of N + 33.6 Kg/ha. of P_2O_5 + 22.4 Kg/ha. of K_2O .

3. DESIGN:

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and circle/thana is changed once in two years within the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on Kharif cereal, 8 on a Rabi cereal, 8 on cash crop, 4 on an oilseed crop and 3 on a leguminous crop. Half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. The three trials on legumes are of type C. Residual effects of phosphate application are studied on Type C trial in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98.8 ha. (b) 1/197.7 ha. (iv) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of barley. (iv) (a) 1961—only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

Av. response in Kg/ha.

61(SFT)

District	No. of trials	Control yield in Kg/ha.	N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Mahasu	2	940	140	180	40	43.0	-40	10	-50	10	30.0
Mandi	2	700	180	140	70	40.0	30	50	50	70	19.0

Crop :- Barley (Rabi).

Ref :- H.P. 61(SFT) for Mahasu.

Site :- (District) : Mahasu.

Type :- 'M'.

Object :- To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS:

(i) to (x) N.A.

2. TREATMENTS:

7 manurial treatments:

O=Control (no manure),

$N_1=22.4$ Kg/ha. of N as Urea,

$N_2=44.8$ Kg/ha. of N as Urea,

$N_1'=22.4$ Kg/ha. of N as A/S/N,

$N_2'=44.8$ Kg/ha. of N as A/S/N,

$N_1''=22.4$ Kg/ha. of N as C/A/N and

$N_2''=44.8$ Kg/ha. of N as C/A/N.

3. DESIGN:

Same as in type A conducted on Barley crop on page No. 230.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1961—only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

Av. response in Kg/ha.

61(SFT)

District	No. of trials	Control yield in Kg/ha.	N_1	N_2	N_1'	N_2'	N_1''	N_2''	S.E.
Mahasu	2	1360	260	410	-170	350	310	430	31.0

Crop :- Barley (Rabi).

Ref :- H.P. 61(SFT) for Mandi.

Site :- District : Mandi.

Type :- 'M'.

Object :- Type B: To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (no manure),

$N_1=22.4$ Kg/ha. of N as A/S

$N_2=44.8$ Kg/ha. of N as A/S

$N_3'=22.4$ Kg/ha. of N as A/S/N

$N_4'=44.8$ Kg/ha. of N as A/S/N

$N_1''=22.4$ Kg/ha. of N as C/A/N

$N_2''=44.8$ Kg/ha. of N as C/A/N

3. DESIGN:

Same as in type A conducted on Barley crop on page No. 230.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1961—only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

61(SFT)	District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.					S.E.	
				N_1	N_2	N_1'	N_2'	N_1''		N_2''
	Mandi	2	910	80	290	140	280	180	370	55.0

Crop :- Barley (Rabi).

Ref :- H.P. 60(162).

Site :- Govt. Reclamation Farm, Kama.

Type :- 'CM'.

Object :-To study the effect of different leaching levels on the yield of Barley.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Saline Alk. soil. (iii) 17.11.60. (iv) (a) 4 to 5 ploughings. (b) to (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 9.4.61.

2. TREATMENTS :

Main-plot treatments :

All combinations of (1) and (2)

(1) 2 levels of gypsum: $G_0=0$ and G_1 =Gypsum at 101.6 Q/ha,

3 levels of leaching: L_1 =No leaching, L_2 =leaching at 30 cm, L_3 =leaching at 91 cm.

(2) Sub-plot treatments :

2 levels of N: $N_0=0$, and $N_1=45$ Kg/ha. of N as C/A/N,

3. DESIGN :

(i) Split-plot, (ii) (a) 6 main-plots/replication, 2 sub-plots/main-plot. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 1/897 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960—61. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

- (i) 1180 Kg/ha. (ii) (a) 394.8 Kg/ha. (b) 232.7 Kg/ha. (iii) Main effect of N alone is highly significant.
 (iv) Av. yield of grain in Kg/ha.

	L ₁	L ₂	L ₃	N ₀	N ₁	Mean
G ₀	970	1034	1202	687	1451	1069
G ₁	1345	1414	1115	827	1756	1291
Mean	1158	1224	1159	757	1604	1108
N ₀	688	897	686			
N ₁	1628	1552	1631			

C.D. for N marginal means=169.0 Kg/ha.

Crop :- Maize (Kharif).

Ref :- H.P. 62(277).

Site :- Auhar Farm, Bilaspur.

Type :- 'M'.

Object :- To study the effect of Nitrogen on the yield of Maize.

1. BASAL CONDITIONS:

- (i) and (ii) N.A. (iii) 17.7.62. (iv) and (v) N.A. (vi) Hybrid Ganga—101. (vii) to (ix) N.A. (x) 30.10.62.

2. TREATMENTS :

5 manurial treatments :—M₀=Control, M₁=75 Q/ha. of F.Y.M. +45 Kg/ha., of P₂O₅+22.5 Kg/ha. of K₂O, M₂=M₁+90 Kg/ha. of N, M₃=M₁+180 Kg/ha. of N and M₄=M₁+270 Kg/ha. of N.

3. DESIGN:

- (i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) and (b) 10'06m × 3'35m. (v) Nil. (vi) Yes.

4. GENERAL :

- (i) N.A. (ii) Nil. (iii) Yield of grain. (iv) (a) 1962—only. (b) No. (c) Nil. (v) Haripura. (vi) and (vii) Nil.

5. RESULTS :

- (i) 978 Kg/ha. (ii) 52.4 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of Maize in Kg/ha.

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄
Av. yield.	222	445	1075	1446	1705

C.D.=80.7 Kg/ha.

Crop :- Maize (Kharif).

Ref :- H.P. 62(267), 64(173).

Site :- Govt. Agri. Res. Stn., Dhaul Kuan.

Type :- 'M'.

Object :- To study the effect of increased doses of N on the yield of Maize crop.

1. BASAL CONDITIONS :

- (i) (a) Nil. (b) Nil; Berseem. (c) N.A. (ii) Clayey loam. (iii) N.A.; 27.6.64. (iv) (a) 4—5 Ploughings. (b) N.A. (c) 14.8 Kg/ha. (d) 61 cm between rows and 30 cm between plants. (e) N.A. (v) Nil. (vi) N.A.; Ganga—101. (vii) Unirrigated. (viii) 3 weedings and 2 hoeings. (ix) N.A.; 16.0 cm. (x) N.A.; Oct., 64.

2. TREATMENTS:

5 manurial treatments: M_0 = Control (no manure), M_1 = 185.3 Q/ha. of F.Y.M. + 44.8 Kg/ha. of P_2O_5 + 22.4 Kg/ha. of K_2O , M_2 = M_1 + 89.6 Kg/ha. of N as C/A/N, M_3 = M_1 + 179.2 Kg/ha. of N as C/A/N and M_4 = M_1 + 268.8 Kg/ha. of N as C/A/N.

3. DESIGN:

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) N.A.; 10.94m × 3.05m, (b) 1/543.6376 ha., 10.06m × 1.83m (v) 61 cm on both sides. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1962—64 (63 N.A.). (b) No. (c) Results of combined analysis are presented under 5-Results. (v) and (vi) Nil. (vii) Error variances are homogeneous and Treatments × years interaction is present.

5. RESULTS:

Pooled results:

(i) 3153 Kg/ha. (ii) 1108.6 Kg/ha. (based on 4 d.f. made up of Treatments × years interaction), (iii) Treatment differences are significant. (iv) Av. yield of grain in Kg/ha.

Treatment	M_0	M_1	M_2	M_3	M_4
Av. yield	1870	2144	3348	4360	4045

C.D. = 1539 Kg/ha.

Individual results

Treatment	M_0	M_1	M_2	M_3	M_4	Sig.	G.M.	S.E./plot
Year								
1962	2304	2412	4145	5640	4621	**	3824	290.4
1964	1436	1876	2550	3080	3469	**	2482	413.7
Pooled	1870	2144	3348	4360	4045	*	3153	1108.6

Crop :- Maize (Kharif).

Ref : H.P. 64(172).

Site :- Agri. Res. Stn., Dhaula Kuan.

Type :- 'M'.

Object :- To study the effect of levels of N and K in combination on the yield of Maize crope.

1. BASAL CONDITIONS:

(i) (a) Nil. (b) Berseem. (c) N.A. (ii) Sandy Loam. (iii) 29.6.64. (iv) (a) 4 ploughings. (b) to (e) N.A. (v) Nil. (vi) Ganga—10l. (vii) Unirrigated. (viii) 3 weedings and 2 hocings. (ix) 168 cm. (x) Oct, '64.

2. TREATMENTS:

Main-plot treatments:

4 doses of N: N_1 = 44.8 Kg/ha. of N at sowing + 44.8 Kg/ha. of N after one month later, N_2 = 22.4 Kg/ha. of N at sowing + 33.6 Kg/ha. each at silking and one month later, N_3 = 67.3 Kg/ha. of N, at sowing + 67.3 Kg/ha. of N one month later, and N_4 = 44.8 Kg/ha. of N at sowing + 44.8 Kg/ha. of N one month later + 44.8 Kg/ha. of N at silking.

Sub-plot treatments:

4 doses of K_2O : K_1 = 44.8 Kg/ha. of K_2O at sowing, K_2 = 22.4 Kg/ha. of K_2O at sowing + 22.4 Kg/ha. of K_2O one month later, K_3 = 22.4 Kg/ha. of K_2O at sowing + 33.6 Kg/ha. of K_2O one month later, and K_4 = 22.4 Kg/ha. of K_2O at sowing + 33.6 Kg/ha. of K_2O each one month later and silking N applied as C/A/N and K_2O as Mur. Pot.

Fertilizers applied $\frac{1}{2}$ at sowing, $\frac{1}{2}$ one month after sowing.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication, 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) 10.98m × 3.05m. (b) 10.06m × 1.83m. (v) 46 cm × 61 cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1964—Contd. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 2481 Kg/ha. (ii) (a) 367.5 Kg/ha. (b) 616.2 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	K ₁	K ₂	K ₃	K ₄	Mean
N ₁	2493	2265	1841	2130	2182
N ₂	2750	2993	2793	2710	2812
N ₃	1939	2667	2733	2711	2512
N ₄	2340	2859	1366	3010	2419
Mean	2406	2696	2183	2640	2481

C.D. for N marginal means=293.9 Kg/ha.

Crop :- Maize (*Kharij*).

Ref :- H.P. 65(181).

Site :- Agri. Res. Stn., (Chemistry Section)
Dhanla Kuan.

Type :- 'M'.

Object:—To study the effect of micronutrients on Maize crop.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) and (c) N.A. (ii) Sandy loam. (iii) N.A. (iv) and (v) N.A. (vi) Ganga—101. (vii) Irrigated. (viii) and (ix) N.A. (x) 18.10.65.

2. TREATMENTS :

8 micronutrients: M₀=Control, M₁=Copper Sul. at 5.6 Kg/ha., M₂=Copper Sul. at 11.2 Kg/ha. M₃=Zinc Sul. at 11.2 Kg/ha., M₄=Zinc Sul. at 16.8 Kg/ha. M₅=Manganese Sul. at 16.8 Kg/ha., M₆=Iron Sul. at 5.6 Kg/ha. and M₇=M₁+M₂+M₃+M₆.

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 9. (iv) (a) N.A. (b) 3.05m × 6.70m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1963—only. (b) No (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 3477 Kg/ha. (ii) 607.1 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆	M ₇
Av. yield	2471	2752	3731	3691	4360	3486	3446	4039

C.D.=892.9 Kg/ha.

Crop :- Maize (Kharif).**Ref :- H.P. 62(275), 63(267).****Site :- Crop Res. Stn., Haripura.****Type :- 'M'.**

Object :- To study the effect of N, P and K on the yield of Maize.

1. BASAL CONDITIONS :

(i) and (ii) N.A. (iii) 14.7,62 ; N.A. (iv) to (x) N.A.

2. TREATMENTS :5 manurial treatments : M_0 =Control, M_1 =75 Q/ha. of F.Y.M.+45 Kg/ha. of P_2O_5 +22.5 Kg/ha. of K_2O , M_2 = M_1 +90 Kg/ha. of N, M_3 = M_1 +180 Kg/ha. of N and M_4 = M_1 +270 Kg/ha. of N.**3. DESIGN:**

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 5.49m×3.05m ; 4.27m×2.44m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—63. (b) No. (c) Results of combined analysis are presented under 5-Results. (v) Bilaspur, Dhaura Kaun. (vi) Nil. (vii) Error variances are homogeneous and Treatments×years interaction is present.

5. RESULTS :**Pooled results**

(i) 2705 Kg/ha. (ii) 920.3 Kg/ha. (based on 4 d.f. made up of Treatments×years interaction). (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	M_0	M_1	M_2	M_3	M_4
Av. yield	2451	2269	2522	3318	2964

Individual results

Treatment	M_0	M_1	M_2	M_3	M_4	Sig.	G.M.	S.E./p/ot
Year								
1962	1323	1163	1392	1446	1628	N.S.	1390	380.4
1963	3580	3376	3652	5190	4301	*	4020	578.1
Pooled	2451	2269	2522	3318	2964	N.S.	2705	920.3

Crop :- Maize (Kharif).**Ref :- H.P. 62(273).****Site :- Sunder Nagar Farm, Maudi.****Type :- 'IM'.**

Object :- To study the effect of N, P and K on the yield of Maize.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :5 manurial treatments : M_0 =Control, M_1 =33.6 Kg/ha. of P_2O_5 +22.5 Kg/ha. of K_2O , M_2 = M_1 +45 Kg/ha. of K_2O , M_3 = M_1 +67 Kg/ha. of K_2O and M_4 = M_1 +90 Kg/ha. of N.**3. DESIGN :**

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 4.27m×2.44m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 5080 Kg/ha. (ii) 774.7 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of Maize in Kg/ha.

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄
Av. yield	4517	4661	5937	5262	5021

Crop :- Maize (Kharif).

Ref :- H.P. 60 and 61(SFT) for
Mahasu, Mandi,
Chamba and Kangra.

Site :- District : Mahasu, Mandi, Chamba and Kangra. Type :- 'M'.

Object :—Type As: To study the response of maize to levels of N, P and K applied individually and in combination.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (iii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments:

- O=Control (no manure),
- N=22.4 Kg/ha. of N,
- P=22.4 Kg/ha. of P₂O₅,
- K=22.4 Kg/ha. of K₂O,
- NP=22.4 Kg/ha. of N+22.4 Kg/ha. of P₂O₅,
- NK=22.4 Kg/ha. of N+22.4 Kg/ha. of K₂O,
- PK=22.4 Kg/ha. of P₂O₅+22.4 Kg/ha. of K₂O,
- NPK=22.4 Kg/ha. of N+22.4 Kg/ha. of P₂O₅+22.4 Kg/ha. of K₂O.

3. DESIGN :

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle/thana is changed once in two years within the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on Kharif cereal, 8 on a Rabi cereal, 8 on cash crop, 4 on oilseed crop and 3 on a leguminous crop. Half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. The three trials on legumes are of type C. Residual effects of phosphate application are studied on Type C trials in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village, (iii) (a) 1/98.8 ha. (b) 1/197.7 ha. (iv) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—61. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

Av. response in Kg/ha.

60(SFT)

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.								
			N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Mahasu	24	1160	260	150	120	41.0	-20	-20	50	60	37.0
Mandi	14	1610	350	200	110	71.0	-100	-30	90	130	67.0
Chamba	12	1450	220	50	-60	51.0	60	-60	60	10	37.0
Kangra	12	960	380	350	180	51.0	-50	-40	30	-20	23.0

61(SFT)

District	No of trials	Control yield in Kg/ha.	N	P	K	S.E.	NP	NK	NPK	NPK	S.E.
Mahasu	14	1540	310	330	120	5.0	-120	-20	-20	20	9.0
Mandi	7	1590	270	300	220	78.0	-70	0	10	210	41.0
Chamba	18	1840	240	190	90	40.0	50	0	20	20	15.0
Kangra	15	1070	70	470	340	97.0	70	40	0	30	47.0

Crop :- Maize (Kharif).

Ref :- H.P. 61(SFT) for Mahasu and Chamba.

Site :- District : Mahasu and Chamba.

Type :- 'M'.

Object :-Type B : To investigate the relative efficiency of different fertilizers of N at different doses.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (no manure,)

N₁=22.4 Kg/ha. of N as A/S,

N₂=44.8 Kg/ha. of N as A/S,

N₁'=22.4 Kg/ha. of N as A/S/N,

N₂'=44.8 Kg/ha. of N as A/S/N,

N₁"=22.4 Kg/ha. of N as C/A/N,

N₂"=44.8 Kg/ha. of N as C/A/N,

3. DESIGN :

Same as in type A conducted on Maize crop on page No. 237.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1961—only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			N ₁	N ₂	N ₁ '	N ₂ '	N ₁ "	N ₂ "	
Mahasu	16	1560	320	580	300	590	580	730	95.0
Chamba	18	1880	230	500	220	1120	260	990	116.0

Crop :- Maize (Kharif).

Ref :- H.P. 60(SFT), 61(SFT) for Kangra.

Site :- District : Kangra.

Type :- 'M'.

Object :-Type B : To investigate the relative efficiency of different fertilizers of N at different doses.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

7 manurial treatments:

O=Control (no manure)

 $N_1=22.4$ Kg/ha. of N as A/S, $N_2=44.8$ Kg/ha. of N as A/S, $N_1'=22.4$ Kg/ha. of N as urea, $N_2'=44.8$ Kg/ha. of N as urea, $N_1''=22.4$ Kg/ha. of N as A/S/N, $N_2''=44.8$ Kg/ha. of N as A/S/N,

3. DESIGN:

same as in type A Conducted on maize crop on page No. 237.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—61. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Av. response in Kg/ha.

60(SFT)

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			N_1	N_2	N_1'	N_2'	N_1''	N_2''	
Kangra	8	1500	420	840	370	700	390	830	57.0

61(SFT)

Kangra	16	1280	500	100	330	703	520	1130	57.0
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Crop :- Maize (Kharif).**Ref :- H.P. 61(SFT) for Mandi.****Site :- District : Mandi.****Type :- 'M'.**

Object :—Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Hilly tract. (iii) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (no manure),

 $N_1=22.4$ Kg/ha. of N as urea, $N_2=44.8$ Kg/ha. of N as urea, $N_1'=22.4$ Kg/ha. of N as A/S/N, $N_2'=44.8$ Kg/ha. of N as A/S/N, $N_1''=22.4$ Kg/ha. of N as C/A/N, $N_2''=44.8$ Kg/ha. of N as C/A/N,

3. DESIGN :

Same as in type A conducted on Maize crop on Page No. 237.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1961—only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

61(SFT)

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			N ₁	N ₂	N ₁ '	N ₂ '	N ₁ "	N ₂ "	
Kangra	4	1470	990	1120	870	990	940	1160	245.0

Crop :- Maize (*Kharif*).

Ref :- H.P. 62 to 65 (SFT) for Kangra.

Site :- (District) Kangra.

Type :- 'M'.

Object :- Type A₁: To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) Nil. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure)

N₁=60 Kg/ha. of N,N₂=120 Kg/ha. of N,P₁=35 Kg/ha. of P₂O₅,N₁P₁=60 Kg/ha. of N+35 Kg/ha. of P₂O₅,N₂P₁=120 Kg/ha. of N+35 Kg/ha. of P₂O₅,N₂P₂=120 Kg/ha. of N+70 Kg/ha. of P₂O₅ andN₁P₂K₁=120 Kg/ha. of N+70 Kg/ha. of P₂O₅+35 Kg/ha. of K₂O.

3. DESIGN :

(i) and (ii) A selected district is divided into four agriculturally homogenous zones based on climate, soil cropping pattern etc. In each zone one block is selected at random. A block normally consists of a group of 50-100 villages. In each block 36 experiments are conducted in a year of which 11 are of type A₁, 11 of type A₂, 11 of type A₃ and 3 are of type C. The eleven experiments under type A₁, A₂ and A₃ are distributed as 3 on Kharif cereal, 3 on Rabi cereal, 3 on cash crop and 2 on oil seed. All the three type-C experiments are conducted on a legume crop. For the purpose of conducting the A₁, A₂ and A₃ experiments 11 villages are randomly selected in each block and in each village 3 experiments one each of type A₁, A₂ and A₃ are laid out. For conducting the experiments three villages are randomly selected in each block. (iii) (a) 1/100 ha. (b) 1/200 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-66. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

62(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	774	1105	575	1080	1275	1752	1920	173.8

Control yield=1577 Kg/ha.; No. of trials=12

63(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	566	1020	278	979	1207	1503	1642	103.0

Control yield=1689 Kg/ha; No. of trials=13

64(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	360	708	105	668	366	1255	1420	97.1

Control yield=1781 Kg/ha. ; No. of trials=10

65(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	369	771	260	926	1094	1327	1357	175.9

Control yield=1296 Kg/ha. ; No. of trials=9

Crop :- Maize (Kharif).**Ref :- H.P. 62 to 65(SFT) for Kangra.****Site :- District : Kangra.****Type :- 'M'.**Object :—Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS:

8 manurial treatments i

O=Control (no manure)

N₁=60 Kg/ha. of N,P₁=35 Kg/ha. of P₂O₅,P₂=70 Kg/ha. of P₁O₅.N₁P₁=60 Kg/ha. of N+35 Kg/ha. of P₂O₅,N₁P₂=60 Kg/ha. of N+70 Kg/ha. of P₂O₅,N₂P₁=120 Kg/ha. of N+70 Kg/ha. of P₁O₅,N₂P₂K₂=120 Kg/ha. of N+70 Kg/ha. of P₂O₅+70 Kg/ha. of K₂O.

3. DESIGN :

Same as in type A₁ conducted under unirrigated conditions on Maize crop page No. 240.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—65. (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS :

62(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	484	320	421	705	789	1217	1362	73.2

Control yield=1453 Kg/ha. ; No. of trials=12

63(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	546	254	415	746	911	1187	1341	91.0

Control yield=1710 Kg/ha. ; No. of trials=14

64(SFT)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	586	299	591	798	1036	1492	1445	230.6

Control yield=1945 Kg/ha. ; No of trials=10

65(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	631	339	617	1012	1167	1506	1675	116.2

Control yield=1293 Kg/ha. ; No. of trials=11

Crop :- Maize (Kharif).

Ref :- H.P. 62 to 65(SFT) for Kangra.

Site :- District : Kangra.

Type :- 'M'.

Object :—Type A₃ : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

N₁=60 Kg/ha. of N,

K₁=35 Kg/ha. of K₂O,

K₂=70 Kg/ha. of K₂O,

N₁K₁=60 Kg/ha. of N+35 Kg/ha. of K₂O,

N₁K₂=60 Kg/ha. of N+70 Kg/ha. of K₂O,

N₂K₂=120 Kg/ha. of N+70 Kg/ha. of K₂O and

N₁P₁K₁=60 Kg/ha. of N+35 Kg/ha. of P₂O₅+35 Kg/ha. of K₂O.

3. DESIGN :

Same as in type A₁ conducted under unirrigated conditions on Maize crop on page No. 240.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—66. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

62(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	641	269	501	684	824	1209	1234	95.2

Control yield=1363 Kg/ha. ; No. of trials=12

63(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	649	86	295	616	813	1146	1187	88.0

Control yield=1778 Kg/ha. ; No. of trials=13

64(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	552	225	395	716	857	1289	1084	84.4

Control yield=1608 Kg/ha. ; No. of trials=10

65(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	434	288	409	775	957	1377	1194	187.9

Control yield=1424 Kg/ha. : No. of trials=11

Crop :- Maize (*Kharif*).

Ref :- H.P. 65(196).

Site :- Maize Breeding Stn., Bajama (Bhunta).

Type :- 'CV'.

Object :- To study a suitable date of planting and plant population for different varieties of Maize Crop.

1. BASAL CONDITIONS:

(i) (a) Nil. (b) and (c) N.A. (ii) Sandy loam. (iii) Mid June-65. (iv)(a) 2-3 ploughings. (b) Dibbling. (c) 18 Kg/ha. (d) Rows 76 cms apart (e) N.A. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) Oct., 65.

2. TREATMENTS:

Main-plot treatments:

5 dates of planting : D₁=Normal Planting date, D₂=10 days earlier than D₁, D₃=20 days earlier than D₁, D₄=20 days later than D₁ and D₅=20 days later than D₁.

Sub-plot treatments:

All combinations of (1) and (2)

(1) 2 varieties : V₁=cumports Hyline and V₂=Recommended Hyline.(2) 3 plant populations : P₁=30, P₂=60 and P₃=90 thousand plants/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 5 main-plots/replication, 6 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 28.80 Sq. N. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1965-67. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 436 Kg/ha. (ii) (a) 143.8 Kg/ha. (b) 63.1 Kg/ha. (iii) Main effect of D and P are highly significant. (iv) Av. yield of grain in Kg/ha.

	D ₁	D ₂	D ₃	D ₄	D ₅	V ₁	V ₂	Mean
P ₀	431	454	421	319	226	354	401	378
P ₁	483	525	462	429	360	462	442	452
P ₂	553	533	491	457	361	475	483	479
Mean	489	504	458	402	328	430	442	436
V ₁	488	496	466	390	312			
V ₂	490	511	450	414	344			

C.D. for D marginal means=127.9 Kg/ha.

C.D. for P marginal means= 39.8 Kg/ha.

Crop :- Maize (Kharif).**Ref :- H.P. 64(174).****Site :- Agri. Res. Stn., Dhaula Kuan.****Type :- 'CM'.**

Object :—To study the effect of levels of N and dates of sowing on the yield of Maize.

1. BASAL CONDITIONS :(i) (a) Nil. (b) Berseem. (c) N.A. (ii) Sandy loam. (iii) As per treatments. (iv) (a) 4 ploughings. (b) to (e) N.A. (v) 185 Q/ha. of F.Y.M. + 56 Kg/ha. of P_2O_5 + 44.8 Kg/ha. of K_2O . (vi) Ganga—101—hybrid. (vii) Unirrigated. (viii) 3 weedings. (ix) 18 cm. (x) October, 64.**2. TREATMENTS :****Main-plot treatments :**4 dates of sowing : $D_1=3.6.64$, $D_2=13.6.64$, $D_3=23.6.64$ and $D_4=3.7.64$.**Sub-plot treatments :**5 levels of N as C/A/N : $N_1=89.7$, $N_2=112$, $N_3=134.5$, $N_4=156.9$, $N_5=179.3$ Kg/ha.**3. DESIGN :**

(i) Split-plot. (ii) (a) 4 main-plots/replication ; 5 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) 10.98 m × 3.05m. (b) 10.06m × 1.83m. (v) 46 cm × 61 cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1964–65 (Modified) in—65. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :(i) 2550 Kg/ha. (ii) (a) 1198.7 Kg/ha. (b) 471.7 Kg/ha. (iii) Main effect of D is significant while interaction $N \times D$ is highly significant. (iv) Av. yield of grain in Kg/ha.

	N_1	N_2	N_3	N_4	N_5	Mean
D_1	3952	3536	3644	2995	2891	3404
D_2	1962	2444	2550	2434	3366	2551
D_3	2050	1688	2158	1950	2271	2007
D_4	2014	1977	2018	2360	2815	2237
Mean	2494	2391	2592	2435	2835	2550

C.D. for D marginal means = 857.4 Kg/ha.

C.D. for N means at the same level of D = 335.7 Kg/ha.

C.D. for D means at the same level of N = 1045.1 Kg/ha.

Crop :- Maize (Kharif).**Ref :- H.P. 65(178).****Site :- Crop Res. Stn., Dhaula Kuan.****Type :- 'CM'.**

Object :—To find out the optimum date of sowing and Nitrogen doses for Maize crop.

1. BASAL CONDITIONS :(i) (a) Wheat—Maize—Wheat. (b) Wheat. (c) 44.8 Kg/ha. of N + 22.4 Kg/ha. of C/A/N and Super respectively. (ii) Loam. (iii) As per treatments. (iv) (a) N.A. (b) Line sowing. (c) to (e) N.A. (v) 56 Kg/ha. of P_2O_5 + 44.8 Kg/ha. of K_2O as Mur. Pot. drilled at sowing. (vi) Hybrid maize—Ganga—101. (vii) Unirrigated. (viii) 2 weedings by hand *khurpies*. (ix) and (x) N.A.

2. TREATMENTS

Main-plot treatments :

4 dates of sowing : $D_1=10\text{th June}$, $D_2=17\text{th June}$, $D_3=24\text{th June}$, $D_4=1\text{st July}$.

Sub-plot treatments:

5 levels of N as C/A/N : $N_1=67.2$, $N_2=89.7$, $N_3=112.1$, $N_4=134.5$ and $N_5=156.9$ Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication ; 5 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) $10.97\text{m} \times 3.05\text{m}$. (b) $10.06\text{m} \times 1.83\text{m}$. (v) $46\text{ cm} \times 61\text{ cm}$. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) No of cobs and yield of grain. (iv) (a) 1964—65 (modified in 65). (b) No. (c) Nil. (v) N.A. (vi) Drought during milling stage.

5. RESULTS :

(i) 4879 Kg/ha. (ii) (a) 987.7 Kg/ha. (b) 592.4 Kg/ha. (iii) Main effects of D and N are highly significant. (iv) Av. yield of grain in Kg/ha.

	N_1	N_2	N_3	N_4	N_5	Mean
D_1	4897	5249	5826	6192	6417	5716
D_2	4561	5008	5696	5917	5980	5432
D_3	4291	4415	5044	5177	5391	4864
D_4	3045	3535	3766	3822	3360	3506
Mean	4198	4552	5083	5277	5287	4879

C.D. for D marginal means=706.5 Kg/ha.

C.D. for N marginal means=517.1 Kg/ha.

Crop :- Maize (Kharif).

Ref :- H.P. 60(186).

Site :- Agri. Res. Stn., Dhaulakuan.

Type :- 'M'.

Object :—To test efficacy of different seed dressings against germination and yield of Maize.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

11 Seed dressing treatments : T_0 =Control, T_1 =Agrosan G.N., T_2 =Copper carbonate, T_3 =Cereson, T_4 =Tillex, T_5 =Hexason, T_6 =Lunasan, T_7 =Shell agrosan, T_8 =Sulphur, T_9 =Thiram and T_{10} =P.C.N.B.

3. DESIGN :

(i) R.B.D. (ii) (a) 11. (b) N.A. (iii) 4. (iv) (a) N.A. (b) $3.05\text{m} \times 5.18\text{m}$. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 324 Kg/ha. (ii) 70.9 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀
Av. yield.	316	561	254	249	244	220	406	406	301	272	332

Crop :- Maize (Kharif).

Ref :- H.P. 61 (193).

Site :- Agri. Res. Stn., Dhaula Kuan.

Type :- 'D'.

Object :- To test the efficacy of different seed dressings on germination, stand and yield of Maize.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

13 seed dressing treatments : S₀—Control, S₁—Agrosan G.N., S₂—Cereson Dry, S₃—Tillex, S₄—Lunsan, S₅—Cereson wet, S₆—Hexosan, S₇—Shell seed Dresser 'B', S₈—Shell seed Dresser 101, S₉—Copper carbonate, S₁₀—Sulphur, S₁₁—P.C.N.B. and S₁₂—Thiram.

3. DESIGN :

(i) R.B.D. (ii) (a) 13. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 9.75m × 1.83m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of Maize. (iv) (a) 1961—only. (b) No. (c) Nil. (v) Solan. (vi) and (vii) Nil.

5. RESULTS :

(i) 738 Kg/ha. (ii) 188.9 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	S ₀	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉	S ₁₀	S ₁₁	S ₁₂
Av. yield	893	618	867	818	748	751	641	550	805	894	715	550	739

Crop :- Maize (Kharif).

Ref :- H.P. 61(186).

Site :- Crop Res. Stn., Solan.

Type :- 'D'.

Object :- To test the efficacy of different seed dressings on germination, stand and yield of Maize.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

Same as in expt. No. 61 (193) and presented above

3. DESIGN

(i) R.B.D. (ii) (a) 13. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 2.44m × 3.05m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1961—only. (b) No. (c) Nil. (v) Dhaula Kuan. (vi) and (vii) N.A.

5. RESULTS :

(i) 1993 Kg/ha. (ii) 403.1 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of Maize in Kg/ha.

Treatment	S ₀	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉	S ₁₀	S ₁₁	S ₁₂
Av. yield	1819	2582	1906	1969	1615	1969	2148	2097	1589	1855	2036	2201	2124

Crop :- Gram (Rabi).**Ref :- H.P. 63(194).****Site :- Agri. Res. Stn., Dhaula Kuan.****Type :- 'M'.****Object :-** To find optimum dose of P and K on the yield of Gram.**1. BASAL CONDITIONS :**

(i) (a) Nil. (b) Maize (Ganga-101). (c) 112 Kg/ha. of N+56 Kg/ha. of P_2O_5 +22.4 Kg/ha. of K_2O +123.6 Q/ha. of F.Y.M. (ii) Clay loam. (iii) 28.10.63. (iv) (a) 2 ploughings (b) N.A. (c) 61.8 Kg/ha. (d) 30 cm×30 cm. (e) N.A. (v) Nil. (vi) C-235. (vii) Unirrigated. (viii) 2 weedings. (ix) 16.9 cm. (x) 28.4.64.

2. TREATMENTS :

All the combinations of (1) and (2)

(1) 4 levels of P_2O_5 as super : $P_0=0$, $P_1=22.4$, $P_2=44.8$ and $P_3=67.2$ Kg/ha.(2) 2 levels of K_2O as Mur. Pot. : $K_0=0$ and $K_1=22.4$ Kg/ha.**3. DESIGN :**

(i) Fact in R.B.D. (ii) (a) 8. (b) N.A. (iii) 6. (iv) (a) 3.05m×1.83m. (b) 2.44m×1.22m. (v) 30 cm around. (vi) Yes.

4. GENERAL :

(i) Poor. (ii) Attacked by pests. Pash and Pod borer. (iii) Yield of grain. (iv) (a) 1963—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 500 Kg/ha. (ii) 218.7 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	P_0	P_1	P_2	P_3	Mean
K_0	532	509	581	427	512
K_1	498	493	525	434	488
Mean	515	501	533	4.0	500

Crop :- Pea (Rabi).**Ref :- H.P. 62(232).****Site :- Agri. Res. Stn., Dhaula Kuan.****Type :- 'C'.****Object :-** To study the effect of different dates of sowing on the yield of Pea.**1. BASAL CONDITIONS :**

(i) (a) Turnip—Sunn Pemp—Pea. (b) Sunn hemp. (c) G.M. (ii) Sandy. (iii) As per treatments. (iv) (a) Ploughing and planking. (b) and (c) N.A. (d) 61 cm×15 cm. (e) N.A. (v) 280 Kg of F.Y.M. 10 days before sowing. (vi) T-14. (vii) Irrigated. (viii) 8 weedings and 2 hoeings. (ix) 15 cm. (x) April, 63.

2. TREATMENTS :

7 dates of sowing : $D_1=24.9.62$, $D_2=9.10.62$, $D_3=24.10.62$, $D_4=8.11.62$, $D_5=23.11.62$, $D_6=8.12.62$ and $D_7=23.12.62$.

3. DESIGN :

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3.05m×1.83m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Poor. (ii) Rabbits. (iii) Yield of pea. (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 14.64 Kg/ha. (ii) 22.38 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of pea in Kg/ha.

Treatment	D ₁	D ₂	D ₃	D ₄	D ₅	D ₆	D ₇
Av. yield	21.61	19.24	14.13	33.86	5.25	3.45	4.93

Crop :- Pea (Kharif).

Ref :- H.P. 61(182).

Site :- Crop Res. Stn., Solan.

Type :- 'D'.

Object :- To control powdery mildew of Pea by different chemicals and to study their effects on yield.

1. BASAL CONDITIONS:

(i) to (x) N.A.

2. TREATMENTS:

13 chemical treatments: T₀=Control, T₁=Kirti copper W×PV 50, T₂=Fytolan, T₃=Blitox, T₄=Karathane W.D., T₅=Weitable sulphur, T₆=8-Dust; T₇=Flit-406, T₈=Solban, T₉=Thiote, T₁₀=Elosal, T₁₁=Sultaf and T₁₂=Line sulphur. Other details N.A.

3. DESIGN:

(i) R.B.D. (ii) (a) 13. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 3.05×1.37m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of pea. (iv) (a) 1961—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 108.1 Q/ha. (ii) 8.53 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of pea in Q/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂
Av. yield	92.4	91.7	109.4	125.4	108.5	93.8	107.3	107.1	121.1	120.0	108.9	110.5	109.8

Crop :- Pea.

Ref :- H.P. 61(187).

Site :- Crop Res. Stn., Solan.

Type :- 'D'.

Object : To study the efficacy of different seed-dressings on the control of *Ascochyta* of Pea.

1. BASAL CONDITIONS:

(i) to (x) N.A.

2. TREATMENTS:

13 seed-dressing treatments: T₀=Control (Diseased seeds), T₁=Healthy seeds, T₂=Thiram, T₃=P.C.N.B., T₄=Flit-406, T₅=Cereson Dry, T₆=Cereson Wet, T₇=Copper carbonate, T₈=Sulphur, T₉=Agrosan G.N. T₁₀=Shell 'B', T₁₁=Tillex, T₁₂=Hexasan. No other details are available.

3. DESIGN:

(i) R.B.D. (ii) (a) 13. (b) N.A. (iii) 2. (iv) (a) 3.66m×0.61m. (b) N.A. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield and % Infection of pea. (iv) (a) 1961—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 158.1 Q/ha. (ii) 22.36 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of pea in Q/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂
Av. yield	130.9	99.1	84.5	113.1	82.6	84.6	84.6	99.8	103.5	140.0	115.0	117.0	106.0

Crop :- Bhindi.

Ref :- H.P. 60(70).

Site :- Vegetable Res. Stn., Bhagot.

Type :- 'M'.

Object :- To study the effect of N, P and K on the yield of Bhindi.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loamy. (iii) 29.2.60. (iv) to (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) 4.6.60 to 5.7.60.

2. TREATMENTS :

All combinations of (1), (2) and (3) + one control (no manure)

(1) 2 levels of N : N₁=33.6 and N₂=56.0 Kg/ha.

(2) 2 levels of P₂O₅ : P₁=53.8 and P₂=71.7 Kg/ha.

(3) 2 levels of K₂O : K₁=28.0 and K₂=39.2 Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3.05m × 1.22m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Satisfactory. (ii) N.A. (iii) Yield of bhindi. (iv) (a) 1960—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 978 Kg/ha. (ii) 708.9 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of bhindi in Kg/ha.

Control=1294

	N ₁	N ₂	K ₁	K ₂	Mean
P ₁	1078	882	951	1010	980
P ₂	833	961	970	823	897
Mean	956	922	961	916	939
K ₁	1157	765			
K ₂	755	1078			

Crop :- Bhindi.

Ref :- H.P. 62(135).

Site :- Vegetable Res. Stn., Bhagot.

Type :- 'C'.

Object :- To study the effect of mulching (with black polythene) on the yield of Bhindi.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loamy. (iii) 16.4.62. (iv) (a) to (c) N.A. (d) 61 cm × 46 cm. (e) 1. (v) N.A. (vi) Vermar Improved. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 6.6.62 to 12.8.62.

2. TREATMENTS :

2 mulching treatments : M_0 = Control (No mulching) and M_1 = Mulching with black polythene.

3. DESIGN :

(i) R.B.D. (ii) (a) 2. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 2.44m × 3.66m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of bhindi. (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 82.0 Q/ha. (ii) 14.2 Q/ha. (iii) Treatment difference is not significant. (iv) Av. yield of bhindi in Q/ha.

Treatment	M_0	M_1
Av. yield	73.7	90.3

Crop :- Brinjal.

Ref :- H.P. 60(68).

Site :- Vegetable Res. Stn., Bhagot.

Type :- 'M'.

Object :- To study the effect of N, P and K on the yield of Brinjal.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loamy. (iii) 23.4.60. (iv) (a) N.A. (b) Transplanting. (c) and (d) N.A. (e) 1. (v) N.A. (vi) Black beauty. (vii) Irrigated. (viii) and (ix) N.A. (x) 15.6.60 to 6.8.60.

2. TREATMENTS :

All combinations of (1), (2) and (3) + one control (no manure)

- (1) 2 levels of N : $N_1=56$ and $N_2=84$ Kg/ha.
 (2) 2 levels of P_2O_5 as super : $P_1=56$ and $P_2=84$ Kg/ha.
 (3) 2 levels of K_2O : $K_1=28$ and $K_2=44.8$ Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 9. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 3.05m × 1.22m. (v) Normal. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of brinjal. (iv) (a) 1960—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 149.1 Q/ha. (ii) 53.6 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of brinjal in Q/ha.

Control = 202.3

	P_1	P_2	K_1	K_2	Mean
N_1	136.7	181.1	156.8	161.0	158.9
N_2	121.0	131.0	110.0	141.9	126.0
Mean	128.9	156.0	133.4	151.5	142.5
K_1	135.4	131.5			
K_2	122.3	180.6			

Crop :- Potato (Kharif).**Ref :- H.P. 60(42).****Site :- Potato Develop. Stn., Ahla.****Type :- 'M'.**

Object:—To study the effect of N, P and K applied individually and in combination on the yield of Potato.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy clay loam. (iii) 26.4.60. (iv) (a) 4 ploughings with *deshi* Plough, 4 *Suhagas*. (b) Flat sowing. (c) 85 Kg/ha. (d) Row to row 61 cm, Tuber to tuber 30 cm. (e) 1. (v) 138 Q/ha. of F.Y.M. (vi) D.R.R. (vii) Unirrigated. (viii) 2 weedings, 2 hoeings and 2 earthings up. (ix) N.A. (x) 6/7.10.60.

2. TREATMENTS :

All combinations of (1), (2) and (3)

(1) 3 Levels of N as A/S: $N_0=0$, $N_1=84$ and $N_2=168$ Kg/ha.(2) 3 Levels of P_2O_5 as Super: $P_0=0$, $P_1=84$ and $P_2=168$ Kg/ha.(3) 3 Levels of K_2O as Pot. Sul: $K_0=0$, $K_1=84$ and $K_2=168$ Kg/ha.**3. DESIGN :**

(i) Fact. in R.B.D. (ii) (a) 27. (b) N.A. (iii) 3. (iv) (a) N.A. (b) $4.57\text{ m} \times 1.83\text{ m}$. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Good germination. (ii) N.A. (iii) Yield of potato. (iv) (a) 1960—Only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 83.4 Q/ha. (ii) 45.4 Q/ha. (iii) Main effects of N and P are significant. (iv) Av. yield of tuber in Q/ha.

	N_0	N_1	N_2	P_0	P_1	P_2	Mean
K_0	130.4	95.5	57.1	81.7	100.6	100.6	94.3
K_1	81.1	91.6	66.1	68.1	89.3	81.3	79.6
K_2	83.8	71.5	73.9	46.4	93.8	89.0	76.4
Mean	98.4	86.2	65.7	65.4	94.6	90.3	83.4
P_0	81.9	67.7	46.6				
P_1	105.5	101.3	77.0				
P_2	107.8	89.6	73.6				

C.D. for N or P marginal means = 24.8 Q/ha.

Crop :- Potato (Kharif).**Ref :- H.P. 60(43).****Site :- Potato Develop. Stn., Ahla.****Type :- 'MP'.**

Object:—To study the efficacy of G.N.C. as manure in comparison to F.Y.M. on the yield of Potato.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy clay loam. (iii) 25.4.60. (iv) (a) 4 ploughings with *deshi* plough and 4 *Suhagas*. (b) Flat sowing. (c) N.A. (d) Row to row 61 cm and tuber to tuber 30 cm. (e) 1.(v) and (vi) N.A. (vii) Unirrigated. (viii) 2 weedings, 2 hoeings, and 2 earthings. (ix) N.A. (x) 7.10.60.

2. TREATMENTS :

All combinations of (1) and (2)+a control (no manure)

(1) 2 levels of N : $N_1=112$ and $N_2=224$ Kg/ha.(2) 3 sources of N : $S_1=F.Y.M.$, $S_2=G.N.C.$ and $S_3=F.Y.M.+G.N.C.$ in 1 : 1 on N basis.**3. DESIGN :**(i) Fact. in R.B.D. (ii) (a) 7. (b) N.A. (iii) 4. (iv) (a) N.A. (b) $3.05\text{ m} \times 3.35\text{ m}$. (v) N.A. (vi) Yes.**4. GENERAL :**

(i) Normal. (ii) N.A. (iii) Yield of potato. (iv) (a) 1960—Only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 88.2 Q/ha. (ii) 38.3 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of tuber in Q/ha.

Control=98.1

	S_1	S_2	S_3	Mean
N_1	92.3	82.2	71.2	83.9
N_2	112.4	77.7	77.5	89.2
Mean	102.4	83.0	74.4	86.6

Crop :- Potato (Kharif).**Ref :- H.P. 63(68).****Site :- Potato Develop Stn., Ahla.****Type :- 'M'.**

Object :—To study the effect of different fertilizers in combination with Zinc on the yield of Potato crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy clay loam. (iii) 30.4 63. (iv) to (vi) N.A. (vii) Irrigated. (viii) 2 Weedings, 2 hoeings and 2 earthings up. (ix) and (x) N.A.

2. TREATMENTS :

All combinations of (1) and (2)+one Control

(1) 2 levels of fertilizer : $F_1=112$ Kg/ha. of N+84 Kg/ha. of P_2O_5 and $F_2=112$ Kg/ha. of N+84 Kg/ha. of P_2O_5 +56 Kg/ha. of K_2O .(2) 2 doses of Zinc : $Z_0=0$ and $Z_1=0.34$ Kg/ha.**3. DESIGN :**(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) $3.66\text{ m} \times 3.05\text{ m}$. (b) $2.44\text{ m} \times 2.44\text{ m}$. (v) $61\text{ cm} \times 30\text{ cm}$. (vi) Yes.**4. GENERAL :**

(i) Normal. (ii) N.A. (iii) Yield of potato. (iv) (a) 1963—Only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 163.2 Q/ha. (ii) 24.75 Q/ha. (iii) Main effect of F and control vs. others are significant. (iv) Av. yield of tuber in Q/ha.

Control=138.8

	Z_0	Z_1	Mean
F_1	138.8	170.3	154.6
F_2	187.1	180.8	184.0
Mean	163.0	175.6	169.3

C.D. for control vs. Others=30.15 Q/ha.

C.D. for F marginal means=26.97 Q/ha.

Crop :- Potato (Kharif)**Ref :- H.P. 64(55)****Site :- Potato Develop. Stn., Ahla.****Type :- 'M'.****Object :-**To compare the efficiency of F.Y.M. with G.N.C. as a manure to Potato crop.**1. BASAL CONDITIONS:**(i) (a) to (c) N.A. (ii) Sandy clay loam. (iii) 18.4.64. (iv) (a) 4 ploughings, 4 *suhagas*. (b) Flatsowing. (c) N.A. (d) 53 cm × 23 cm. (e) 1. (v) 112 Kg/ha. of N as C/A/N, 84 Kg/ha. of P₂O₅ as S/Pand 112 Kg/ha. of K₂O as Pot. Sul. (vi) C.D. (vii) Unirrigated. (viii) 2 weedings, 2 hoeings and 2 earthings (ix) N.A. (x) 14.10.64.**2. TREATMENTS :**

All combinations of (1) and (2) + one control (no manure)

(1) 2 sources of N : S₁=G.N.C., S₂=F.Y.M.(2) 2 levels of N : N₁=33.6, N₂=67.2 Kg/ha.

N broadcasted in the field before planting.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) 3.20m × 3.20m. (b) 2.74m × 2.13m. (v) 23 cm × 53 cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of potato. (iv) (a) N.A. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 241.4 Q/ha. (ii) 72.9 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of tuber in Q/ha.

Control=231.5.

	N ₁	N ₂	Mean
S ₁	233.6	259.7	246.6
S ₂	271.7	210.6	241.2
Mean	252.6	235.2	243.9

Crop :- Potato (Kharif).**Ref :- H.P. 60(185).****Site :- Potato Develop. Stn., Bagposhag.****Type :- 'M'.****Object :-**To find out the effect of N as A/S and C/A/N with and without P on the yield of Potato crop.**1. BASAL CONDITIONS :**

(i) (a) to (c) N.A. (ii) N.A. (iii) 3.4.60. (iv) (a) 4 ploughings. (b) Furrow sowing. (c) 53 cm × 30 cm. (d) and (e) N.A. (v) to (vii) N.A. (viii) 2 earthings up. (ix) N.A. (x) 13 and 14th Sep., 60.

2. TREATMENTS :

All combinations of (1), (2) and (3) + 2 extra treatments.

(1) 2 sources of N : S₁=A/S and S₂=C/A/N,(2) 2 levels of N : N₁=56 and N₂=112 Kg/ha. of N.(3) 2 levels of P₂O₅ as super : P₀=0 and P₁=112 Kg/ha.Extra treatments : C₀=Control and C₁=112 Kg/ha. of P₂O₅ as super.**3. DESIGN :**

(i) Fact. in R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3.05 m × 2.67 m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of potato. (iv) (a) 1960—Only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 78.7 Q/ha. (ii) 28.8 Q/ha. (iii) Main effect of P and interaction N×P are significant. (iv) Av. yield of tuber in Q/ha.

$C_0=58.8$ and $C_1=84.7$

	N ₁	N ₂	P ₀	P ₁	Mean
S ₁	78.1	81.7	61.1	98.7	79.9
S ₂	79.9	81.9	61.3	100.5	80.9
Mean	79.0	81.8	61.2	99.6	80.4
P ₀	57.8	64.6			
P ₁	100.2	99.0			

C.D. for P marginal means=21.5 Q/ha.

C.D. for the body of N×P table=30.4 Q/ha.

Crop :- Potato (Kharif)

**Site :- Potato Develop. Stn., Bagposhag.
(Dist. Sinnur).**

Ref :- H.P. 63(259).

Type :- 'M'.

Object:—To find out a suitable fertilizer schedule for the important variety of Potato.

1. BASAL CONDITIONS:

(i) to (iv) N.A. (v) F.Y.M. at 24.5 Q/ha. (vi) Upto date. (vii) to (x) N.A.

2. TREATMENTS:

All combinations of (1), (2) and (3)

(1) 3 levels of N as C/A/N : N₀=0, N₁=56 and N₂=112 Kg/ha.

(2) 3 levels of P₂O₅ as super : P₀=0, P₁=56 and P₂=112 Kg/ha.

(3) 3 levels of K₂O as Pot. Sul. : K₀=0, K₁=56 and K₂=112 Kg/ha.

3. DESIGN:

(i) 3rd Conf'd. (ii) (a) 3 blocks/replication and 9 plots/block. (b) N.A. (iii) 1. (iv) (a) 2.74m×3.05m.
(b) N.A. (v) N.A. (vi) Yes.

4. GENERAL:

(i) to (iii) N.A. (iv) (a) 1963—Only. (b) No. (c) Nil. (v) and (vi) Nil. (vii) As net plot size is not available, the yield is calculated by taking gross plot size as net plot size.

5. RESULTS:

(i) 31.2 Q/ha. (ii) 16.6 Q/ha. (iii) None of the effects is significant. (iv) Av. yield. of tuber in Q/ha.

	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
N ₀	30.1	31.1	32.7	27.1	41.5	28.3	32.3
N ₁	39.5	24.3	18.7	33.1	19.1	30.3	27.5
N ₂	34.3	31.9	35.1	36.3	30.3	34.7	33.8
Mean	35.0	29.1	28.8	32.2	30.3	31.1	31.2
K ₀	43.0	26.3	27.1				
K ₁	31.5	32.7	26.7				
K ₂	32.3	28.3	32.7				

Crop :- Potato (Kharif).**Ref :- H.P. 61(199).****Site :- Potato Develop. Stn., Jhatingri.****Type :- 'M'.****Object :-**To find out the suitability of manuring the Potato with oil cake against F.Y.M.**1. BASAL CONDITIONS :**(i) and (ii) N.A. (iii) 4.4.61. (iv) (a) to (e) N.A. (v) 112 Kg/ha. of K_2O as Pot. Sul. (vi) Up-to-date. (vii) to (ix) N.A. (x) 24/25 Sept., 61.**2. TREATMENTS:****Main-plot treatments:** F_0 =Control, F_1 =F.Y.M. at 56 Kg/ha. of N and F_2 =Oil cake at 56 Kg/ha. of N.**Sub-Plot treatments :**

All combinations of (1) and (2)

(1) $N_0=0$ and $N_1=112$ Kg/ha.(2) $P_0=0$ and $P_1=112$ Kg/ha.**3. DESIGN :**(i) Split-plot. (ii) (a) 2 main-plots/replication, 4 sub-plots/main-plot. (b) N.A. (iii) 5. (iv)(a) 3'66m \times 3'05m. (b) 2'44m \times 2'44 m. (v) 61 cm \times 30'5m. (vi) Yes.**4. GENERAL :**

(i) and (ii) N.A. (iii) Yield of potato. (iv) (a) 1961—Only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :(i) 110.0 Q/ha. (ii) (a) 94.7 Q/ha. (b) 27.0 Q/ha. (iii) Main effect of N, P and Interaction $N \times P$ are highly significant. (iv) Av. yield of tuber in Q/ha.

	N_0	N_1	P_0	P_1	Mean
F_0	82.0	140.6	74.4	148.2	111.3
F_1	88.7	105.2	63.8	130.0	97.0
F_2	163.5	140.2	96.0	147.7	121.9
Mean	91.4	128.7	78.1	142.0	110.0
P_0	71.8	84.4			
P_1	111.0	173.0			

C.D. for N or P marginal means = 14.1 Q/ha.

C.D. for the body of $N \times P$ table = 20.0 Q/ha.**Crop :- Potato (Kharif).****Ref :- H.P. 61(201).****Site :- Potato Develop. Stn., Kamrah.****Type :- 'M'.****Object :-**To find out the efficiency of Groundnut cake as organic manure vs. F.Y.M. on the yield of Potato crop.**1. BASAL CONDITIONS:**(i) (a) Potato—Wheat—Potato. (b) and (c) N.A. (ii) N.A. (iii) 23.4.61. (iv) (a) to (c) N.A. (d) 61 cm \times 30.5 cm. (e) N.A. (v) 112 Kg/ha. of K_2O as Pot. Sul. (vi) Up-to-date. (vii) to (ix) N.A. (x) 11/12.10.61.

2. TREATMENTS :**Main-plot treatments :**

3 Organic manures : M_0 =No organic manure (control), M_1 =Groundnut cake at 56 Kg/ha. of N, M_2 =F.Y.M. at 56 Kg/ha. of N.

Sub-plot treatments :

All combinations of (1) and (2)

(1) 2 levels of N : $N_0=0$, $N_1=112$ Kg/ha.

(2) 2 levels of P_2O_5 : $P_0=0$, $P_1=112$ Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication and 4 sub-plots/main-plot. (b) N.A. (iii) 6. (iv) (a) N.A. (b) $3.66m \times 3.05m$. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of potato. (iv) (a) 1961—Only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 57.2 Q/ha. (ii) (a) 18.4 Q/ha. (b) 18.3 Q/ha. (iii) Main effect of M, interaction $M \times N$ and $M \times P$ are highly significant and that of interaction $N \times P$ is significant. (iv) Av. yield of tuber in Q/ha.

	N_0	N_1	P_0	P_1	Mean
M_0	55.8	32.1	60.2	27.7	44.0
M_1	66.7	59.2	57.9	68.0	62.9
M_2	52.8	76.8	66.3	63.3	64.8
Mean	58.4	56.1	61.5	53.0	57.2
P_0	58.0	65.0			
P_1	58.9	47.1			

C.D. for M marginal means = 11.8 Q/ha.

C.D. for the body of $N \times P$ table = 12.3 Q/ha.

C.D. for M means at the same level of N or P = 11.8 Q/ha.

C.D. for N or P means at the same level of M = 16.6 Q/ha.

Crop :- Potato (Kharif).

Ref :- H.P. 60(193).

Site :- Potato Develop. Stn., Phula Dhar.

Type :- 'M'.

Object :- To determine optimum requirement of N, P and K for Potato crop.

1. BASAL CONDITIONS :

(i) and (ii) N.A. (iii) 16.4.60. (iv) (a) to (e) N.A. (v) 18 Q/ha. of F.Y.M. (vi) Craigs defiance. (vii) to (ix) N.A. (x) 27/28.10.60.

2. TREATMENTS :

All combinations of (1), (2) and (3)

(1) 3 levels of N as A/S : $N_0=0$, $N_1=84.1$ and $N_2=168.2$ Kg/ha.

(2) 3 levels of P_2O_5 as super : $P_0=0$, $P_1=84.1$ and $P_2=168.2$ Kg/ha.

(3) 3 levels of K_2O : $K_0=0$, $K_1=84.1$ and $K_2=168.2$ Kg/ha.

3. DESIGN :

(i) 3^3 Conf'd. (ii) (a) 9 plots/block ; 3 blocks/replication. (b) N.A. (iii) 3. (iv) (a) N.A. (b) $4.88m \times 3.35m$. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of potato. (iv) (a) 1960—only. (b) No. (c) Nil. (v) to (vii) As Layout plan is not received by Res. Stn. Hence experiment is analysed as fact in R.B.D.

5. RESULTS :

(i) 43.6 Q/ha. (ii) 18.7 Q/ha. (iii) Main effect of N and P are highly significant. (iv) Av. yield of tuber in Q/ha.

	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
N ₀	25.8	37.0	39.3	30.3	31.4	40.4	34.0
N ₁	33.4	43.5	56.5	51.0	44.1	37.5	44.5
N ₂	36.0	58.3	61.6	42.0	57.1	57.4	52.2
Mean	32.0	46.2	52.5	41.4	44.2	45.1	43.6
K ₀	35.6	42.4	46.2				
K ₁	26.2	48.9	57.5				
K ₂	34.2	47.5	53.7				

C.D. for N or P marginal means = 10.2 Q/ha.

Crop :- Potato (*Kharif*).

Ref :- H.P. 60(194).

Site :- Potato Develop. Stn., Phula-Dhar.

Type :- 'M'.

Object :- To compare different doses of N with F.Y.M. and G.N.C.

1. BASAL CONDITIONS:

(i) and (ii) N.A. (iii) 24.4.60. (iv) (a) to (e) N.A. (v) Nil. (vi) Craigs Defiance. (vii) to (ix) N.A. (x) 29.10.60.

2. TREATMENTS:

All combinations of (1) and (2) + one control

(1) 3 sources of N: S₁=F.Y.M., S₂=C. cake and S₃=F.Y.M.+C. Cake.

(2) 2 levels of N: N₁=112 and N₂=224 Kg/ha.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 7. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 4.88m x 3.35m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of potato. (iv) (a) 1960—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 34.5 Q/ha. (ii) 16.1 Q/ha. (iii) Main effect of N and control Vs. others are highly significant. (iv) Av. yield of tuber in Q/ha.

Control = 14.3

	N ₁	N ₂	Mean
S ₁	22.3	34.6	28.4
S ₂	31.6	49.9	40.8
S ₃	30.8	58.3	44.6
Mean	28.2	47.6	37.9

C.D. for N marginal means = 13.8 Q/ha.

C.D. for Control Vs. others = 18.3 Q/ha.

Crop :- Potato.

Ref :- H.P. 60 (SFT) Mahasu, Mandi and 61(SFT) for Mahasu, Mandi and Kangra.

Site :- District : Mahasu, Mandi and Kangra. Type :- 'M'.

Object :- Type A : To study the response of Potato to levels of N, P and K applied individually and in combination.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Hilly. (iii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

N=56 Kg/ha. of N,

P=28 Kg/ha. of P_2O_5 ,

K=56 Kg/ha. of K_2O ,

NP=56 Kg/ha. of N+28 Kg/ha. of P_2O_5 ,

NK=56 Kg/ha. of N+56 Kg/ha. of K_2O ,

PK=28 Kg/ha. of P_2O_5 +56 Kg/ha. of K_2O and

NPK=56 Kg/ha. of N+28 Kg/ha. of P_2O_5 +56 Kg/ha. of K_2O .

3. DESIGN:

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle/thana is changed once in two years within the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on *Kharif* cereal, 8 on a *Rabi* cereal, 8 on cash crop, 4 on an oilseed crop and 3 on a leguminous crop. Half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. The three trials on legumes are of type C. Residual effects of phosphate application are studied on type C trials in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98.8 ha. (b) 1/197.7 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) to (c) N.A. (v) to (vii) N.A.

5. RESULTS :

		Av. response in Kg/ha.										
60(SFT)		No. of trials	Control yield in Kg/ha.	N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Mahasu	4											
Mandi	5	10290	460	1370	820	572.0	-860	500	-930	200	542.0	
61(SFT)		No. of trials	Control yield in Kg/ha.	N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Mahasu	6											
Mandi	8	7670	1970	1170	280	256.0	930	260	1600	1060	455.0	
Kangra	14	11380	6170	2780	2480	682.0	-430	-330	980	1440	496.0	

Crop :- Potato.

Ref :- H.P. 60 and 61(SFT) for Mandi.

Site :- District : Mandi.

Type :- 'M'.

Object :- Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O—Control (no manure)
 N_1 —56 Kg/ha. of N as A/S,
 N_2 —112 Kg/ha. of N as A/S,
 N_1' —56 Kg/ha. of N as A/S/N,
 N_2' —112 Kg/ha. of N as A/S/N,
 N_1'' —56 Kg/ha. of N as C/A/N,
 N_2'' —112 Kg/ha. of N as C/A/N,

3. DESIGN :

Same as in type A conducted on Potato crop on page No. 258.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) 1960—61. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

60(SFT)

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			N_1	N_2	N_1'	N_2'	N_1''	N_2''	
Mandi	5	11920	-960	-590	-850	920	-1140	520	450.0

61(SFT)

Mandi	8	4630	170	3120	860	2840	1660	4270	376.0
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Crop :- Potato.**Ref : H.P. 61(SFT) for Kangra.****Site :- District : Kangra.****Type : 'M'.**

Object :—Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O—Control (no manure),
 N_1 —56 Kg/ha. of N as A/S,
 N_2 —112 Kg/ha. of N as A/S,
 N_1' —56 Kg/ha. of N as Urea,
 N_2' —112 Kg/ha. of N as Urea,
 N_1'' —56 Kg/ha. of N as C/A/N,
 N_2'' —112 Kg/ha. of N as C/A/N,

3. DESIGN :

Same as in type A conducted on Potato crop on page No. 258.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) 1960—Only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			N_1	N_2	N_1'	N_2'	N_1''	N_2''	
Kangra	10	11670	4140	8680	2890	6460	3960	8150	784.0

Crop :- Potato (Rabi).

**Ref :- H.P. 62, 63 and
65(SFT) for Kangra**

Site :- District : Kangra

Type :- 'M'.

Object :—Type A₁ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS:

8 manurial treatments :

O=Control (no manure),

N₁=60 Kg/ha. of N,

N₂=120 Kg/ha. of N,

P₁=35 Kg/ha. of P₂O₅,

N₁P₁=60 Kg/ha. of N+35 Kg/ha. of P₂O₅,

N₂P₁=120 Kg/ha. of N+35 Kg/ha. of P₂O₅,

N₂P₂=120 Kg/ha. of N+70 Kg/ha. of P₂O₅ and

N₂P₂K₁=120 Kg/ha. of N+70 Kg/ha. of P₂O₅+60 Kg/ha. of K₂O.

3. DESIGN:

(i) and (ii) A selected district is divided into four agriculturally homogeneous zones based on climate, soil, cropping pattern etc. In each zone one block is selected at random. A block normally consists of a group of 50–100 villages. In each block 36 experiments are conducted in a year of which 11 are of type A₁, 11 of type A₂ and 11 of type A₃ and 3 are of type C. The eleven experiments under type A₁, A₂, A₃ are distributed as 3 on a Kharif cereal, 3 on a Rabi cereal, 3 on a cash crop and 2 on oil seed. All the three type—C experiments are conducted on a legume crop. For the purpose of conducting the A₁, A₂ and A₃ experiments, 11 villages are randomly selected in each block and in each village 3 experiments one each of type A₁, A₂ and A₃ are laid out. For conducting the three villages are randomly selected in each block. (iii) (a) 1/100 ha. (b) 1/200 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of Potato. (iv) (a) 1962–66 (64 N.A.) (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

Av. response in Kg/ha.

62(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	3847	7824	1717	4732	7690	9074	10413	2287.5

Control yield=12145 Kg/ha. ; No. of trials=8

63(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	4491	8310	1667	7244	10990	11547	14129	813.0

Control yield=11304 Kg/ha. ; No. of trials=7

65(SFT)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	2287	3106	1400	1445	5182	7031	8351	906.5

Control yield=5718 Kg/ha. ; No. of trials=9

Crop :- Potato (Kharif).
Site :- District : Kangra.

Ref :- H.P. 63(SFT) for Kangra.
Type :- 'M'.

Object :- Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS

8 manurial treatments:

- O=Control (no manure),
- N₁=90 Kg/ha. of N,
- P₁=35 Kg/ha. of P₂O₅,
- P₂=70 Kg/ha. of P₂O₅,
- N₁P₁=90 Kg/ha. of N+35 Kg/ha. of P₂O₅,
- N₁P₂=90 Kg/ha. of N+70 Kg/ha. of P₂O₅,
- N₂P₁=180 Kg/ha. of N+70 Kg/ha. of P₂O₅ and
- N₁P₂K₂=180 Kg/ha. of N+70 Kg/ha. of P₂O₅+70 Kg/ha. of K₂O.

3. DESIGN :

Same as in type A₁ conducted under irrigated conditions on Potato crop on page No. 260.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of Potato. (iv) (a) 1963—Only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

43(SFT)	Av. response in Kg/ha.							S.E.	
	Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂		N ₁ P ₂ K ₂
Av. response of yield in Kg/ha.		2517	1812	2958	5152	6773	8098	8842	754.0

Control yield=11761 Kg/ha. ; No. of trials=3

Crop :- Potato (Summer).
Site :- District : Kangra

Ref :- H.P. 62(SFT) for Kangra
Type :- 'M'.

Object :- Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

- O=Control (no manure),
- N₁=60 Kg/ha. of N,
- P₁=35 Kg/ha. of P₂O₅,
- P₂=70 Kg/ha. of P₂O₅,
- N₁P₁=60 Kg/ha. of N+35 Kg/ha. of P₂O₅,
- N₁P₂=60 Kg/ha. of N+70 Kg/ha. of P₂O₅,
- N₂P₁=120 Kg/ha. of N+70 Kg/ha. of P₂O₅ and
- N₂P₂K₂=120 Kg/ha. of N+70 Kg/ha. of P₂O₅+120 Kg/ha. of K₂O.

3. DESIGN :

Same as in type A₁ conducted under irrigated conditions on Potato crop on page No. 260.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) 1962—Only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

62(SFT)	Av. response in Kg/ha.							S.E.
	Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	
Av. response of yield in Kg/ha.	5913	2053	4576	7989	10138	11609	13042	1013.3

Control yield=12434 Kg/ha. ; No. of trials=8

Crop :- Potato (Rabi).

Ref :- H.P. 63 and 65(SFT).

Site :- District : Kangra.

Type :- 'M'.

Object :—Type A₂: To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

Treatments are same as in type A₂ conducted under irrigated conditions on Potato crop in summer on page No. 261.

3. DESIGN :

Same as in type A₁ conducted under irrigated conditions on Potato crop on page No. 260.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) 1963 to 66 (64 N.A.) (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

63(SFT)	Av. response in Kg/ha.							S.E.
	Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	
Av. response of yield in Kg/ha.	5946	2100	3739	7289	8413	11136	11980	631.0

Control yield=14101 Kg/ha. ; No. of trials=7

65(SFT)

65(SFT)	Av. response in Kg/ha.							S.E.
	Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	
Av. response of yield in Kg/ha.	2897	2445	3531	5454	6808	8974	6964	984.6

Control yield=6464 Kg/ha. ; No. of trials=8

Crop :- Potato (Rabi).

Ref :- H.P. 62(SFT) for Kangra.

Site :- District : Kangra.

Type :- 'M'.

Object :—Type A₂: To study the response curves of important cereal, cash and oilseed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

N₁=60 Kg/ha. of N,K₁=60 Kg/ha. of K₂O,K₂=120 Kg/ha. of K₂O,N₁K₁=60 Kg/ha. of N+60 Kg/ha. of K₂O,N₁K₂=60 Kg/ha. of N+120 Kg/ha. of K₂O,N₂K₂=120 Kg/ha. of N+120 Kg/ha. of K₂O andN₁P₁K₁=60 Kg/ha. of N+35 Kg/ha. of P₂O₅+60 Kg/ha. of K₂O.

3. DESIGN :

Same as in type A₁ conducted under irrigated conditions on Potato crop on page No. 260.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) 1962—only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Av. response in Kg/ha.

62(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	6088	2997	4863	8933	9991	14447	13113	840.2

Control yield=12145 Kg/ha. ; No. of trials=7

Crop :- Potato (*Kharif*).

Ref :- H.P. 63(SFT) for Kangra.

Site :- District : Kangra.

Type :- 'M'.

Object :—Type A₁ : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

Treatments are same as in type A₃ conducted under irrigated conditions on potato crop in summer on page No- 262.

3. DESIGN :

Same as in type A₁ conducted on Potato crop on page No. 260.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) 1963—Only. (b) and (c) N.A. (v) to (vi) N.A.

5. RESULTS :

Av. response in Kg/ha.

63(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	2747	474	1251	4401	5159	6642	8131	711.0

Control yield=10542 Kg/ha. ; No. of trials=3

Crop :- Potato (Kharif).**Ref:- H.P. 63, 65(SFT) for Kangra.****Site :- District : Kangra****Type :- 'M'.**

Object :—Type A₂: To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

N₁=90 Kg/ha. of N,K₁=60 Kg/ha. of K₂O,K₂=120 Kg/ha. of K₂O,N₁K₁=90 Kg/ha. of N+60 Kg/ha. of K₂O,N₁K₂=90 Kg/ha. of N+120 Kg/ha. of K₂O,N₂K₂=180 Kg/ha. of N+120 Kg/ha. of K₂O andN₁P₁K₁=90 Kg/ha. of N+35 Kg/ha. of P₂O₅+60 Kg/ha. of K₂O,**3. DESIGN :**Same as in type A₁ conducted on Potato crop on page No. 260.**4. GENERAL :**

(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) 1962—66 (1962 and 64 N.A.), (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

Av. response in Kg/ha.

63(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	5589	2513	3303	8080	9357	14405	12058	949.0

Control yield=8927 Kg/ha. ; No. of trials=6

65(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	3622	1980	2642	4216	5611	7247	5881	1107.3

Control yield=7052 Kg/ha. ; No. of trials=9

Crop :- Potato (Kharif).**Ref :- H.P. 61(198).****Site :- Potato Develop. Stn., Jhatangiri
Joginder Nagar.****Type : 'MV'.**

Object ;—To study the effect of different levels of N, P and K on the yield of different varieties of Potato crop.

1. BASAL CONDITIONS :

(i) and (ii) N.A. (iii) 3.4.61. (iv) (a) to (c) N.A. (d) 61 cm × 23 cm. (v) 18 Q/ha. of F.Y.M. (vi) 2000 kg/ha. (vii) to (ix) N.A. (x) 22/23.9.61.

2. TREATMENTS:

All combinations of (1), (2), (3) and (4)

(1) 3 varieties : V₁=up-to-date, V₂=Craigs defiance and V₃=local.(2) 3 levels of N as A/S : N₀=0, P₁=84.1 and N₂=168.2 Kg/ha.(3) 3 levels of P₂O₅ as Super : P₀=0, P₁=84.1 and P₂=168.2 Kg/ha.(4) 3 levels of K₂O as Pot. Sul. : K₀=0, K₁=84.1 and K₂=168.2 Kg/ha.

3. DESIGN

(i) 3⁴ confounding. (ii) (a) 9 plots/block and 9 blocks/replication. (b) N.A. (iii) 1. (iv) (a) N.A. (b) 2.44m × 2.44m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of Potato. (iv) (a) 1961—Only. (b) No. (c) Nil. (v) Kharadhar. (vi) and (vii) Nil.

5. RESULTS:

(i) 127.8 Q/ha. (ii) 51.7 Q/ha. (iii) Main effect of V alone is highly significant. (iv) Av. yield of tuber in Q/ha.

	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	V ₁	V ₂	V ₃	Mean
N ₀	116.8	102.6	117.8	115.4	110.2	111.5	56.1	148.3	132.8	112.4
N ₁	121.0	160.2	144.8	140.6	129.5	155.8	74.6	172.0	179.3	142.0
N ₂	123.1	128.1	135.5	154.4	117.2	115.1	95.1	163.3	128.3	128.9
Mean	120.3	130.3	132.7	136.8	119.0	127.5	75.3	161.2	146.8	127.8
V ₁	57.5	84.0	84.3	70.7	78.1	77.0				
V ₂	162.7	170.5	150.5	193.0	124.7	165.9				
V ₃	140.8	136.4	163.3	146.7	154.2	139.6				
K ₀	123.4	145.2	141.7							
K ₁	137.0	108.9	111.0							
K ₂	100.4	136.7	145.3							

C.D. for V marginal means = 29.4 Q/ha.

Crop : Potato (Kharif)

Ref : H.P. 61(191)

Site :-Potato Develop. Stn., Kharadhar

Type : 'MV'

Object : To study the effect of different fertilizers on the yield of different varieties of Potato crop.

1. BASAL CONDITIONS:

(i) and (ii) N.A. (iii) 9,4,61. (iv) to (x) N.A.

2. TREATMENTS:

All combinations of (1), (2), (3) and (4)

- (1) 3 varieties : V₁=up to date, V₂=Kufri Kundam and V₃=Local.
- (2) 3 levels of N as A/S : N₀=0, N₁=84.1 and N₂=168.2 Kg/ha.
- (3) 3 levels of P₂O₅ as Super : P₀=0, P₁=84.1 and P₂=168.2 Kg/ha.
- (4) 3 levels of K₂O as Potash : K₀=0, K₁=84.1 and K₂=168.2 Kg/ha.

3. DESIGN:

(i) 3⁴ confounded. (ii) 9 blocks/replication and 9 plots/block. (b) N.A. (iii) 1. (iv) (a) N.A. (b) 2.44m × 2.44m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of Potato. (iv) (a) 1961—Only. (b) No. (c) Nil. (v) Joginder Nagar. (vi) and (vii) Nil.

5. RESULTS:

(i) 66.6 Q/ha. (ii) 26.05 Q/ha. (iii) Main effect of V is highly significant while interaction V x N is significant. (iv) Av. yield of tuber in Q/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
V ₁	113.0	88.0	113.3	105.5	101.7	107.1	103.5	85.7	125.1	104.8
V ₂	55.0	67.5	38.6	44.5	63.9	52.7	62.0	47.4	51.8	53.7
V ₃	39.0	51.6	33.5	39.7	46.5	37.9	48.6	37.0	38.5	41.4
Mean	69.0	69.1	61.8	63.2	70.7	65.9	71.3	56.7	71.8	66.6
K ₀	68.6	75.0	70.4	67.0	73.8	73.2				
K ₁	64.4	61.0	44.7	51.0	62.6	56.5				
K ₂	74.0	71.1	70.4	71.8	75.7	68.0				
P ₀	54.4	58.7	76.6							
P ₁	76.1	78.6	57.4							
P ₂	76.3	69.8	51.5							

C.D. for V marginal means=14.33 Q/ha.

C.D. for the body of V x N table=24.82 Q/ha.

Crop :- Potato (Rabi).

Ref :- H.P. 64(56).

Site : Potato Develop. Stn., Ahla.

Type : 'C'.

Object :- To find out the suitable depth and method of planting of Potato.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy clay loam. (iii) 21.4.64. (iv) (a) 4 Ploughings and 4 *Suhagas*. (b) As per treatments. (c) and (d) N.A. (e) One. (v) 112 Kg/ha. of N+84 Kg/ha. of P₂O₅+112 Kg/ha. of K₂O. (vi) C.D. (vii) un-irrigated. (viii) 2 weedings, 2 hoeings and 2 earthing up. (ix) N.A. (x) 24.10.64.

2. TREATMENTS:

All combinations of (1), (2) and (3)

(1) 2 depths of planting:—D₁=8 and D₂=15 cm deep.

(2) 2 methods of planting: M₁=flat and M₂=ridge.

(3) No of rows of planting: R₁=Single and R₂=double row planting.

3. DESIGN:

(i) Fact in R.B.D. (ii) (a) 8. (b) N.A. (iii) 3. (iv) (a) 3.66m x 3.05m. (b) 1.83m x 2.44m. (v) 91 cm x 30 cm. (vi) Yes.

4. GENERAL

(i) Normal. (ii) N.A. (iii) Yield of potato. (iv) (a) 1964—Only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 176.4 Q/ha. (ii) 81.2 Q/ha. (iii) None of the effects is significant. (iv) Table of Mean and differential response in Q/ha.

	Mean response	Differential response					
		D		M		R	
		Absent	Present	Absent	Present	Absent	Present
D	-0.6	—	—	50.8	-52.0	13.4	-14.6
M	23.4	74.7	-28.0	—	—	-32.1	78.9
R	-17.8	-3.7	-31.8	-73.2	37.7	—	—

Crop :- Potato.

Ref :- H.P. 61(192), 62 (271).

Site :- Potato Develop. Str., Baghpashog.

Type :- 'C'.

Object :- To find out the best sowing time for up-to-date variety of Potato seed.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) N.A. (iii) As per treatments. (iv) (a) 4 ploughings. (b) Furrow sowing. (c) N.A. (d) 53cm. x 30cm. (e) — (v) 30.5 Q/ha of A/S and 61 Q/ha of Super. (vi) Up-to-date. (vii) N.A. (viii) 2 earthings up. (ix) N.A. (x) 10 to 13th Sept., 61 ; 5.9.62.

2. TREATMENTS :

5 dates of sowing : D₁—28th March, D₂—5th April, D₃—13th April, D₄—21st April and D₅—29th April.

3. DESIGN :

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 5, 4. (iv) (a) N.A. (b) 3.66m. x 3.05m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) N.A. (ii) Nil. (iii) Yield of tuber. (iv) (a) 1961 — 62. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) and (vi) Nil. (vii) Error variances are homogeneous and Treatments x Years interaction is absent.

5. RESULTS:

Pooled results

(i) 132.5 Q/ha. (ii) 54.5 Q/ha (based on 32 d.f. made up of Pooled error and Treatments x Years interaction). (iii) Treatment differences are highly significant. (iv) Av. yield of tuber in Q/ha.

Treatment	D ₁	D ₂	D ₃	D ₄	D ₅
Av. yield	195.8	152.8	170.6	85.5	57.8

C.D.—56.7 Q/ha.

Individual results

Treatment	D ₁	D ₂	D ₃	D ₄	D ₅	Sig.	G.M.	S.E./plot
Year								
1961	171.9	161.9	182.0	112.5	41.0	**	133.9	50.5
1962	225.8	141.5	156.3	51.8	78.9	*	130.9	43.0
Pooled	195.8	152.8	170.6	85.5	57.8	**	132.5	54.5

Crop :- Potato.**Ref. :- H.P. 63(260).****Site :- Potato Develop. Stn., Baghpashog.****Type :- 'C'.****Object :-**To find out best cultivation practices in Baghpashog conditions for Potato crop.**1. BASAL CONDITIONS:**(i) to (iii) N.A. (iv) (a) N.A. (b) As per treatments. (c) N.A. (d) As per treatments. (e) N.A. (v) 56Kg/ha of N+90 Kg/ha of P_2O_5 +112 Kg/ha of K_2O +24.5 Q/ha of F.Y.M. (vi) to (ix) N.A. (x) As per treatments.**2. TREATMENTS:**

All combinations of (1), (2) and (3)

(1) 3 methods of sowing:— M_1 =Flat sowing, M_2 =Flat sowing-cum-ridging and M_3 =ridge sowing followed by 18.3 Q/ha of mulch.(2) 3 spacings:— S_1 =30cm.×30cm. S_2 =45cm.×45cm. and S_3 =61cm.×61cm.(3) 3 harvesting dates:— D_1 =31st August, D_2 =15th November and D_3 =30th November.**3. DESIGN:**(i) 3^3 confounded (MSD² confounded). (ii) (a) 9 plots/block and 3 blocks/replication. (b) N.A. (iii) 1. (iv) (a) 3.05m.×2.74m. (b) N.A. (v) N.A. (vi) Yes.**4. GENERAL:**

(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) 1963—only. (b) No (c) Nil. (v) to (vii) N.A.

5. RESULTS:(i) 34.0 Q/ha (ii) 12.1 Q/ha (iii) Main effect of M and interaction $S \times D$ are significant. (iv) Av. yield of tuber in Q/ha.

	S_1	S_2	S_3	D_1	D_2	D_3	Mean
M_1	62.6	33.9	25.1	37.1	54.2	30.3	40.5
M_2	41.1	29.9	48.6	31.9	54.6	33.1	39.9
M_3	21.5	22.3	20.7	23.5	21.9	19.1	21.5
Mean	41.7	28.7	31.5	30.8	43.6	27.5	34.0
D_1	23.5	35.5	33.5				
D_2	66.2	22.3	42.2				
D_3	35.5	28.3	18.7				

C.D. for M marginal means=14.0 Q/ha

C.D. for the body of $S \times D$ table=24.2 Q/ha**Crop :- Potato.****Ref :- H.P. 61(188).****Site :- Potato Develop. Stn., Kheradhar****Type :- 'C'.****Object :-**To study the effect of different methods of planting.**1. BASAL CONDITIONS:**

(i) and (ii) N.A. (iii) 11.4.61. (iv) and (v) N.A. (vi) Up-to-date. (vii) to (x) N.A.

2 TREATMENTS :

All combinations of (1), (2) and (3)

- (1) 2 times of planting: T₁=Early and T₂=Late planting.
- (2) 2 depths of planting: D₁=Shallow planting and D₂=Deep planting.
- (3) 2 methods of planting: M₁=Flat and M₂=Ridge planting.

3. DESIGN :

(i) 2³ Fact. in R.B.D. (ii) (a) 8. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 2.44m. x 2.44m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) 1961—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 200.2 Q/ha. (ii) 54.3 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of tuber in Q/ha.

	D ₁	D ₂	M ₁	M ₂	Mean
T ₁	191.9	192.9	221.7	163.1	192.4
T ₂	202.9	213.0	274.4	191.4	207.9
Mean	197.4	203.0	223.0	177.3	200.2
M ₁	209.6	236.5			
M ₂	185.2	169.4			

Crop :- Potato (Kharif).

Ref :- H.P. 61(189)

Site :- Potato Develop. Stn., Kheradhar.

Type :- 'C'.

Object :- To find the effective date of harvesting Potato crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) N.A. (iii) 11.4.61. (iv) and (v) N.A. (vi) Up-to-date. (vii) to (ix) N.A. (x) As per treatments.

2. TREATMENTS :

8 harvesting dates :- H₁=10.11.61, H₂=17.7.61, H₃=24.7.61, H₄=31.7.61, H₅=7.8.61, H₆=14.8.61, H₇=21.8.61 and H₈=28.8.61.

3. DESIGN:

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 2. (iv) (a) N.A. (b) 2.44 m. x 2.44 m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) 1961-62 (modified in 62). (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 244.2 Q/ha. (ii) 55.6 Q/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of tuber in Q/ha.

Treatment	H ₁	H ₂	H ₃	H ₄	H ₅	H ₆	H ₇	H ₈
Av. yield	117.7	282.5	172.6	149.1	141.2	431.6	337.4	321.7

C.D. = 131.5 Q/ha.

Crop :- Potato (Kharif).**Ref :- H.P. 62(264).****Site :- Potato Develop. Stn., Kheradhar.****Type :- 'C'.****Object :—**To find the effective date of harvesting Potato crop.**1. BASAL CONDITIONS:**(i) to (iv) N.A. (v) 112 Kg/ha of N+84 kg/ha of P_2O_5 +84 kg/ha of K_2O . (vi) Up-to-date. (vii) to (ix) N.A. (x) As per treatments.**2. TREATMENTS:**12 harvesting dates :— $H_1=24.7.62$, $H_2=1.8.62$, $H_3=8.8.62$, $H_4=15.8.62$, $H_5=22.8.62$, $H_6=29.8.62$, $H_7=5.7.62$, $H_8=12.9.62$, $H_9=19.9.62$, $H_{10}=26.9.62$, $H_{11}=3.10.62$ and $H_{12}=10.10.62$.**3. DESIGN:**

(i) R.B.D. (ii) (a) 12. (b) N.A. (iii) 2. (iv) (a) 3.66m. × 2.44m. (b) 2.44m × 2.44m. (v) 61 cm. (vi) Yes.

4. GENERAL :(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) 1961-62 (modified in 1962). (b) No. (c) Nil. (v) and (vi) N.A. (vii) Yields for treatments H_9 to H_{12} are not available.**5. RESULTS :**

(i) 246.0 Q/ha. (ii) 24.6 Q/ha. (iii) Treatment differences are significant. (iv) Av. yield of tuber in Q/ha.

Treatment	H_1	H_2	H_3	H_4	H_5	H_6	H_7	H_8
Av. yield	227.0	201.8	185.0	210.2	252.3	361.6	243.9	285.9

C.D.=58.2 Q/ha.

Crop :- Potato (Kharif).**Ref :- H.P. 62(265).****Site :- Potato Develop. Stn., Kheradhar.****Type :- 'C'.****Object :—**To study the effect of seasons, times, depths and methods of planting on the yield of Potato crop.**1. BASAL CONDITIONS :**(i) and (ii) N.A. (iii) As per treatments. (iv) (a) N.A. (b) As per treatments. (c) to (e) N.A. (v) 112 Kg/ha. of N+84 Kg/ha. of P_2O_5 +112 Kg/ha. of K_2O . (vi) Up-to-date. (vii) to (x) N.A.**2. TREATMENTS :**

All combinations of (1), (2), (3) and (4)

- (1) 2 seasons of planting : S_1 —Spring and S_2 —Monsoon.
- (2) 2 times of planting : T_1 —Early and T_2 —Late.
- (3) 2 depths of planting : D_1 —Shallow and D_2 —Deep.
- (4) 2 methods of planting : M_1 —Flat and M_2 —Ridge.

3. DESIGN :

(i) 2³ confounding. (ii) (a) 2 blocks/replication and 4 plots/block. (iii) 3. (iv) (a) and (b) 4.18 m. x 3.05m. (v) Nil. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) 1962-only. (b) Nil. (c) No. (v) and (vi) N.A. (vii) As the planting was not done in spring season, hence the results are given for monsoon only with 2³ fact. in R.B.D. design.

5. RESULTS :

(i) 89.0 Q/ha. (ii) 28.2 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of tuber in Q/ha.

	D ₁	D ₂	M ₁	M ₂	Mean
T ₁	91.9	118.2	102.4	107.8	105.1
T ₂	79.1	66.5	56.5	89.1	72.8
Mean	85.5	92.4	79.4	98.4	89.0
M ₁	85.7	73.3			
M ₂	85.4	111.5			

Crop :- Potato.

Ref :- H.P. 62(262).

Site :- Potato Develop. Stn., Shilaroo.

Type :- 'C'.

Object :- To find the optimum date of sowing for Potato crop.

1. BASAL CONDITIONS :

(i) and (ii) N.A. (iii) As per treatments. (iv) to (x) N.A.

2. TREATMENTS :

4 dates of sowing : D₁=10.10.62, D₂=30.10.62, D₃=9.11.62 & D₄=20.11.62.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 2.44m. x 2.44m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) 1962-63 (modified in 63). (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 24.8 Q/ha. (ii) 18.6 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of tuber in Q/ha.

Treatment	D ₁	D ₂	D ₃	D ₄
Av. yield	29.3	22.2	25.3	22.6

Crop :- Potato (Kharif).

Ref :- H.P. 63(257).

Site :- Potato Develop. Stn., Shilaroo.

Type :- 'C'.

Object :-To find out the effective dated of planting on Potato crop.

1. BASAL CONDITIONS:

(i) to (x) N.A.

2. TREATMENTS:

5 dates of sowing : $D_1=13.4.63$, $D_2=21.4.63$, $D_3=29.4.63$, $D_4=7.5.63$ and $D_5=16.5.63$.

3. DESIGN:

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) 3'66m. \times 2'44m. (b) 2'44m. \times 2'44m. (v) 61cm. row to row. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) 1962-63 (Modified in 63). (b) and (c) -. (v) to (vii) N.A.

5. RESULTS:

(i) 57.7 Q/ha. (ii) 16.6 Q/ha. (iii) Treatment differences are significant. (iv) Av. yield of tuber in Q/ha.

Treatment	D_1	D_2	D_3	D_4	D_5
Av. yield	64.1	81.9	55.0	50.7	36.5

C.D. = 25.6 Q/ha.

Crop :- Potato.

Ref :- H.P. 60(184).

Site :- Potato Develop. Stn., Baghpashog.

Type :- 'CM'.

Object :-To find out the best method of preserving soil moisture to grow Potato crop.

1. BASAL CONDITIONS :

(i) to (iii) N.A. (iv) (a) 4 ploughings. (b) to (e) N.A. (v) 30.6 Q/ha. of F.Y.M + 3 Q/ha of A/S + 6 Q/ha of Super. (vi) Up-to-date. (vii) N.A. (viii) 2 earthings up. (ix) N.A. (x) 14 to 17th Sept., 60.

2. TREATMENTS:

Main-plot treatments: 2 land preparation treatments: B_0 = No breaking and B_1 = Breaking up of land to a depth of 22.5 to 30.5cm deep.

Sub-plot treatments : 4 mulching treatments: M_0 = Control, M_1 = Composit-mulch, M_2 = Dry leaves of Chil and Bam mulch 812, and M_3 = Polythelene cloth.

3. DESIGN :

(i) Split-plot. (ii) (a) 2 main-plots/replication, 4 sub-plots/main-plot. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 3.05m \times 2.67m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) 1960-only. (b) No. (c) Nil, (v) to (vii) Nil.

5. RESULTS :

(i) 50.6 Q/ha. (ii) (a) 10.0 Q/ha. (b) 16.2 Q/ha. (iii) Main effect of M alone is significant. (iv) Av. yield of tuber in Q/ha.

	M ₀	M ₁	M ₂	M ₃	Mean
B ₀	38.3	66.2	62.6	40.2	51.8
B ₁	30.6	68.2	63.8	34.7	49.3
Mean	34.4	67.2	63.2	37.4	50.6

C.D. for M marginal means=20.4 Q/ha.

Crop :- Potato

Ref : H.P. 62(270).

Site :- Potato Develop. Stn., Baghpashog.

Type :- 'CM'.

Object :- To find the effect of different methods of planting and manuring on the yield of Potato crop.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

Main-plot treatments :-

3 methods of planting : M₁=Flat planting, M₂=Raised bed with 1.23m. breadth and M₃=Raised bed with 2.46m. breadth.

Sub-Plot treatments :-

6 applications of organic manure at 30.6 Q/ha of compost+12.2 Q/ha of mulch :- A₀=Control, A₁=mixing of compost with soil & preparation, A₂=Localised application of compost after planting, A₃=Application of compost at preparation & mulch after planting, A₄=Application of compost at preparation & mulch at earthing up and A₅=Application of compost at preparation + mulching in mid August.

3. DESIGN :

(i) Split-plot (ii) (a) 3 main-plots/replication and 6 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A (b) 2.74m. x 3.05m. (v) N.A. (vi) Yes.

4. GENERAL

(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) 1962-only. (b) and (c) — (v) to (vii) Nil.

5. RESULTS :

(i) 106.1 Q/ha. (ii) (a) 51.7 Q/ha. (b) 32.8 Q/ha. (iii) Main effect of M alone is significant. (iv) Av. yield of tuber in Q/ha.

	A ₀	A ₁	A ₂	A ₃	A ₄	A ₅	Mean
M ₁	125.3	145.0	153.4	128.9	122.9	136.6	135.3
M ₂	75.6	87.3	74.2	78.3	96.3	94.2	84.3
M ₃	94.8	120.2	90.6	75.6	101.1	110.0	98.7
Mean	98.6	117.5	106.0	94.3	106.7	113.6	106.1

C.D. for M marginal means=36.5 Q/ha.

Crop :- Potato.**Ref :- H.P. 60(183).****Site :- Potato Develop. Stn., Baghpashog.****Type :- 'C'.**

Object :—To study the efficacy of different fungicides against late blight on Potato crop.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :10 Chemical treatments :—C₀=Control, C₁=Blue Copper, C₂=Fungimar, C₃=Blitox-1, C₄=Bord Mixture, C₅=Flit-406, C₆=Kirti Copper W×P50, C₇=Dithane D-14, C₈=Shell Copper and C₉=Fytelan.

Doses or concentrations are N.A.

3. DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3.05m.×2.74m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) N.A. (ii) Late blight attack. (iii) Yield of tuber. (iv) (a) 1960-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 61.8 Q/ha. (ii) 25.3 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of tuber in Q/ha.

Treatment	C ₀	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉
Av. yield	34.9	85.4	70.4	72.5	68.4	65.6	63.8	63.1	53.7	40.4

Crop :- Potato (Kharif).**Ref :- H.P. 61(196).****Site :- Potato Develop. Stn., Baghpashog.****Type :- 'D'.**

Object :—To study the effect of different chemicals on the yield of Potato .

1. BASAL CONDITIONS :

(i) to (x) N. A.

2. TREATMENTS :11 Chemicals :—C₀=Control, C₁=P.C.N.B., C₂=P.C.N.B. (½ Plantings+Cuelting), C₃=Cheshnut Compound, C₄=Copper sul., C₅=Copper sul. & Biruc acid, C₆=Cuproxol, C₇=Aratan, C₈=Aldrin, C₉=Aldrin+F.Y.M. and C₁₀=F.Y.M.**3. DESIGN :**

(i) R.B.D. (ii) (a) 11. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3.05 m.×2.74 m. (v) N.A. (vi) Yes

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) 1961-only. (b) No. (c) Nil. (v) to (vii) Nil

5. RESULTS:

(i) 30.6 Q/ha. (ii) 18.7 Q/ha. (iii) Treatment differences are not significant (iv) Av. yield of tuber in Q/ha

Treatment	C ₀	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉	C ₁₀
Av. yield	19.4	28.8	24.9	23.1	31.6	25.6	24.2	31.0	26.4	50.5	51.5

Crop :- Potato

Ref :- H.P. 61(197)

Site :- Potato Develop. Stn., Baghpashog.

Type :- 'D'.

Object—To test the relative efficiency of different chemicals to control early Blight of Potato.

1. BASAL CONDITIONS:

(i) to (x) N.A.

2. TREATMENTS:

16 chemical treatments :—C₀=Control, C₁=Cuproxol, C₂=Copesan, C₃=Shell Copper, C₄=Vitigram, C₅=Kirti Copper, W×P 50-1, C₆=Blitox, C₇=Fytelan, C₈=Blue Copper, C₉=Cuprancer, C₁₀=Bardeans mixture 4 : 4 : 50, C₁₁=Kirti Copper W×P.50-2, C₁₂=Fungimar, C₁₃=Dithane M-22, C₁₄=Dithane Z-78 and C₁₅=Flit-406.

3. DESIGN:

(i) R.B.D. (ii) (a) 16. (b) N.A. (iii) 3. (iv) (a) and (b) 3.05m.×2.74m. (v) Nil. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) 1961-only. (b) No. (c) Nil (v) Shillaroo. (vi) and (vii) Nil.

5. RESULTS:

(i) 27.3 Q/ha. (ii) 12.2 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of tuber in Q/ha.

Treatment	C ₀	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉	C ₁₀	C ₁₁	C ₁₂	C ₁₃	C ₁₄	C ₁₅
Av. yield	22.3	27.4	27.6	30.4	18.3	21.6	26.9	26.5	22.3	20.4	30.0	37.6	24.6	21.6	43.2	36.7

Crop :- Potato (Kharif)

Ref :- H.P. 61(200)

Site :- Potato Develop. Stn., Jhatingri.

Type :- 'D'.

Object—To assess the utility of Pre-emergence application of Amine and Sodium salts, form of 2,4-D acetic acid, in the presence and absence of weeding on weed growth of Potato crop.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) N.A. (iii) 9.4.61 (iv) (a) to (e) N.A. (v) N.P.K. mixture at 112 kg/ha as A/S, 84.5 kg/ha of P₂O₅ and 112 kg/ha of K₂O (vi) UP—to—date. (vii) to (ix) N.A. (x) 27.11.61.

2. TREATMENTS :

10. weedicial treatments :—

W₀=No weeding & no application, W₁=No weeding+Amine of 2,4-D at 0.57 Kg. acid equivalent seven days after sowing, W₂=seven days after sowing, W₃=No weeding+Sodium salt of 2,4-D—7 days after sowing, W₄=No weeding+Sodium salt of 2,4-D—14 days after sowing, W₅=Weeding+no application, W₆=Weeding+2,4-D amine salt—7 days after sowing, W₇=Weeding+2,4-D amine salt—14 sowing, W₈=Weeding+Sodium salt of 2,4-D—7 days after sowing and W₉=Weeding+Sodium salt of 2,4-D—14 days after sowing.

3. DESIGN :

(i) R.B.D. (ii) (a) 10 (b) N.A. (iii) 4. (iv) (a) 3.66m. × 3.05m. (b) 2.44m. × 2.44m. (v) 61 cm. × 30.5 cm. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) 1961—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 172.8 Q/ha. (ii) 44.5 Q/ha. (iii) Treatment differences are significant. (iv) Av. yield of tuber in Q/ha.

Treatment	W ₀	W ₁	W ₂	W ₃	W ₄	W ₅	W ₆	W ₇	W ₈	W ₉
Av. yield	135.1	131.2	145.2	170.2	141.7	165.0	182.2	239.3	201.1	217.0

C.D=64.6 Q/ha.

Crop :- Potato.

Ref :- H.P. 60(199).

Site :- Potato Develop. Stn., Shillaroo.

Type :- 'D'.

Object:—To Compare the efficacy of different chemicals to control Blight disease of Potato crop.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

18 Chemicals :—C₀=Control, C₁=Blue Copper, C₂=Kirti Copper W × P. 50-1, C₃=Dithane M 20, C₄=Blitox, C₅=Cuprosol, C₆=Coppesan, C₇=Cupraman, C₈=Fungimar, C₉=Shell Copper, C₁₀=Fytelan, C₁₁=Dithane Z-78, C₁₂=Vitigram, C₁₃=Ziram, C₁₄=Kirti Copper W × P-50-2, C₁₅=Bordeaux mixture, C₁₆=Flit-406. and C₁₇=Dithane D-14.

Note:—Concentrations and Method of application N.A.

3. DESIGN :

(i) R.B.D. (ii) (a) 18. (b) 4. (iii) 4. (iv) (a) N.A. (b) 3.66m. × 2.74m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield and early blight and late blight incidence. (iv) (a) 1960—only. (b) No. (c) Nil. (v) to (vi) N.A.

5. RESULTS :

(i) 122.1 Q/ha. (ii) 35.0 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of tuber in Q/ha.

Treatment	C ₀	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈
Av. yield	73.5	128.2	116.2	99.4	137.2	175.6	165.7	110.7	103.5
	C ₉	C ₁₀	C ₁₁	C ₁₂	C ₁₃	C ₁₄	C ₁₅	C ₁₆	C ₁₇
	146.5	125.0	99.4	121.8	89.8	142.8	104.4	139.6	115.7

Early Blight :

(i) 13.6 degrees. (ii) 2.7 degrees. (iii) Treatment differences are highly significant (iv) Mean angle in degree.

Treatment	C ₀	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉	C ₁₀
Mean angle	24.2	10.6	10.7	11.3	11.3	11.7	11.5	13.5	13.0	13.4	13.7
Transformed back %	16.9	3.4	3.5	3.8	3.9	4.1	4.0	5.4	5.1	5.4	5.6
Treatment	C ₁₁	C ₁₂	C ₁₃	C ₁₄	C ₁₅	C ₁₆	C ₁₇				
Mean angle	13.7	13.8	13.5	13.9	14.0	14.6	15.4				
Transformed back %	5.6	5.7	5.5	5.7	5.8	6.3	7.0				

C.D.—4.1 degrees

Late Blight

(i) 10.9 degrees. (ii) 2.0 degrees. (iii) Treatment differences are highly significant. (iv) Mean angle in degree.

Treatment	C ₀	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉	C ₁₀
Mean angle	16.0	9.6	11.6	10.9	9.9	9.9	9.5	10.6	9.6	11.0	12.1
Transformed back %	7.6	2.8	4.0	3.6	2.9	2.9	2.7	3.4	2.8	3.7	4.4
Treatment	C ₁₁	C ₁₂	C ₁₃	C ₁₄	C ₁₅	C ₁₆	C ₁₇				
Mean angle	12.2	10.0	12.5	9.0	10.8	10.6	11.0				
Transformed back %	4.5	3.0	4.7	2.5	3.5	3.4	3.6				

C.D. = 2.8 degrees

Crop :- Potato**Ref :- H.P. 60(200).****Site :- Potato Develop Stn., Shillaroo.****Type :- 'D'.**

Object :—To test the efficacy of different stickers on the control of Blights of Potato crop.

1. BASAL CONDITIONS:

(i) to (x) N. A.

2. TREATMENTS:7 treatments of sticker :—T₀=Control, T₁=Tenac, T₂=Wheat flour, T₃=Triton, T₄=Kirti Sticker, T₅=Linseed oil and T₆=Albolineum.**3. DESIGN:**

(i) R.B.D. (ii) (a) 7 (b) N.A. (iii) 4 (iv) (a) N.A. (b) 3.66m. x 2.74 m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) N.A., (ii) As per treatments. (iii) Yield and incidence of disease. (iv) (a) 1960-only, (b) No, (c) Nil, (v) N.A. (vi) Nil.

5. RESULTS:

(i) 155.9 Q/ha. (ii) 23.5 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of tuber in Q/ha.

Treatment	C ₀	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆
Av. yield.	122.9	142.1	155.6	180.1	165.6	162.3	141.5

Early Blight :

(i) 18.58 degrees. (ii) 2.27 degrees. (iii) Treatment differences are highly significant. (iv) Mean angle of Infection in degree.

Treatment	C ₀	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆
Mean angle	24.17	15.03	14.99	17.73	18.11	16.60	24.46
Transformed back %	16.76	6.73	6.69	9.28	9.67	7.23	17.15

C.D. = 3.37 degrees

Late Blight :

(i) 11.39 degrees. (ii) 1.69 degrees. (iii) Treatment differences are not significant. (iv) Mean angle in degree.

Treatment	C ₀	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆
Mean angle	11.91	11.25	11.04	11.49	11.04	11.46	11.54
Transformed back %	4.25	3.31	3.66	3.97	3.66	3.94	4.00

Crop :- Potato.

Ref :- H.P. 61(178).

Site :- Potato Develop. Stn. Shillaroo.

Type :- 'D'.

Object :-To test the relative efficacy of different sticky materials for the control of late Blight of Potato.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

9 Sticky matters :-

C₀=Control. C₁=Linseed oil. C₂=Albolineum. C₃=Tenac. C₄=Triton. C₅=Kirti Sticker. C₆=Wheat flour. C₇=Peepol and C₈=Sandovit.

3. DESIGN:

(i) R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) 2.74 m. x 3.66m. (b) N.A. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) 1961-only. (b) No. (c) Null. (v) to (vii) N.A.

5. RESULTS :

(i) 74.2 Q/ha. (ii) 24.5 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of tuber in Q/ha.

Treatment.	C ₀	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈
Av. yield	97.9	67.5	68.8	65.3	49.7	91.3	61.0	77.9	73.3

Crop :- Potato.**Ref :- H.P. 61(179).****Site : Potato Develop. Stn., Shillaroo.****Type : 'D'.**

Object :—To test the relative efficiency of different chemicals to control the blights of Potato crop.

1. BASAL CONDITIONS:

(i) to (x) N.A.

2. TREATMENTS:

16 Chemicals :—C₀=Control, C₁=Cuproxol, C₂=Coppesan, C₃=Shell Copper, C₄=Vitigram, C₅=Kirti Copper W×P 50-1, C₆=Blitox, C₇=Fytelan, C₈=Blue Copper, C₉=Cupermar, C₁₀=Bordeaux mixture, C₁₁=Kirti Copper W×P-50-2, C₁₂=Fungimar, C₁₃=Dithane M. 22, C₁₄=Dithane-Z. 78 and C₁₅=Flit-406.

3. DESIGN :

(i) R.B.D. (ii) (a) 16. (b) N.A. (iii) 4. (iv) (a) 3.66 m.×2.74m. (b) N.A. (v) N.A. (vi) Yes

4. GENERAL :

(i) and (ii) N.A. (iii) Incidence of blight and yield of tuber. (iv) (a) 1961-only. (b) No. (c) Nil. (v) Bagh-pashog. (vi) and (vii) N.A.

5. RESULTS:

(i) 81.8 Q/ha, (ii) 16.8 Q/ha, (iii) Treatment differences are not significant, (iv) Av. yield of tuber in Q/ha.

Treatment	C ₀	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉	C ₁₀	C ₁₁	C ₁₂	C ₁₃	C ₁₄	C ₁₅
Av. yield	77.6	80.2	81.1	67.1	88.1	82.0	92.8	82.0	85.3	91.2	73.2	82.5	82.4	74.8	97.0	71.5

Early Blight :

(i) 12.0 degrees, (ii) 1.8 degrees, (iii) Treatment differences are highly significant, (iv) Mean angle in degree.

Treatment	C ₀	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉	C ₁₀	C ₁₁	C ₁₂	C ₁₃	C ₁₄	C ₁₅
Mean angle	22.4	11.4	11.0	11.4	10.6	11.0	10.0	12.0	11.2	12.3	13.7	10.6	11.2	10.1	11.1	11.4
Transformed back %	14.5	3.9	3.7	3.9	3.4	3.7	3.0	4.3	3.8	4.6	5.6	3.4	3.8	3.1	3.7	3.9

C.D.=2.6 degrees

Late Blight :

(i) 20.2 degrees, (ii) 3.4 degrees, (iii) Treatment differences are highly significant, (iv) Mean angle in degree.

Treatment	C ₀	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉	C ₁₀	C ₁₁	C ₁₂	C ₁₃	C ₁₄	C ₁₅
Mean angle	56.1	18.9	17.0	18.6	16.2	15.5	15.9	15.5	17.2	18.6	23.3	15.5	20.8	18.5	18.6	17.2

Transformed back %

69.0	10.5	8.5	10.2	7.8	7.1	7.5	7.2	8.8	10.1	15.6	7.2	12.7	10.0	10.2	8.8
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C.D.=4.8 degrees

Crop :- Radish.**Ref :- H.P. 62(133).****Site :- Vegetable Res. Stn., Kalpa.****Type :- 'C'.**

Object :—To study the effect of cut radish sown on the yield of Radish seed.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) June, 62. (iv) and (v) N.A. (vi) French Breakfast. (vii) Irrigated. (viii) and (ix) N.A. (x) Nov., 62

2. TREATMENTS:5 models of seed material :— T_0 —Whole root (control) T_1 —Root tips cut, T_2 — $\frac{1}{2}$ root length cut, T_3 — $\frac{1}{4}$ root length cut and T_4 — $\frac{3}{4}$ root length cut.**3. DESIGN:**(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 2.44 m. \times 1.83 m. (v) N.A. (vi) Yes.**4. GENERAL:**

(i) Satisfactory. (ii) N. A. (iii) Yield of radish seed. (iv) (a) 1962-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 77.0 kg/ha, (ii) 52.5 kg/ha, (iii) Treatment differences are highly significant, (iv) Av. yield of Radish seed in kg./ha.

Treatment	T_0	T_1	T_2	T_3	T_4
Av. yield	138	105	60	28	54

C.D.—63.2 kg./ha

Crop :- Tomato**Ref :-HP 60(72).****Site :- Vegetable Res. Stn., Bhagot.****Type :- 'M'.**

Object :—To study the effect of different levels of N, P and K. on the yield of Tomato.

1. BASAL CONDITIONS:(i) (a) to (c) N.A. (ii) Loamy. (iii) 19.3.60. (iv) (a) N.A. (b) Transplanting. (c) —. (d) 61 cm. \times 61 cm. (e) 1. (v) N. A. (vi) Marglobe. (vii) Irrigated. (viii) 1 weeding. (ix) N.A. (x) 17.6.60 to 18.8.60.**2. TREATMENTS:**

All combinations of (1), (2) and (3)+control. *

(1) 2 levels of N :— N_1 —56 and N_2 —84 kg./ha.(2) 2 levels of P_2O_5 :— P_1 —56 and P_2 —84 kg./ha.(3) 2 levels of K_2O :— K_1 —28, and K_2 —44.8 kg./ha.

Sources of N, P, K and time of Application———N.A.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 9. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 3.05m. × 2.44m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of tomato. (iv) (i) 1960—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 49.7 Q/ha, (ii) 26.7 Q/ha, (iii) Main effect of P alone is significant, (iv) Av. yield of tomato in Q/ha.

Control=53.1 Q/ha

	P ₁	P ₂	K ₁	K ₂	Mean
N ₁	72.3	38.6	63.5	47.3	55.4
N ₂	52.5	34.0	40.8	45.7	44.2
Mean	62.4	36.3	52.2	46.5	49.3
K ₁	64.8	39.5			
K ₂	60.0	33.1			

C.D. for P marginal means=23.19 Q/ha.

Crop :- Tomato

Ref :- H.P. 64(287).

Site :- Vegetable Res. Stn., Katrain.

Type :- 'M'.

Object :- To find the N and P requirements of Tomato crop.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandyloam. (iii) 10.5.64, (iv) (a) to (e) N.A. (v) N.A. (vi) Marglobe. (vii) Irrigated. (viii) and (ix) N.A. (x) July & Aug. 64.

2. TREATMENTS

All Combinations of (1) and (2)

(1) 3 levels of N :—N₀=0, N₁=49.4 and N₂=98.8 kg./ha.

(2) 2 levels of P₂O₅ :—P₀=0 and P₁=49.4 kg./ha.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) and (c) 1/1709.99 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of tomato. (iv) (a) 1964—only. (b) Nil. (v) to (vii) Nil.

RESULTS:

(i) 198.6 Q/ha. (ii) 30.3 Q/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of tomato in Q/ha.

	P ₀	P ₁	Mean
N ₀	139.4	174.5	157.0
N ₁	191.5	203.1	197.3
N ₂	241.6	241.7	241.7
Mean	190.8	206.4	198.6

C.D. for N marginal means = 33.0 Q/ha

Crop :- Tomato.

Ref :- H.P. 62(137).

Site :- Vegetable Res. Stn., Bhagot.

Type :- 'C'.

Object :-To study the effect of polythene mulching on the yield of Tomato.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) (a) Loamy. (b) N.A. (iii) 23.4.62. (iv) (a) N.A. (b) Transplanting. (c) and (d) — (e) 1. (v) and (vi) N.A. (vii) Irrigated. (viii) 1 weeding. (ix) N.A. (x) 16.7.62 to 19.8.62.

2. TREATMENTS:

2 mulching treatments :—M₀—No mulching and M₁—Mulching with polythene.

3. DESIGN:

(i) Paired plot. (ii) (a) 2. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 3.66m. × 1.83m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of tomato. (iv) (a) 1962-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 118.0 Q/ha, (ii) 17.1 Q/ha. (iii) Treatment differences are not significant, (iv) Av. yield of tomato in Q/ha.

Treatment	M ₀	M ₁
Av. yield	107.0	129.1

Crop :- Tomato.

Ref :- H.P. 60(74).

Site :- Vegetable Res. Stn. Bhagot.

Type :- 'C'.

Object :-To study the effect of spacings on the yield of Tomato.

1. BASAL CONDITIONS

(i) (a) to (c) N.A. (ii) Loamy. (iii) Last week of April. (iv) (a) N.A. (b) Transplanting. (c) and (d) As per treatments. (e) 1. (v) 454 gm. of Super and 58 gm. of Mur. pot. per plot applied before sowing and

340 gm. of A/s applied on 11.5.60. (vi) N.A. (vii) Irrigated. (viii) 1 weeding. (ix) N.A. (x) 23.6.60 to 20.8.60.

2. TRETMENTS :

5 spacings :— $S_1=76\text{cm.}\times 46\text{cm}$, $S_2=76\text{cm.}\times 61\text{cm}$, $S_3=76\text{cm.}\times 76\text{cm}$, $S_4=76\text{cm.}\times 91\text{cm}$ and $S_5=76\text{cm.}\times 106\text{cm}$.

3. DESIGN :

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 3. (iv) (a) N.A. (b) $4.57\text{m.}\times 2.13\text{m}$. (v) N.A. (vi) Yes.

4. GENERAL

(i) Normal. (ii) N.A. (iii) Yield of tomato. (iv) (a) 1960-only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 66.7 Q/ha, (ii) 20.2 Q/ha, (iii) Treatment differences are not significant, (iv) Av. yield of tomato in Q/ha.

Treatment	T ₁	T ₂	T ₃	T ₄	T ₅
Av. yield	92.6	84.4	62.7	53.8	40.2

Crop :- Tomato.

Ref : H.P. 62(136).

Site :- Vegetable Res. Stn. Bhagot.

Type :- 'C'.

Object :—To study the effect of pruning on the yield of Tomato.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loamy. (iii) 20.5.62. (iv) (a) N.A. (b) Transplanting. (c) — (d) N.A. (e) 1. (v) and (vi) N.A. (vii) Irrigated. (viii) 1 weeding. (ix) N.A. (x) 19 to 26.8.62.

2. TREATMENTS :

2 pruning treatments :— P_0 =No pruning and P_1 =Prunning.

3. DESIGN :

(i) Paired plot. (ii) (a) 2, (b) N.A. (iii) 5. (iv) (a) N.A. (b) $4.88\text{m.}\times 1.22\text{m}$. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of tomato. (iv) (a) 1962-only. (b) No. (c) Nil, (v) to (vii) Nil.

5. RESULTS :

(i) 21.8 Q/ha, (ii) 10.3 Q/ha, (iii) Treatment difference is not significant, (iv) Av. yield of tomato in Q/ha.

Treatment :	P_0	P_1
Av. yield.	28.1.	15.4

Crop :- Tomato.**Ref :- H.P. 60(73).****Site :- Vegetable Res. Stn., Bhagot.****Type :- 'CV'.****Object :—**To study the different dates of picking on the yield of Tomato.**1. BASAL CONDITIONS**

(i) (a) to (c) N.A. (ii) Loamy. (iii) Last week of April. (iv) (a) N.A. (b) Transplanting. (c) and (d) N.A. (e) 1. (v) and (vi) N.A. (vii) Irrigated. (viii) 1 weeding. (ix) N.A. (x) As per treatments.

2. TREATMENTS :

All combinations of (1) and (2).

(1) 4 dates of picking:— $T_1=22.7.60$, $T_2=1.8.60$, $T_3=6.8.60$ and $T_4=15.8.60$.(2) 3 types of tomato picked:— $V_1=$ Light red, $V_2=$ Half red and $V_3=$ Full red.**3. DESIGN :**(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) N.A. (b) $3.05m. \times 1.22m$. (v) N.A. (vi) Yes.**4. GENERAL :**

(i) Normal. (ii) N.A. (iii) Yield of tomato. (iv) (a) 1960—only. (b) No (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 11.5 Q/ha, (ii) 6.7 Q/ha, (iii) Main effect of T alone is highly significant, (iv) Av. yield of tomato in Q/ha.

	T_1	T_2	T_3	T_4	Mean
V_1	3.9	6.3	14.1	15.7	10.0
V_2	6.7	12.9	14.9	22.0	14.1
V_3	3.1	5.1	13.7	19.6	10.4
Mean	4.6	8.1	14.2	19.1	11.5

C.D. for T marginal means=5.6 Q/ha.

Crop :- Tomato. (Kharif)**Ref :- H.P. 61(184).****Site :- Vegetable Res. Stn., Solan.****Type :- 'D'.****Object :—**To study the effect of cultural methods to control Fruit-rot disease of Tomato.**1. BASAL CONDITIONS :**

(i) to (x) N.A.

2. TREATMENTS :

All combinations of (1) and (2).

(1) 2 stakings:— $S_0=$ No staking and $S_1=$ Staking.(2) 2 mulching treatments:— $M_0=$ No mulch and $M_1=$ Mulch.

No other details are available

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 4. (b) N.A. (iii) 4. (iv) (a) and (b) 3.66 m. × 1.83 m. (v) Nil. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield and No. of healthy & diseased fruits. (iv) (a) 1961—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 50.04 Q/ha. (ii) 34.04 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of tomato in Q/ha.

	M ₀	M ₁	Mean
S ₀	26.39	69.31	47.85
S ₁	65.99	48.46	52.22
Mean	41.19	58.88	50.04

Crop :- Tomato.

Ref :- H.P. 60(178).

Site :- Crop. Res. Stn., Solan.

Type :- 'D'.

Object :- To test the efficacy of different fungicides against Fruit rot of Tomato crop.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

9 fungicidal treatments :- F₀—Control, F₁—Dithane-1, F₂—Vitigam, F₃—Bod mixture, F₄—Cuproxol, F₅—Blitox, F₆—Kirti Copper, F₇—Flit—406 and F₈—Dithane-2

3. DESIGN :

(i) R.B.D. (ii) (a) 9. (b) N.A. (iii) 3. (iv) (a) and (b) N.A. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Lot of diseased fruits and defoliation percentage. (iv) (a) 1960—only. (b) No (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 44.89 degrees. (ii) 5.32 degrees. (iii) Treatment differences are significant. (iv) Mean angle in degree.

Treatment	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Mean angle	70.33	29.57	45.43	50.87	36.63	48.46	39.73	42.60	40.53

Crop :- Cabbage.**Ref :- H.P. 63(159)****Site :- Vegetable Res. Sub-Stn., Kalpa.****Type :- 'M'.**

Object :—To study the effect of different levels of N, P and K on the yield of Cabbage.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 10.4.63. (iv) (a) N.A. (b) Transplanting, (c) —. (d) N.A. (e) 1. (v) 92.2 Q/ha of F.Y.M. (vi) Pride of India. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

All combinations of (1), (2) and (3).

(1) 3 levels of N: $N_1=56$, $N_2=112$ and $N_3=168$ Kg/ha.(2) 3 levels of P_2O_5 : $P_1=28$, $P_2=56$ and $P_3=113$ Kg/ha.(3) 3 levels of K_2O : $K_1=11.2$, $K_2=28.0$ and $K_3=44.8$ Kg/ha.**3. DESIGN:**(i) 3^3 fact. confounding, (Z-effect confd.). (ii) (a) 3 blocks/replication and 9 plots/block. (b) N.A. (iii) 2 (iv) (a) N.A. (b) 3.05m. \times 1.83m. (v) N.A. (vi) Yes.**4. GENERAL :**

(i) Normal. (ii) N.A. (iii) Yield of seed. (iv) (a) 1963—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:(i) 658 Kg/ha. (ii) 181.0 Kg/ha. (iii) Interaction $N \times K$ is significant. (iv) Av. yield of seed in Kg/ha.

	P_1	P_2	P_3	K_1	K_2	K_3	Mean
N_1	725	689	671	549	686	849	695
N_2	671	730	655	659	725	671	685
N_3	707	529	543	715	534	531	593
Mean	701	649	623	641	648	684	658
K_1	586	614	722				
K_2	724	716	505				
K_3	794	617	640				

C.D. for the body of $N \times K$ table = 88.5 Kg/ha.**Crop :- Cabbage.****Ref :- H.P. 63(252).****Site :- Vegetable Res. Stn., Katrain.****Type :- 'M'.**

Object :—To study the effect of different levels of N, P and K levels on the yield of Cabbage.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 12.9.63. (iv) (a) N.A. (b) Transplanting. (c) to (e) N.A. (v) N.A. (vi) Pride of India. (vii) Irrigated. (viii) and (ix) N.A. (x) 6.7.64.

2. TREATMENTS :

6 manurial treatments : $M_0=0$, $M_1=100$ Kg/ha of N, $M_2=M_1+80$ Kg/ha of P_2O_5 , $M_3=M_2+40$ Kg/ha of K_2O , $M_4=M_1+40$ Kg/ha of K_2O and $M_5=80$ Kg/ha of P_2O_5 .

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3'20m.×1'83m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of seed. (iv) (a) 1963—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 1240 Kg/ha. (ii) 215'0 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of seed in Kg/ha.

Treatment	M_0	M_1	M_2	M_3	M_4	M_5
Av. yield	895	1110	1271	1052	1378	1736

C.D.=324'0 Kg/ha.

Crop :- Cabbage (Kharif).

Ref :- H.P. 65(186).

Site :- Vegetable Res. Stn., Kalpa.

Type :- 'C'.

Object :—To find the optimum spacing for the seed of Cabbage crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 5.4.65. (iv) (a) 2 to 3 diggings. (b) Transplanting. (c) N.A. (d) As per treatments. (e) 1. (v) N.A. (vi) Pride of India. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) Aug., 65.

2. TREATMENTS :

Main-plot treatments :

3 row to row spacings :— $S_1=61$, $S_2=91$ and $S_3=122$ cm.

Sub-plot treatments :

2 plant to plant spacings :— $R_1=31$ and $R_2=62$ cm.

3. DESIGN :

(i) Split-plot (ii) (a) 3 main-plots/replication and 2 sub-plots/main-plot : (b) N.A. (iii) 7. (iv) (a) N.A. (b) 3'66m.×3'66m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of seed. (iv) (a) 1965—contd. (b) N.A. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 1640 Kg/ha. (ii) (a) 409'9 Kg/ha. (b) 213'9 Kg/ha. (iii) Main effect of R alone is highly significant. Interaction $S \times R$ is significant. (iv) Av. yield of seed in Kg/ha.

	S ₁	S ₂	S ₃	Mean
R ₁	1770	1972	1640	1794
R ₂	1561	1390	1505	1485
Mean	1666	1681	1572	1640

C.D. for R marginal means=138.7 Kg/ha.

C.D. for R means at the same level of S means=240.2 Kg/ha.

C.D. for S means at the same level of R means=377.9 Kg/ha.

Crop :- Cabbage.

Ref :- H.P. 65(190).

Site :- Cabbage Res. Stn., Kalpa.

Type :- 'C'.

Object :-To see the effect of depths of planting at head on the seed yield of Cabbage.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 20.4.65. (iv) (a) 2 to 3 diggings. (b) Transplanting. (c) N.A. (d) 61cm. x 61cm. (e) One (v) N.A. (vi) Pride of India. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) Aug., 65.

2. TREATMENTS :

4 methods of planting :- M₁=Head and whole stem above ground, M₂=Only head above ground
M₃=Half stem and head above the ground and M₄=Stem and above head 2.5 cm, deep in soil.

3. DESIGN

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 2.44m. x 1.83m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of seed. (iv) (a) 1965—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 2820 Kg/ha. (ii) 688.8 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of seed in Kg/ha.

Treatment	M ₁	M ₂	M ₃	M ₄
Av. yield	2352	3163	2967	2799

Crop :- Cabbage.

**Ref :- H.P. 62(139), 63(160), 64(150),
65(185)**

Site :- Vegetable Res. Stn., Kalpa.

Type :- 'C'.

Object :-To study the effect of Cut-cabbage sown on the yield of Cabbage seed.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) April for 62 and 63; In the last week of March for 64; 13.4.65.
 (iv) (a) N.A. (b) Transplanting. (c) N.A. ~~40-61 cm.~~ × 61 cm. (e) 1. (v) N.A. (vi) Pride of India
 for 62 and 65; Large drum (late) head for others. (vii) Irrigated. (viii) 2 weedings. (ix) N.A.
 (x) Month of August.

2. TREATMENTS :

3 types of seeds : T₁—Whole head (Control), T₂—Control Core and T₃—Stumps.

3. DESIGN :

(i) R.B.D. (ii) (a) 3. (b) N.A. (iii) 2 for 62; 4 for 63; 8 for 64 and 65. (iv) (a) N.A. (b) 3.05
 m. × 1.83m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal (ii) N.A. (iii) Yield of seed. (iv) (a) 1962—Contd. (b) No. (c) Nil. (v) N.A. (vi) Nil.
 (vii) Since expt. is continued beyond 65, hence individual year results are presented under 5. Results.

5. RESULTS :

62 (139)

(i) 230 Kg/ha. (ii) 100.0 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of
 seed in Kg/ha.

Treatment	T ₁	T ₂	T ₃
Av. yield	390	160	140

63 (160)

(i) 440 Kg/ha. (ii) 200.0 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of
 seed in Kg/ha.

Treatment	T ₁	T ₂	T ₃
Av. yield	460	640	230

64 (150)

(i) 290 Kg/ha. (ii) 101.0 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of
 seed in Kg/ha.

Treatment	T ₁	T ₂	T ₃
Av. yield	400	270	210

C.D. = 108.3 Kg/ha

65 (185)

(i) 1869 Kg/ha. (ii) 394.3 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of
 seed in Kg/ha.

Treatment	T ₁	T ₂	T ₃
Av. yield	2545	1559	1502

C.D. = 422.9 Kg/ha.

Crop :- Cauliflower (Rabi).

Ref :- H.P. 64(139).

Site :- Agri. Res. Farm, Dhaula Kuan.

Type :- 'M'.

**Object :—To study the effect of N, P and K applied individually and in combination on the yield of
 Cauliflower.**

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Tomato. (c) N.A. (ii) Sandy. (iii) 29.9.64/24.10.64. (iv) (a) N.A. (b) Transplanting. (c) to (e) N.A. (v) N.A. (vi) Snow ball. (vii) Irrigated. (viii) 3 hoeings and 3 weedings. (ix) and (x) N.A.

2. TREATMENTS:

All combinations of (1), (2) and (3).

(1) 3 levels of N as A/S: $N_0=0$, $N_1=56$, and $N_2=112$ Kg/ha.

(2) 3 levels of P_2O_5 as Super: $P_0=0$, $P_1=44.8$, and $P_2=67.2$ Kg/ha.

(3) 3 levels of K_2O as Mur. Pot: $K_0=0$, $K_1=22.4$, and $K_2=44.8$ Kg/ha.

N applied in two doses on 14.11.64 and 14.12.64.

3. DESIGN :

(i) 3^3 Fact. confd. (W-effect completely confd.). (ii) (a) 9 plots/block, 3 blocks/replication. (b) N.A. (iii) 2 (iv) (a) N.A. (b) 3.05 m. \times 2.44 m. (v) N.A. (vi) Yes

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of Cauliflower. (iv) (a) 1964-only. (b) No. (c) Nil. (v) Nil. (vi) and (vii) N.A.

5. RESULTS :

(i) 89.4 Q/ha. (ii) 43.2 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of Cauliflower in Q/ha.

	P_0	P_1	P_2	K_0	K_1	K_2	Mean
N_0	58.8	84.1	94.3	70.4	79.3	87.5	79.1
N_1	85.2	83.0	92.4	63.1	106.4	91.1	86.9
N_2	75.0	118.8	113.0	81.3	120.0	105.5	102.3
Mean	73.0	95.3	99.9	71.6	101.9	94.7	89.4
K_0	56.1	63.8	94.9				
K_1	96.5	105.5	103.7				
K_2	66.4	116.5	101.1				

Crop :- Cauliflower (Rabi).

Ref :- H.P. 64(138).

Site :- Agri. Res. Farm, Dhaula Kuan.

Type :- 'M'.

Object :- To study the effect of P on the yield of Cauliflower.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 5.11.64 (iv) (a) to (e) N.A. (v) 112 Kg/ha. of N as A/S applied in two doses on 4.1.65 and 15.1.65 to all plots. (vi) Snow ball. (vii) Irrigated. (viii) and (ix) N.A. (x) 2.2.65 to 2.3.65.

2. TREATMENTS:

4 doses of P_2O_5 as Super: - P_0 =control (no manure), $P_1=28$, $P_2=56$ and $P_3=84$ Kg/ha.

3. DESIGN.

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 7 (iv) (a) N.A. (b) 3.05 m. × 1.83 m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of cauliflower. (iv) (a) 1964—only (b) No. (c) Nil. (v) Nil. (vi) and (vii) N.A.

5. RESULTS:

(i) 3948 Kg/ha. (ii) 1139.2 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of cauliflower in Kg/ha.

Treatment	P ₀	P ₁	P ₂	P ₃
Av. yield	3571	4212	3953	4054

Crop :-Cauliflower.

Ref :- H.P. 62(231),

Site :- Agri. Res. Stn., Dhaula Kuan,

Type :- 'M'.

Object :-To study the effect of micronutrients on the yield of Cauliflower.

1. BASAL CONDITIONS:

(i) (a) Peas-Sun—hemp-Cauliflower. (b) Sun-hemp. (c) G.M. (ii) Sandy loam. (iii) 25.9.62/26.10.62. (iv) (a) to (c) N.A. (d) 61cm. × 45cm. (e)— (v) 400 Kg/ha. of F.Y.M. mixed before transplanting. (vi) Snow ball (Late). (vii) Irrigated. (viii) 8 weedings and one hoeing. (ix) 15 cm. (x) 4 to 18.12.63.

2. TREATMENTS:

All combinations of (1) and (2).

(1) 3 levels of boron :—B₀=Control (no boron), B₁=6.7 Kg/ha. and B₂=8.0 Kg/ha.

(2) 3 levels of molybdenum:—M₀=Control, M₁=1.1 and M₂=1.7 Kg/ha.

Micronutrients sprayed before planting.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 2.44 m. × 1.83 m. (v) N.A. (vi) Yes

4. GENERAL:

(i) Poor. (ii) Aphids attack and B.H.C. dusted. (iii) Yield of cauliflower. (iv) (a) 1962—only. (b) No, (c) Nil. (v) Nil. (vi) and (vii) N.A.

5. RESULTS:

(i) 2956 Kg/ha. (ii) 1708 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of cauliflower in Kg/ha.

	M ₀	M ₁	M ₂	Mean
B ₀	4457	2214	2971	3214
B ₁	2747	2299	2943	2663
B ₂	3027	1906	4037	2990
Mean	3410	2140	3317	2956

Crop :- Cauliflower.

Ref :- H.P. 61(73).

Site :- Vegetable Res. Stn., Bhagot.

Type :- 'C'.

Object :-To study the effect of once and twice transplanting on the yield of Cauliflower.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loamy. (iii) 21.7.61. (iv) (a) N.A. (b) Transplanting. (c) 45cm. (d) Plant to plant, Row to row, 61cm. (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) 7.9.61 to 26.10.61.

2. TREATMENTS :

2 planting treatments : T_1 —Once transplanting and T_2 —Twice transplanting.

3. DESIGN :

(i) R.B.D. (ii) (a) 2. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 6.10m. × 1.83m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cauliflower. (iv) (a) 1961—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 3633 Kg/ha. (ii) 93.7 Kg/ha. (iii) Treatment difference is highly significant. (iv) Av. yield of cauliflower in Kg/ha.

Treatment	T_1	T_2
Av. yield	3153	4113

C.D.—144.3 Kg/ha.

Crop :- Cauliflower.

Ref :- H.P. 62(134)

Site :- Vegetable Res. Stn. Bhagot.

Type :- 'D'.

Object :-To study the effect of Bora spray on the yield of Cauliflower.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) N.A. (iii) 30.7.62. (iv) (a) — (b) Transplanting. (c) N.A. (d) and (e) N.A. (v) to (ix) N.A. (x) Sept., and Oct., 62.

2. TREATMENTS :

T_0 —Control (no bora applied), T_1 —11.2 Kg/ha. of Bora sprayed twice—15 days and 30 days after transplanting.

3. DESIGN :

(i) Paired-plot. (ii) (a) 2. (b) N.A. (iii) 7. (iv) (a) N.A. (b) 5.03m. × 1.22m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cauliflower. (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 4158 Kg/ha, (ii) 833.9 Kg/ha, (iii) Treatment differences is not significant. (iv) Av. yield of cauliflower in Kg/ha.

Treatment	T ₀	T ₁
Av. yield	3873	4444

Crop :- Turnip.

Ref :- H.P. 64(149)

Site :- Vegetable Res. Stn., Kalpa.

Type : 'M'.

Object :-To study the effect of N, P and K applied individually and in combination on the yield of Turnip.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 2nd week of April. (iv) and (v) N.A. (vi) P.T.W. Globe (Late) (vii) Irrigated. (viii) N.A. (ix) 15cm. to 20 cm. (x) N.A.

2. TREATMENTS:

All combinations of (1), (2) and (3)

(1) 3 levels of N:—N₁=56, N₂=112 and N₃=168Kg/ha..

(2) 3 levels of P₂O₅:—P₁=28, P₂=56 and P₃=112 Kg/ha.

(3) 3 levels of K₂O:—K₁=11.2, K₂=28 and K₃=44.8 Kg/ha.

Sources of N, P, K and time of application— N.A.

3. DESIGN :

(i) 3rd confd. (Z-effect confd.). (ii) (a) 3 blocks/replication and 9 plots/block. (b) N.A. (iii) 2. (iv) (a) N.A. (b) 1.83m. x 1.83m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of turnip. (iv) (a) 1964—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 22.3 Q/ha. (ii) 6.8 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of turnip in Q/ha.

	P ₁	P ₂	P ₃	K ₁	K ₂	K ₃	Mean
N ₁	22.9	19.7	20.0	19.0	23.5	20.1	20.9
N ₂	24.3	22.4	16.8	18.8	23.1	21.7	21.2
N ₃	19.6	29.3	25.4	24.0	25.1	25.2	24.8
Mean	22.3	23.8	20.7	20.6	23.9	22.3	22.3
K ₁	21.3	23.7	16.8				
K ₂	25.9	23.9	21.9				
K ₃	19.6	23.9	23.5				

Crop :- Turnip.
Site :- Vegetable Res. Stn., Katrain.

Ref :- H.P. 64(286).

Type :- 'M'.

Object :-To study the effect of different levels of N and P on the yield of Turnip.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 26.11.64 (date of transplanting is N.A.). (iv) and (v) N.A. (vi) Purple Top White. (vii) Irrigated. (viii) and (ix) N.A. (x) 2nd week of June, 65.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 3 levels of N :— $N_0=0$, $N_1=62$ and $N_2=124$ Kg/ha.

(2) 2 levels of P_2O_5 :— $P_0=0$, and $P_1=99$ Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/1630·8941 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of seed. (iv) (a) 1964-66 (Expt. not conducted in 65). (b) N.A. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 1656 Kg/ha. (ii) 1590 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of seed in Kg/ha.

	N_0	N_1	N_2	Mean
P_0	722	1639	3404	1922
P_1	754	1708	1708	1390
Mean	738	1674	2556	1656

Crop :- Turnip.
Site :- Vegetable Res. Stn., Kalpa.

Ref. - H.P. 65(192).

Type :- 'C'.

Object :-To see the best spacing for the seed production of Turnip crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 12.4.65. (iv) (a) 2 diggings. (b) Planting. (c) N.A. (d) As per treatments. (e) one (v) N.A. (vi) Purple Top White Globe. (vii) Unirrigated. (viii) 1 Weeding (ix) N.A. (x) July, 65.

2. TREATMENTS:

Main-plot treatments:

3 spacings between rows :— $S_1=46$, $S_2=61$, and $S_3=76$ cm.

Sub-plot treatments :

3 plant spacings :— $P_1=30\cdot5$, $P_2=46$ and $P_3=61$ cm.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication and 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) plots lying in main-plots 3.66 m. x 2.29 m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of turnip seed. (iv) (a) 1965—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 313 Kg/ha. (ii) (a) 201.5 Kg/ha. (b) 74.1 Kg/ha (iii) Main effect of P alone is highly significant (iv) Av. yield of seed in Kg/ha.

	P ₁	P ₂	P ₃	Mean
S ₁	299	290	275	288
S ₂	485	409	278	391
S ₃	335	239	203	259
Mean	373	313	252	313

C.P. for P marginal means = 63.5 Kg/ha.

Crop :- Turnip.

Ref :- H.P. 65(188).

Site :- Vegetable Res. Stn., Kalpa.

Type :- 'C'.

Object :- To find out the optimum spacing for seed yield of Turnip crop.

1 BASAL CONDITIONS :

(i) N.A. (ii) Clay loam. (iii) 11.4.65. (iv) (a) 2 to 3 diggings. (b) Transplanting. (c) N.A. (d) As per treatments. (e) One. (v) N.A. (vi) Purple Top White Globe. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) Last week of July, 65.

2 TREATMENTS :

Main-plot treatments :

3 spacings between rows : S₁=45, S₂=61 and S₃=91 cm.

Sub-plot treatments :

3 spacings within rows : R₁=20, R₂=30 and R₃=45 cm.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication ; 3 sub-plots/main-plot. (b) N.A. (iii) 8. (iv) (a) N.A. (b) 1.83m. x 1.83m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of seed. (iv) (a) 1965-contd. (b) No. (c) Nil. (v) to (vii) Nil.

5 RESULTS :

(i) 985 Kg/ha. (ii) (a) 309.3 Kg/ha. (b) 294.0 Kg/ha. (iii) Main effects of S and R are highly significant. Interaction S x R is significant. (iv) Av. yield of seed in Kg/ha.

	R ₁	R ₂	R ₃	Mean
S ₁	1471	1140	773	1128
S ₂	1308	809	821	979
S ₃	905	829	808	847
Mean	1228	926	801	985

C.D. for S marginal means=191.5 Kg/ha.

C.D. for R marginal means=171.4 Kg/ha.

C.D. for R means at the same level of S means=296.8 Kg/ha.

C.D. for S means at the same level of R means=311.9 Kg/ha.

Crop :- Turnip.

Ref :- H.P. 65(189).

Site :- Vegetable Res. Stn. Kalpa.

Type :- 'C'.

Object :-To see the effect of different sizes of the roots on the seed production of Turnip.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 14.4.65. (iv) (a) 2 to 3 diggings. (b) Transplanting. (c) N.A. (d) 61cm. x 61cm. (e) One. (v) N.A. (vi) Purple Top White Globe. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 1.7.65.

2. TREATMENTS :

3 root sizes in diameters for transplanting :—R₁=2.5cm. to 5cm., R₂=5cm. to 7.5cm. and R₃=7.5cm. of diameter.

3. DESIGN :

(i) R.B.D. (ii) (a) 3. (b) N.A. (iii) 5 (iv) (a) N.A. (b) 1.83m. x 1.83m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of seed. (iv) (a) 1965-contd. (b) N.A. (v) to (vii) N.A.

5. RESULTS :

(i) 1135 Kg/ha. (ii) 258.4 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of seed in Kg/ha.

Treatment	R ₁	R ₂	R ₃
Av. yield	891	1208	1307

Crop :- Carrot.

Ref :- H.P. 62(230).

Site :- Agri. Res. Stn. Dhaula Kuan,

Type :- 'M'.

Object :-To study the effect of different levels of N, P and K on the yield of Carrot crop.

1. BASAL CONDITIONS:

(i) (a) Cabbage-Capsicum-Carrot. (b) Capsicum. (c) 300 Kg. of F.Y.M. before transplanting + 4 Kg. of A/S after 1 and 2 months, later 4 Kg. of S/P followed by ploughing. (ii) Sandy loam. (iii) 4.10.62. (iv) (a) 4 ploughings and plankings. (b) and (c) N.A. (d) 3cm. x 8cm. (e) — (v) Nil. (vi) Ch. Scarlet (Mid-late) (vii) Irrigation by Tubewell, Gurrigatesu. (viii) 8 hoeings and weedings. (ix) 13cm. (x) 30.1.63 to 24.2.63.

2. TREATMENTS:

Main-plot treatments:

2 levels of N : $N_1=28$ and $N_2=56$ Kg/ha. of N

Sub-plot treatments :

All combinations of (1) and (2)

(1) 3 levels of P_2O_5 : $P_1=17.9$, $P_2=35.9$ and $P_3=53.8$ Kg/ha.

(2) 3 levels of K_2O : $K_1=26.9$, $K_2=53.8$ and $K_3=80.7$ Kg/ha.

P_2O_5 applied followed by ploughing while N and K_2O applied in two lots first with sowing and second 40 days after it.

3. DESIGN :

(i) Split-plot. (ii) 2 main-plots/replication ; 9 sub-plots/main-plot. (b) N.A. (iii) 3. (iv) (a) and (b) 3.05m. x 1.83m. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of Carrot. (iv) (a) 1962-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 211.8 Q/ha. (ii) (a) 17.7 Q/ha. (b) 28.5 Q/ha. (iii) Interaction $P \times K$ is significant. (iv) Av. yield of Carrot in Q/ha.

	P_1	P_2	P_3	K_1	K_2	K_3	Mean
N_1	205.8	202.9	210.2	197.2	209.3	212.4	206.3
N_2	220.9	226.0	205.3	227.1	209.3	215.9	217.4
Mean	213.3	214.4	207.8	212.1	209.3	214.1	211.8
K_1	186.6	232.9	216.9				
K_2	220.9	214.0	192.9				
K_3	232.5	196.4	213.5				

C.D. for the body of $P \times K$ table = 33.5 Q/ha.

Crop :- Carrot.

Site :- Vegetable Res. Stn., Kalpa.

Ref :- H.P. 63(158), 64(153).

Type :- 'MF'.

Object :- To study the effect of different levels of N, P and K on the yield of Carrot.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 12.4.63; 1st week of April 64. (iv) (a) to (e) N.A. (v) N.A. (vi) Chantenary. (vii) Irrigated. (viii) N.A. (ix) 15cm. to 20cm. (x) N.A.

2. TREATMENTS:

All combinations of (1), (2) and (3).

- (1) 3 levels of N: $-N_1=56$, $N_2=112$ and $N_3=168$ Kg/ha.
 (2) 3 levels of P_2O_5 : $-P_1=28$, $P_2=56$ and $P_3=112$ Kg/ha.
 (3) 3 levels of K_2O : $-K_1=11.2$, $K_2=28$ and $K_3=44.8$ Kg/ha.

3. DESIGN:

- (i) 3³ confd. (Z-effect completely confd.). (ii) 3 blocks/replication, 9 plots/block. (b) N.A. (iii).2. (iv) (a) N.A. (b) 1/1993 ha. (v) N.A. (vi) Yes.

4. GENERAL:

- (i) Normal, (ii) N.A. (iii) Yield of seed. (iv) (a) 1963-64. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) and (vi) N.A. (vii) Error Variances are homogeneous and Treatments \times Years interaction is absent.

5. RESULTS:

Pooled results :

- (i) 541 Kg/ha. (ii) 225.4 Kg/ha. (based on 66 d.f. made up of Treatments \times Years interaction and pooled error.). (iii) None of the effect is significant. (iv) Av. yield of seed in Kg/ha.

	P_1	P_2	P_3	K_1	K_2	K_3	Mean
N_1	576	479	632	533	569	585	562
N_2	683	544	457	485	641	557	561
N_3	543	563	394	463	547	489	500
Mean	601	529	494	494	586	544	541
K_1	569	429	484				
K_2	629	568	501				
K_3	604	590	438				

Individual results

Treatment	N_1	N_2	N_3	Sig.	P_1	P_2	P_3	Sig.	K_1	K_2	K_3	Sig.	G.M.	S.E./plo
Year														
1963	788	863	784	N.S.	949	802	684	*	754	839	842	N.S.	812	239.9
1964	337	260	216	N.S.	252	256	305	N.S.	234	333	246	N.S.	271	189.0
Pooled	562	561	500	N.S.	601	529	494	N.S.	494	586	544	N.S.	541	225.4

Crop :- Carrot (Rabi).

Ref :- H.P. 63(255).

Site :- Vegetable Res. Sta., Katrian.

Type :- 'M'.

Object :- To study the effect of different levels of N, P and K on the seed yield.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 8.11.63. (iv) (a) to (e) N.A. (v) As per treatments. (vi) Nantees. (vii) Irrigated. (viii) and (ix) N.A. (x) 12.7.64.

2. TREATMENTS:

5 manurial treatments: M_0 —control, M_1 —28Kg/ha. of N+90Kg/ha. of P_2O_5 +45Kg. of K_2O , M_2 —56 Kg/ha of N+90Kg/ha of P_2O_5 +45Kg/ha of K_2O , M_3 —84Kg/ha of N+90 Kg/ha. of P_2O_5 +45Kg/ha of K_2O and M_4 —112Kg/ha of N+90Kg/ha of P_2O_5 +45Kg/ha of K_2O .

3. DESIGN:

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/1705·0450 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of seed. (iv) 1963-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 394 Kg/ha. (ii) 140·1 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of seed in Kg/ha.

Treatment	M_0	M_1	M_2	M_3	M_4
Av. yield	171	247	350	554	648

C.D.—215·9 Kg/ha.

Crop :- Carrot.

Site :- Vegetable Res. Stn., Kalpa.

Ref :- H.P. 65(194).

Type :- 'C'.

Object :—To see the best spacing for seed production of Carrot.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) clay loam. (iii) N.A. (iv) (a) 2 diggings. (b) Transplanting. (c) N.A. (d) As per treatments. (e) One. (v) N.A. (vi) Early nantees. (vii) Unirrigated. (viii) 1 weeding. (ix) and (x) N.A.

2. TREATMENTS :

Main-plot treatments:

3 spacings between rows :— R_1 —46, R_2 —61 and R_3 —76 cm.

Sub-plot treatments :

4 spacings between plants :— S_1 —15, S_2 —30, S_3 —46 and S_4 —61 cm.

3. DESIGN:

(i) Split-plot. (ii) (a) 3 main-plots/replication and 4 sub-plots/main-Plot. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 3·66m. × 2·44m. for R_1 and R_3 and 3·66m. × 2·29m. for R_2 . (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of seed. (iv) (a) 1965-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 301Kg/ha. (ii) (a) 126·5 Kg/ha. (b) 98·3Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of carrot-seed in Kg/ha.

	S ₁	S ₂	S ₃	S ₄	Mean
R ₁	279	279	369	247	293
R ₂	374	348	277	251	312
R ₃	311	339	291	251	298
Mean	321	322	312	250	301

Crop :- Carrot.

Ref :- H.P. 62(132), 63(161),

Site :- Vegetable Res. Sta., Kalpa.

Type :- 'C'.

Object :- To study the effect of cut-carrot on the yield of Carrot.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) April, 62; June, 63. (iv) (a) to (e) N.A. (v) N.A. (vi) Tender sweet for 62 and chantenary for 63. (vii) Irrigated. (viii) and (ix) N.A. (x) September, 62, October 63.

2. TREATMENTS :

5 methods of carrot cuttings at sowing:—T₀=Whole root (control), T₁=Root tips cut, T₂=1/4 in root length cut, T₃=1/2 in root length cut and T₄=3/4 in root length cut.

3. DESIGN:

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 2.44m. × 1.22m.; 3.05m. × 1.83m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Satisfactory. (ii) N.A. (iii) Yield of carrot seed. (iv) (a) 1962-63. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Nil. (vii) Error variances are homogeneous and Treatments × Years interaction is absent.

5. RESULTS :

Pooled results

(i) 566 Kg/ha. (ii) 221.4 Kg/ha (based on 28 d.f. made up of pooled error and Treatments × Years interaction.) (iii) Treatment differences are not significant. (iv) Av. yield of carrot seed in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄
Av. yield	715	581	532	497	504

Individual results

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	Sig.	S.E./plot	G.M.
Year 1962	660	462	505	484	357	N.S.	238.8	494
1963	770	700	566	510	650	N.S.	110.0	638
Pooled	715	581	532	497	504	N.S.	221.4	566

Crop :- Carrot.

Ref :. H.P. 63(150)

Site :- Vegetable Res. Sub-Stn., Kalpa.

Type :- 'C'.

Object :- To study the effect of spacings on the yield of Carrot.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 11.4.63. (iv) (a) to (c) N.A. (d) As per treatments (e) N.A. (v) to (x) N.A.

2. TREATMENTS :

Main-plot treatments :

3 spacings between rows :- $R_1=46$, $R_2=61$ and $R_3=76$ cm.

Sub-plot treatments :

3 spacings within rows : $S_1=20$, $S_2=38$ and $S_3=61$ cm.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication and 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) $3.05m. \times 2.29m$. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Satisfactory. (ii) N.A. (iii) Yield of Carrot. (iv) (a) 1963-only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 1030Kg/ha. (ii) (a) 427.8 Kg/ha. (b) 120.1 Kg/ha. (iii) Main effect of S is highly significant and interaction $R \times S$ is significant. (iv) Av. yield of carrot in Kg/ha.

	S_1	S_2	S_3	Mean
R_1	1285	1109	888	1094
R_2	1195	939	784	973
R_3	1211	836	1025	1024
Mean	1230	961	899	1030

C.D. for S marginal means—163.0 Kg/ha.

C.D. for S means at the same level of R means—178.4 Kg/ha.

C.D. for R means at the same level of S means—450.8 Kg/ha.

Crop :- Beans.

Ref :- H.P. 60(69).

Site :- Vegetable Res. Stn., Bhagot.

Type :- 'M'.

Object :- To study the effect of different levels of N, P and K on the yield of Beans.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loamy. (iii) 29.2.60. (iv) and (v) N.A. (vi) As paragus beans. (vii) to (ix) N.A. (x) 16.6.60 to 6.7.60.

2. TREATMENTS :

All combinations of (1), (2) and (3)+a control (no manure)

(1) 2 levels of N :- $N_1=33.6$ and $N_2=56.0$ Kg/ha.

(2) 2 levels of P_2O_5 :- $P_1=53.8$ and $P_2=71.7$ Kg/ha.

(3) 2 levels of K_2O :- $K_1=28$ and $K_2=56$ Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3.05m. × 1.22m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Satisfactory. (ii) N.A. (iii) Yield of beans (iv) (a) 1960-only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 3010 Kg/ha. (ii) 1223 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of beans in Kg/ha.

Control yield = 3333 Kg/ha

	N ₁	N ₂	K ₁	K ₂	Mean
P ₁	3176	2686	3333	2529	2931
P ₂	2696	3322	2676	3342	3009
Mean	2936	3004	3004	2936	2970
K ₁	2980	3029			
K ₂	2892	2980			

Crop :- Vegetable Marrow**Ref :- H.P. 64(284).****Site :- Vegetable Res. Stn., Katrian.****Type :- 'M'.****Object ; To study the effect of different levels of N and P on the seed yield.****1. BASAL CONDITIONS :**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 7.4.64. (iv) (a) to (e) N.A. (v) N.A. (vi) White Bush. (vii) Irrigated. (viii) and (ix) N.A. (x) Aug. to Sep., 64.

2. TREATMENTS :

All combinations of (1) and (2).

(1) 3 levels of N : -N₀=0, N₁=25 and N₂=50 Kg/ha.(2) 2 levels of P₂O₅ : -P₀=0 and P₁=25Kg/ha.**3. DESIGN**

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/1709.99 ha. (v) N.A. (vi) Yes.

4. GENERAL

(i) and (ii) N.A. (iii) Yield of seed and No. of fruits. (iv) (a) 1964—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 216 Kg/ha. (ii) 55.1Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of Marrow in Kg/ha.

	N ₀	N ₁	N ₂	Mean
P ₀	109	220	306	212
P ₁	97	169	397	221
Mean	103	194	352	216

C.D. for N marginal means = 58.7 Kg/ha.

Crop :- Sugarbeet.**Ref :- H.P. 63(258).****Site :- Vegetable Res. Sub-Stn., Beach.****Type :- 'M'.**

Object : To see the effect of Nitrogen in the absence or presence of common salt.

1. BASAL CONDITIONS:

(i) (a) Peas—Tomato—Sugar beet. (b) Tomato. (c) F.Y.M. was applied. (ii) N.A. (iii) 1.8.63. (iv) (a) to (c) N.A. (d) 45cm. between rows. (e) N.A. (v) 461Q/ha of F.Y.M. was applied. (vi) Erotype E. (vii) Irrigated. (viii) Weeding. (ix) 152.4 cm. to 177.8cm. (x) N.A.

2. TREATMENTS and 3. DESIGN

Same as in Expt. No. 63 (152) conducted at Solan and presented on page No. 304.

4. GENERAL :

(i) N.A. (ii) No. (iii) Yield of sugarbeet. (iv) (a) 1963— only. (b) No. (c) Nil. (v) Solan (vi) and (vii) Nil.

5. RESULTS :

(i) 147.5Q/ha. (ii) (a) 23.7Q/ha. (b) 2.0Q/ha. (iii) Main effect of S is highly significant and interaction T×S is significant. (iv) Av. yield of sugarbeet in Q/ha.

	T ₀	T ₁	T ₂	T ₃	T ₄	Mean
S ₀	127.6	139.2	143.4	147.1	148.9	141.2
S ₁	140.8	150.5	152.6	163.7	161.1	153.7
Mean	134.2	144.9	148.0	155.4	155.0	147.5

C.D. for S marginal means=1.3Q/ha.

C.D. for S means at the same level of T means=3.0Q/ha.

C.D. for T means at the same level of S means=18.0Q/ha.

Crop :- Sugarbeet.**Ref :- H.P. 64(134), 65(180).****Site :- Agri. Farm, Dhaula Kuan.****Type :- 'M'.**

Object :—To study the optimum dose of F.Y.M. for sugarbeet crop.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy. (iii) 3.10.64 ; N.A. (iv) (a) 3 ploughings. (b) and (c) N.A. (d) 46cm. apart. (e) N.A. (v) As per treatments. (vi) Romona Kaya ; Erotylu (mid-season). (vii) Irrigated. (viii) N.A. (ix) N.A. ; 153.0cm. (x) 26.10.65 ; N.A.

2. TREATMENTS:4 doses of F.Y.M. :—F₀=control, F₁=184.5, F₂=322.8 and F₃=461.1 Kg/ha.**3. DESIGN:**

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 6. (iv) (a) and (b) 3.05m.×1.83m. (v) Nil. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of sugarbeet. (iv) (a) 1964-65. (b) N.A. (c) Results of combined analysis are presented under 5. Results. (v) Solan. (vi) N.A. (vii) Error variances are homogeneous and Treatments \times Years interaction is absent.

5. RESULTS:

Pooled Results

(i) 274.1Q/ha. (ii) 92.5Q/ha (based on 33d.f. made up of Treatments \times Years interaction and pooled error). (iii) Treatment differences are significant. (iv) Av. yield of Sugarbeet in Q/ha.

Treatment	F ₀	F ₁	F ₂	F ₃
Av. yield	217.4	286.0	346.1	247.1

C.D. = 76.9Q/ha.

Individual results

Treatment	F ₀	F ₁	F ₂	F ₃	Sig.	G.M.	S.E./plot
Year							
1964	212.9	292.4	305.0	289.1	N.S.	274.8	82.6
1965	221.9	279.6	387.2	205.1	*	273.5	95.9
Pooled	217.4	286.0	346.1	247.1	*	274.1	92.5

Crop :- Sugarbeet.

Ref :- H.P. 63(152), 64(140).

Site :- Vegetable Res. Stn., Solan.

Type :- 'M'.

Object:—To study the comparison of A/s *vs.* Sodium Nitrate in the presence and absence of common salt on the yield of Sugarbeet.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Loamy. (iii) 25.7.63; 5.8.64. (iv) (a) to (e) N.A. (v) 461.1 Q/ha of F.Y.M.; 184.5Q/ha of F.Y.M. (vi) Romona Kaya. (vii) Irrigated; Unirrigated. (viii) to (x) N.A.

2. TREATMENTS:

Main-plot treatments:

5 nitrogenous treatments: T₀ = control, T₁ = 251.1Kg/ha of A/s, T₂ = 502.1Kg/ha of A/s, T₃ = 313.8Kg/ha of sod. nitrate and T₄ = 627.6Kg/ha of sod. nitrate.

Sub-plot treatments:

2 salt treatments: S₀ = No salt and S₁ = 439.4Kg/ha of common salt was applied in half plot objects treatment.

3. DESIGN:

(i) Split-plot. (ii) (a) 5 main-plots/replication, 2 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 6.10m. \times 3.66m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of sugarbeet. (iv) (a) 1963-64. (b) No. (c) Nil. (v) Boach. (vi) Nil. (vii) Sub-plot error variances are heterogeneous. Hence individual years results are presented under 5. Results.

5. RESULTS:

63 (152)

(i) 145.7Q/ha. (ii) (a) 31.9Q/ha. (b) 4.1Q/ha. (iii) Main effect of S alone is highly significant. (iv) Av. yield of Sugarbeet in Q/ha.

	T ₀	T ₁	T ₂	T ₃	T ₄	Mean
S ₀	118.7	135.4	141.9	143.7	147.0	137.3
S ₁	136.2	147.6	154.6	164.1	168.1	154.1
Mean	127.4	141.5	148.2	153.9	157.6	145.7

C.D. for S marginal means=2.65Q/ha.

64 (140)

(i) 147.5Q/ha. (ii) (a) 23.8Q/ha. (b) 2.0Q/ha. (iii) Main effect of S is highly significant and interaction T×S is significant. (iv) Av. yield of sugarbeet in Q/ha.

	T ₀	T ₁	T ₂	T ₃	T ₄	Mean
S ₀	126.9	139.3	143.4	147.1	148.9	141.1
S ₁	141.1	150.5	152.6	163.4	161.5	153.8
Mean	134.0	144.9	148.0	155.2	155.2	147.5

C.D. for S marginal means=1.23Q/ha.

C.D. for S means at the same level of T means=2.86Q/ha.

C.D. for T means at the same level of S means=25.9 Q/ha.

Crop :- Sugarcane, (Ratoon).

Ref :- H.P. 65(176)

Site :- Crop. Res. Stn., Dhaulakuan (Sirmur).

Type :- 'C'.

Object : To find out the optimum seed rate and spacing for Sugarcane crop.

1. BASAL CONDITIONS:

(i) (a) Nil. (b) Sugarcane. (c) 67Kg/ha of N as C/A/N. (ii) Sandy loam. (iii) N.A. (iv) (a) and (b) Nil. (c) Nil as ratoon crop. (d) As per treatments. (e) — (v) 67Kg/ha of N, $\frac{1}{2}$ at early rains and $\frac{1}{2}$ at earthing up (vi) Coj. 46. (vii) Unirrigated. (viii) 3 hoeings and one earthing up. (ix) N.A. (x) 17.3.66 to 25.3.66.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 3 seed rates :- R₁=74000, R₂=86000 and R₃=99000 two budded sets/ha.

(2) 3 spacings :- S₁=45.7, S₂=61.0 and S₃=76.2cm.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 9.14m.×3.66m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of sugarcane. (iv) (a) 1965—only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 700.9 Q/ha. (ii) 122.9Q/ha. (iii) None of the effects is significant. (iv) Av. yield of sugarcane in Q/ha.

	S ₁	S ₂	S ₃	Mean
R ₁	653.3	689.9	633.9	659.0
R ₂	618.2	769.9	749.0	712.4
R ₃	710.8	791.6	691.4	731.3
Mean	660.8	750.5	691.4	700.9

Crop :- Sugarcane.

Site :- Crop. Res. Stn. Dhaula Kuan (Sirmur).

Ref :- H.P. 65(175).

Type :- 'C'.

Object : To find out the spacings and seed rate for Sugarcane crop.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) Fallow. (c) Nil. (ii) Sandy loam. (iii) 10/ 11.3.65. (iv) (a) 5 ploughings. (b) N.A. (c) and (d) As per treatments. (e) N.A. (v) 67Kg/ha. of N, $\frac{1}{2}$ at sowing and $\frac{1}{2}$ at earthing up. (vi) N.A. (vii) Unirrigated. (viii) 3 hoeings and 1 earthing up. (ix) 132.7cm. (x) 25 to 30.3.66.

2. TREATMENTS:

2 Treatments to 4. General :—Same as in Expt. no. H.P. 65 (176) conducted on page no. 305.

5. RESULTS :

(i) 528.5Q/ha. (ii) 128.5 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of sugarcane in Q/ha.

	S ₁	S ₂	S ₃	Mean
R ₁	509.8	533.0	408.9	483.9
R ₂	514.3	463.4	559.1	512.3
R ₃	547.1	611.4	609.2	589.3
Mean	523.7	535.9	525.7	528.5

Crop :- Groundnut (Kharif).

Site :- Agri. Farm Haripura.

Ref :- H.P. 64(292).

Type :- 'C'.

Object. :—To find out the effect of earthing up and spacing on the yield of Groundnut.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 2 earthingup :—E₀=No earthingup and E₁=Earthingup.(2) 4 spacings :—S₁=61cm. × 10cm., S₂=46cm. × 10cm., S₃=30cm. × 15cm. and S₄=23cm. × 20cm.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 8. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 3'05m. × 3'05m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of pod (iv) (a) 1964-only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 964Kg/ha. (ii) 171.6 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of pod in Kg/ha.

	S ₁	S ₂	S ₃	S ₄	Mean
E ₀	1022	1009	909	997	984
E ₁	909	972	922	972	944
Mean	966	990	916	984	964

Crop :- Sesamum.**Ref :- H.P. 64(293).****Site :- Agri. Farm, Haripura.****Type :- 'C'.****Object :-**To find out the suitable date of sowing for Sesamum.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS:

5 dates of sowing : D₁=25.5.64, D₂=4.6.64, D₃=14.6.64, D₄=25.6.64 and D₅=5.7.64.

3. DESIGN :

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3'66m. × 2'44m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of sesamum. (iv) (a) 1964—only. (b) No. (c) Nil. (v) N.A. (vi) Nil. (vii) Treatment D₅ failed and hence the analysis was carried out with 4 treatments only.

5. RESULTS :

(i) 307 Kg/ha. (ii) 170.8 Kg/ha. (iii) Treatment differences are significant. (iv) Av. yield of sesamum in Kg/ha.

Treatment	D ₁	D ₂	D ₃	D ₄
Av. yield	575	266	252	134

C.D.=273.2 Kg/ha.

Crop :- Sarson (Rabi).**Ref :- H.P. 62(111).****Site :- Agri. Res. Farm, Dhaula Kuan.****Type :- 'M'.****Object :-**To study the effect of different levels of N & P on the yield of Sarson.**1. BASAL CONDITIONS:**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 2.11.62. (iv) (a) and (b) N.A. (c) 7 Kg/ha. (d) and (e) N.A. (v) N.A. (vi) B.S.G.—I. (vii) Irrigated. (viii) and (ix) N.A. (x) 21.3.63.

2. TREATMENTS :

All combinations of (1) and (2) :

(1) 4 levels of N as A/S : $N_0=0$, $N_1=22.4$, $N_2=33.6$ and $N_3=44.8$ Kg/ha.(2) 4 levels of P_2O_5 as Super : $P_0=0$, $P_1=17.9$, $P_2=26.9$ and $P_3=35.9$ Kg/ha.**3. DESIGN :**(i) Fact. in R.B.D. (ii) (a) 16. (b) N.A. (iii) 4. (iv) (a) 6'71m. \times 1'83m. (b) 5'49m. \times 1'37m. (v) 61cm. \times 23cm. (vi) Yes.**4. GENERAL:**

(i) Normal. (ii) N.A. (iii) Yield of Sarson. (4) (a) 1962-63 (Design modified in 63). (b) No. (c) Nil. (v) Nil. (vi) and (vii) N.A.

5. RESULTS :

(i) 201 Kg/ha. (ii) 91.6 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of Sarson in Kg/ha.

	P_0	P_1	P_2	P_3	Mean
N_0	227	164	177	150	180
N_1	154	120	182	153	152
N_2	226	229	129	178	190
N_3	228	291	351	258	282
Mean	209	201	210	185	201

C.D. for N marginal means=65.3 Kg/ha.

Crop :- Brown Sarson (Rabi).**Ref :- H.P. 63(196).****Site :- Agri. Res. Stn., Dhaula Kuan.****Type :- 'M'.****Object :-**To find out the Optimum dose of N and P for the Sarson Crop.**1. BASAL CONDITIONS :**(i) (a) Nil. (b) Sunn—hemp (G.M.). (c) 112.1 Kg/ha. of P_2O_5 . (ii) Sandy loam. (iii) 31.10.63. (iv) (a) 4 ploughings. (b) and (c) N.A. (d) 30cm. \times 23cm. (e) N.A. (v) Nil. (vi) B.S.G.—I. (vii) Un irrigated (viii) 2 weedings and 2 hoeings. (ix) 17cm. (x) 30.3.64.**2. TREATMENTS :****Main-plot treatments:**4 levels of N as C/A/N :— $N_0=0$, $N_1=22.4$, $N_2=33.7$ and $N_3=44.8$ Kg/ha.

Sub-plot treatments :

4 levels of P_2O_5 as Super :— $P_0=0$, $P_1=17.9$, $P_2=26.9$ and $P_3=35.9$ Kg/ha..

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication and 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) 4.88m. × 3.05m. (b) 4.27m. × 2.44m. (v) 30cm. × 30cm. (vi) Yes.

4. GENERAL :

(i) Poor. (ii) Nil. (iii) Yield of sarson. (iv) (a) 1962-63 (Design modified in 63). (b) No. (c) Nil. (v) (a) and (b) Nil. (vi) Failed due to pest. (vii) Nil.

5. RESULTS :

(i) 41Kg/ha. (ii) (a) 22.6 Kg/ha. (b) 9.2 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of sarson in Kg/ha.

	N_0	N_1	N_2	N_3	Mean
P_0	40	46	39	46	43
P_1	28	36	49	42	39
P_2	37	45	46	43	43
P_3	36	42	44	43	41
Mean	35	42	44	44	41

Crop :- Linseed (Rabi).

Ref :- H.P. 62(59).

Site :- Oilseed Sub-Stn., Kangra.

Type :- 'M'.

Object :—To study the effect of different levels of N, P and K on the yield of Linseed.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 22.9.62. (iv) (a) 3 ploughings. (b) Broadcasting. (c) to (e) N.A. (v) Nil. (vi) K_2 . (vii) Irrigated. (viii) 1 hoeing and 3 weedings. (ix) N.A. (x) 2nd week of April.

2. TREATMENTS :

All combinations of (1), (2) and (3)

(1) 3 levels of N : $N_0=0$, $N_1=22.4$ and $N_2=44.8$ Kg/ha.

(2) 3 levels of P_2O_5 as Super : $P_0=0$, $P_1=22.4$ and $P_2=44.8$ Kg/ha.

(3) 3 levels of K_2O as Pot. sul. : $K_0=0$, $K_1=22.4$, $K_2=44.8$ Kg/ha.

3. DESIGN:

(i) 3^3 confd. (ii) (a) 9 plots/block, 3 blocks/replication. (b) N.A. (iii) 2. (iv) (a) and (b) 1/449.5. ha. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of Linseed. (iv) (a) 1960—62 (Doses for 1960 N.A. and yield data for 1961 N.A.). (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 698 Kg/ha. (ii) 96.7Kg/ha. (iii) Main effects of N and P are highly significant while that of K is significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	K ₀	K ₁	K ₂	Mean
P ₀	603	806	907	683	821	812	772
P ₁	541	678	806	646	667	712	675
P ₂	521	595	819	597	648	690	645
Mean	555	693	844	642	712	738	698
K ₀	491	671	764				
K ₁	543	693	899				
K ₂	630	716	869				

C.D. for N or P or K marginal means=66.8Kg/ha.

Crop :- Linseed (*Rabi*)

Ref :- H.P. 63(69), 64(47), 65(118).

Site :- Oil Seed Sub-Stn., Kangra.

Type :- 'M'.

Object:—To study the effect of graded doses of Nitrogen on the yield of Linseed crop.

1. BASAL CONDITIONS:

(i) (a) Soyabean-Linseed. (b) Soyabean. (c) N.A. (ii) Clay Loam. (iii) 18.10.63; 6.11.64; 15.11.65. (iv) (a) 3 ploughings. (b) Broadcasting; Kera; N.A. (c) 59 Kg/ha. (d) 23cm.×10cm. (e) N.A. (v) Nil. (vi) K-2. (vii) Irrigated. (viii) 1 hoeing and 3 weedings. (ix) N.A. (x) Last week of April.

2. TREATMENTS:

6 levels of N as C/A/N:—N₀=0, N₁=22.4, N₂=44.8, N₃=67.2, N₄=89.6 and N₅=112Kg/ha.

3. DESIGN:

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/398.4ha. for 63, 7.77m.×2.82m. for others. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of seed. (iv) (a) 1963-65. (b) No. (c) Results of combined analysis are presented under 5 Results. (v) and (vi) N.A. (vii) Error variances are homogeneous and 'Treatments×Years' interaction is present.

5. RESULTS:

(i) 578Kg/ha. (ii) 149.7Kg/ha. (based on 10 d.f. made up of Treatments×Years interaction). (iii) Treatment differences are highly significant. (iv) Av. yield of linseed in Kg/ha.

Treatment	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅
Av. yield	385	492	552	638	643	760

C.D.=166.8Kg/ha.

Individual results :

Treatment	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅	Sig.	G M.	S.E./plot
Year 1963	353	474	513	581	702	906	**	588	88.1
1964	465	563	569	701	620	764	*	614	118.8
1965	337	439	574	632	607	611	**	533	188.8
Pooled	385	492	552	638	643	760	**	578	149.7

Crop :- Linseed.

Ref :- H.P. 60 and 61(S.F.T.)
for Kangra.

Site :- District : Kangra.

Type :- 'M'.

Object :—Type A : To study the response of different levels of N, P and K applied individually and in combination on the yield of Groundnut crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Hilly. (iii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure).

N=22.4Kg/ha. of N.

P=22.4Kg/ha. of P₂O₅.K=22.4Kg/ha. of K₂O.NP=22.4Kg/ha. of N+22.4Kg/ha. of P₂O₅.NK=22.4Kg/ha. of N+22.4Kg/ha. of K₂O.PK=22.4 Kg/ha. of P₂O₅+22.4 Kg/ha. of K₂ONPK=22.4Kg/ha. of N+22.4Kg/ha. of P₂O₅+22.4Kg/ha. of K₂O.

3. DESIGN :

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle/thana is changed once in two years within the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on Kharif cereal, 8 on a rabi cereal, 8 on cash crop, 4 on an oilseed crop and 3 on a leguminous crop. Half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. The three trials on legumes are of type C, residual effects of Phosphate application are studied on Type C trials in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98.8 ha. (b) 1/1977 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of Linseed. (iv) (a) 1960 to 61. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Av. response in Kg/ha.

60 (S.F.T)

District	No. of trials	Control yield in Kg/ha.	N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Kangra	4	400	190	170	100	11.0	0	40	0	0	14.0

61 (S.F.T.)

Kangra	5	500	210	40	110	43.0	-10	40	-30	-40	41.0
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Crop :- Linseed.

**Ref :- H.P. 60 and 61(S.F.T.)
for Kangra.**

Site :- District : Kangra.

Type :- 'M'.

Object :-Type B—To investigate the relative efficiency of different fertilizers at different doses.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Hilly. (iii) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (No manure).

N₁=22.4Kg/ha. of N as A/S.

N₂=44.8Kg/ha. of N as A/S.

N₁'=22.4Kg/ha. of N as urea.

N₂'=44.8Kg/ha. of N as urea.

N₁''=22.4Kg/ha. of N as C/A/N.

N₂''=44.8Kg/ha. of N as C/A/N.

3. DESIGN :

Same as in type A conducted on Linseed crop on page No. 311.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of Linseed. (iv) (a) 1960 to 61. (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS:

		Av. response in Kg/ha.							
60(SFT)		Control yield in Kg/ha.	N ₁	N ₂	N ₁ '	N ₂ '	N ₁ ''	N ₂ ''	S.E.
District	No. of trials								
Kangra	5	380	160	340	60	270	160	350	53.0

61(SFT)		Control yield in Kg/ha.	N ₁	N ₂	N ₁ '	N ₂ '	N ₁ ''	N ₂ ''	S.E.
District	No. of trials								
Kangra	4	320	170	460	110	290	250	400	53.0

Crop :- Linseed (Rabi).

Ref :- H.P. 62(S.F.T.) for Kangra.

Site :- District : Kangra.

Type :- 'M'.

Object :-Type A₁ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments;

O=Control (no manure).

 $N_1=35\text{Kg/ha. of N,}$ $N_2=70\text{Kg/ha. of N.}$ $P_1=25\text{Kg/ha. of }P_2O_5.$ $N_1P_1=35\text{Kg/ha. of N}+25\text{ Kg/ha. of }P_2O_5,$ $N_2P_1=70\text{Kg/ha. of N}+25\text{Kg/ha. of }P_2O_5.$ $N_2P_2=70\text{Kg/ha. of N}+50\text{Kg/ha. of }P_2O_5.$ $N_2P_2K_1=70\text{Kg/ha. of N}+50\text{Kg/ha. of }P_2O_5+25\text{Kg/ha. of }K_2O.$

3. DESIGN :

(i) and (ii) A selected district is divided into four agriculturally homogeneous zones based on climate, soil, cropping pattern etc. In each zone one block is selected at random. A block normally consists of a group of 50-100 villages. In each block 36 experiments are conducted in a year of which 11 are of type A_1 , 11 of type A_2 , 11 of type A_3 and 3 are of type C. The eleven experiments under type A_1 , A_2 and A_3 are distributed as 3 on a Kharif cereal, 3 on Rabi cereal, 3 on cash crop and 2 on oil seed. All the three type-C experiments are conducted on a legume crop. For the purpose of conducting the A_1 , and A_2 and A_3 experiments 11 villages are randomly selected in each block and in each village 3 experiments one each of type A_1 , A_2 and A_3 are laid out. For conducting the three villages are randomly selected in each block. (iii) (a) 1/100 ha. (b) 1/200 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

Av. response in Kg/ha.

62(SFT)

Treatment	N_1	N_2	P_1	N_1P_1	N_2P_1	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of yield in Kg/ha.	60	103	16	119	141	169	190	27.2

Control yield=255Kg/ha. No of trials=2

Crop :- Wheat (Rabi).

Ref :- H.P. 62(S.F.T.) for Kangra

Site : District : Kangra.

Type :- 'M'.

Object :—Type A_2 : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure)

 $N_1=35$ Kg/ha. of N, $P_1=25$ Kg/ha. of P_2O_5 , $P_2=50$ Kg/ha. of P_2O_5 , $N_1P_1=35$ Kg/ha. of N+25Kg/ha. of P_2O_5 , $N_1P_2=35$ Kg/ha. of N+50Kg/ha. of P_2O_5 , $N_2P_2=70$ Kg/ha. of N+50 Kg/ha. of P_2O_5 and $N_2P_2K_2=70$ Kg/ha. of N+50Kg/ha. of P_2O_5 +50 Kg/ha. of K_2O .

3. DESIGN :

Same as in type A_1 conducted on linseed crop on page No. 313.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) 1962 only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Av. response in Kg/ha

62(SFT)

Treatment	N_1	P_1	P_2	N_1P_1	N_1P_2	N_2P_2	$N_2P_2K_2$	S.E.
Av. response of yield in Kg/ha.	108	114	49	169	190	255	255	59.1

Control yield=233Kg/ha No. of trials=2

Crop :- Linseed (*Rabi*).

Ref :- H.P. 62(SFT) for Kangra.

Site :- District : Kangra.

Type :- 'M'.

Object :—Type A_2 : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

 $N_1=35$ Kg/ha. of N, $K_1=25$ Kg/ha. of K_2O , $K_2=50$ Kg/ha. of K_2O , $N_1K_1=35$ Kg/ha. of N+25 Kg/ha. of K_2O , $N_1K_2=35$ Kg/ha. of N+50 Kg/ha. of K_2O , $N_2K_2=70$ Kg/ha. of N+50 Kg/ha. of K_2O and $N_1P_1K_1=35$ Kg/ha. of N+25 Kg/ha. of P_2O_5 +25 Kg/ha. of K_2O .

3. DESIGN :

Same as in type A_1 conducted on Linseed crop on page No. 313.

4 GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Av. response in Kg/ha.

52(SFT)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	130	15	32	157	168	331	228	38.4

Control yield=358 Kg/ha. ; No. of trials=2

Crop :- Linseed.

Site :- Crop Res. Sub-Stn., Sundernagar.

Ref :- H.P. 63(264)

Type :- 'C'.

Object :—To find out a suitable date of sowing.

1. BASAL CONDITIONS

(i) (a) Nil. (b) Paddy. (c) 45 Kg/ha. of N+28 Kg/ha. of P₂O₅+28 Kg/ha. of K₂O. (ii) Clay (iii) As per treatments (iv) (a) and (b) N.A. (c) 20 Kg/ha. (d) 23 cm. between rows (e) N.A. (v) N.A. (vi) K-2 (medium) (vii) Unirrigated. (viii) Weeding. (ix) N.A. (x) During the months of April and May.

2. TREATMENTS :

4 dates of sowing :—D₁=15th Oct., D₂=21st Oct., D₃=31st Oct., and D₄=10th November.

3. DESIGN :

(i) R.B.D. (ii) (a) 4 (b) N.A. (iii) 5. (iv) (a) 4.57 m.×2.29 m. (b) 3.96 m.×1.83 m. (v) 30.5 cm.×23 cm. (vi) Yes.

4. GENERAL :

(i) Normal (ii) Nil (iii) Yield of linseed. (iv) (a) 1963—only (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 696 Kg/ha. (ii) 133.0 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of Linseed in Kg/ha.

Treatment	D ₁	D ₂	D ₃	D ₄
Av. yield	999	856	599	331

C.D.=183 Kg/ha.

Crop :- Linseed (Rabi).

Site :- Agri. Res. Stn., Dhaulakuan.

Ref :- H.P. 63(193).

Type :- 'CM'.

Object :—To find out the optimum dose of fertilizers and seed rate for Linseed crop.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) Sunnhemp (G.M.). (c) 247.1Kg/ha. of Super. (ii) Sandy loam (iii) 28.10.63. (iv) (a) 4 ploughings. (b) N.A. (c) As per treatments. (d) 23 cm. between rows. (e) 1. (v) Nil. (vi) K-2 (Medium). (vii) Un-irrigated (viii) 2 weedings. (ix) 17 cm. (x) 29/30.4.64.

2. TREATMENTS :

All combinations of (1), (2) and (3)

(1) 3 seed rates :— $S_1=37$, $S_2=49$ and $S_3=62$ kg/ha.

(2) 3 levels of N as C/A/N :— $N_1=22.4$, $N_2=44.8$ and $N_3=67.3$ Kg/ha.

(3) 3 levels of P_2O_5 :— $P_0=0$, $P_1=17.9$ and $P_2=35.9$ Kg/ha.

3. DESIGN :

(i) 3^3 partially balanced confd. (ii) (a) 3 blocks/replication and 9 plots/block. (b) N.A. (iii) 4. (iv) (a) 6.70m. \times 1.83m. (b) 6.10m. \times 1.37m. (v) 30cm. \times 23cm. (vi) Yes.

4. GENERAL :

(i) Poor. (ii) Linseed rust infection. (iii) Yield of Linseed. (iv) (a) 1963—only. (b) No. (c) Nil. (v) Nil. (vi) N.A. (vii) Crop almost failed due to frost and Linseed rust.

5. RESULTS :

(i) 381Kg/ha. (ii) 108.0Kg/ha. (iii) Main effect of N alone is significant. (iv) Av. yield of linseed in Kg/ha.

	N_1	N_2	N_3	P_0	P_1	P_2	Mean
S_1	386	338	351	342	354	379	358
S_2	422	378	400	410	406	385	400
S_3	449	380	325	382	402	370	385
Mean	419	365	359	378	387	378	381
P_0	391	380	364				
P_1	445	344	373				
P_2	422	372	340				

C.D. for N marginal means=50.9Kg/ha.

Crop :- Linseed (Rabi).

Ref :- H.P. 64(48).

Site :- Oilseed Sub-Stn., Kangra.

Type :- 'CM'.

Object :-To study the effect of different seed—rates and different times of application of N on the yield of Linseed.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 30.9.64. (iv) one ploughing by soil turning plough, 2 ploughings by *deshi* plough. (b) Broadcasting. (c) As per treatments. (d) and (e) N.A. (v) Nil. (vi) LC-185. (vii) Irrigated. (viii) 1 hoeing and 3 weedings. (ix) N.A. (x) 2nd week of April.

2. TREATMENTS :

All combinations of (1) and (2)

- (1) 3 seed rates :— $S_1=18.5$, $S_2=24.7$ and $S_3=30.9$ Kg/ha.
 (2) 3 times of application of N at 44.5 Kg/ha. T_1 —At sowing time, T_2 —One month after sowing and T_3 —Two months after sowing.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) and (b) $2.74m. \times 4.91m.$ (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of Linseed. (iv) (a) 1964-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 427 Kg/ha. (ii) 102.2 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of linseed in Kg/ha.

	T_1	T_2	T_3	Mean
S_1	334	361	408	368
S_2	463	426	463	451
S_3	445	454	491	463
Mean	414	414	454	427

Crop :- Linseed (Rabi).

Ref :- H.P. 63(61).

Site :- Oilseed Sub-Strn., Kangra.

Type :- 'CM'.

Object :- To study the effect of different spacings and different times of application of N on the yield of Linseed.

1. BASAL CONDITIONS :

(i) (a) Paddy—linseed. (b) Paddy. (c) Nil. (ii) Clay loam. (iii) 10.11.63. (iv) (a) one ploughing by soil turning plough, 2 ploughings by *deshi* plough. (b) Kera. (c) 49.4 Kg/ha. (d) $10cm. \times 28cm.$ (e) N.A. (v) Nil. (vi) K—2. (vii) Irrigated. (viii) one hoeing, 2 weedings. (ix) N.A. (x) Last week of April.

2. TREATMENTS :

All combinations of (1) and (2)

- (1) 2 spacings between rows: $S_1=15cm.$ and $S_2=23cm.$
 (2) 4 times of application of N : T_0 —No N, T_1 —full dose of N at sowing, T_2 —Full dose of N after one month and T_3 — $\frac{1}{2}$ dose of N at sowing + $\frac{1}{2}$ dose after one month.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) $7.28m. \times 3.66m.$ (b) $6.31m. \times 3.20m.$ (v) $48cm. \times 23cm.$ (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of linseed. (iv) (a) 1963—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 338Kg/ha. (ii) 64.3Kg/ha. (iii) Main effect of T alone is highly significant. (iv) Av. yield of linseed in Kg/ha.

	T ₀	T ₁	T ₂	T ₃	Mean
S ₁	219	410	356	414	350
S ₂	220	331	387	367	326
Mean	220	370	372	390	338

C.D. for T marginal means = 66.9Kg/ha.

Crop :- Chillies (Capsicum)

Ref. :- H.P. 60(71).

Site :- Vegetable Res. Stn., Bhagot.

Type :- 'M'.

Object: To study the effect of different levels of N, P and K on the yield of Capsicum.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loamy. (iii) 19.4.60. (iv) and (v) N.A. (vi) California wonder. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 29.6.60 to 20.8.60.

2. TREATMENTS :

All combinations of (1), (2) and (3)+control (no manure)

(1) 2 levels of N :—N₁=56, N₂=84Kg/ha.

(2) 2 levels of P₂O₅ :—P₁=56, P₂=84Kg/ha.

(3) 2 levels of K₂O :—K₁=28, K₂=44.8Kg/ha.

Sources of N, P and K and time of Application—N.A.

3. DESIGN :

(i) R.B.D. (ii) (a) 9. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 3.05m. × 1.22m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of Capsicum. (iv) (a) 1960—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 63.3 Q/ha. (ii) 23.1 Q/ha. (iii) Only control vs. others effect is highly significant. (iv) Av. yield of capsicum in Q/ha.

Control yield = 116.6 Q/ha.

	P ₁	P ₂	K ₁	K ₂	Mean
N ₁	70.6	53.3	53.3	70.6	61.9
N ₂	50.2	52.3	51.0	51.5	51.2
Mean	60.4	52.8	52.1	61.0	56.6
K ₁	65.1	39.2			
K ₂	55.7	66.4			

C.D. for control Vs. others=30Kg/ha

Crop :- Chillies (Capsicum) (Kharif).
Site :- Vegetable Res. Stn., Katrian.

Ref :- H.P. 64(283).
Type :- 'M'.

Object: —To study the N and P requirements of chillies.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 30.5.64. (iv) (a) N.A. (b) Transplanting. (c) to (e) N.A. (v) N.A. (vi) California wonder. (vii) Irrigated. (viii) and (ix) N.A. (x) During the months of September and October 64.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 3 levels of N : N₀=0, N₁=49 and N₂=98 Kg/ha.

(2) 2 levels of P₂O₅ : —P₀=0 and P₁=49 Kg/ha.

3 DESIGN :

(i) Fact. in R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/1709.99 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of Capsicum. (iv) (a) 1964-65 (Expt. failed in 65). (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 67Kg/ha. (ii) 21.1Kg/ha. (iii) Main effect of N alone is significant. (iv) Av. yield of Capsicum in Kg/ha.

	P ₀	P ₁	Mean
N ₀	39	52	45
N ₁	67	81	74
N ₂	77	86	82
Mean	61	73	67

C.D. for N marginal means=22.5Kg/ha.

Crop :- Chillies (Kharif).**Ref :- H.P. 62(70).****Site:- Agri. Res. Stn. Dhaula Kuan.****Type :- 'M'.****Object :-**To study the effect of different levels of N, P and K on the yield of Chillies crop.**1. BASAL CONDITIONS :**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 17.3.62. (iv) (a) to (c) N.A. (d) 61cm. x 45cm. (e) N.A. (v) N.A. (vi) Solan yellow. (vii) Irrigated. (viii) and (ix) N.A. (x) 2.10.62 to 24.11.62.

2. TREATMENTS :

All combinations of (1), (2) and (3)+control,

(1) 2 levels of N as C/A/N :- $N_0=0$ and $N_1=56\text{Kg/ha}$.(2) 2 levels of P_2O_5 as Super : $P_0=0$ and $P_1=56\text{Kg/ha}$.(3) 2 levels of K_2O as Mur. pot. : $K_0=0$ and $K_1=56\text{Kg/ha}$.

280 Kg/ha. of F.Y.M. applied to all treatments except control.

3 DESIGN:

(i) R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/1495ha. (v) N.A. (vi) Yes.

4 GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of Capsicum. (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 532Kg/ha. (ii) 328.9Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of Capsicum in Kg/ha.

Control=392Kg/ha.

	P_0	P_1	K_0	K_1	Mean
N_0	494	481	371	603	487
N_1	614	614	781	447	614
Mean	554	547	576	525	550
K_0	593	559			
K_1	515	535			

Crop :- Zira (Beldseed).**Ref :- H.P. 64(290).****Site : Zira and Saffron Res. Stn., Sangla District (Kinnaur).****Type :- 'M'.****Object .—**To assess the best date of fertilizer.**1. BASAL CONDITIONS:**

(i) (a) to (c) N.A. (ii) Sandy (iii) 11.10.64 (iv) (a) to (c) N.A. (d) 30.5 cm. x 7.6 cm. (e) N.A. (v) N.A. (vi) Rekehhan. (vii) Irrigated. (viii) weedings. (ix) 43.6 cm. (x) 15.7.66.

2. TREATMENTS:

All Combinations of (1) and (2).

(1) 4 levels of N:— $N_0=0$, $N_1=22.4$, $N_2=44.8$ and $N_3=67.2$ Kg/ha.(2) 4 levels of P_2O_5 :— $P_0=0$, $P_1=17.9$, $P_2=26.9$ and $P_3=35.9$ Kg/ha**3. DESIGN:**

(i) Fact. in R.B.D. (ii) (a) 16. (b) N.A. (iii) 3. (iv) (a) 3.35 m. × 2.44m. (b) 3.05 m. × 2.13 m. (v) 15cm. × 15cm. (vi) Yes.

4. GENERAL:

(i) Good. (ii) Nil. (iii) Yield of zira. (iv) (a) 1964-66 (data for 65 is N.A.). (b) No. (c) Nil (v) to (vii) Nil.

5. RESULTS:

(i) 638 Kg/ha. (ii) 212.5 Kg/ha (iii) Main effect of N alone is highly significant (iv) Av. yield of zira in Kg/ha.

	N_0	N_1	N_2	N_3	Mean
P_0	436	924	667	1026	763
P_1	436	399	462	769	507
P_2	436	539	539	1026	635
P_3	487	390	744	975	649
Mean	449	553	603	949	638

C. D. for N or P marginal means—177.1 Kg/ha.

Crop :- Zira (bold seed).**Ref :- H.P. 64(289).****Site :- Zira and Saffron Res. Sta., Sangla
District : Kinnaur.****Type :- 'C'.****Object :-**To find out the best date of sowing.**1. BASAL CONDITIONS:**

(i) (a) to (c) N.A. (ii) Sandy. (iii) As per treatments. (iv) (a) 3 ploughings. (b) and (c) N.A. (d) 30 cm. × 7.5 cm. (e) N.A. (v) N.A. (vi) Rakchham. (vii) Irrigated. (viii) 3 weedings (ix) 43 cm. (x) 12.7.66

2. TREATMENTS:4 dates of sowing:— $D_1=10.10.64$, $D_2=25.10.64$, $D_3=9.11.64$ and $D_4=24.11.64$.**3. DESIGN:**

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 4 (iv) (a) 3.05m. × 2.44m. (b) 3.05m. × 2.44m. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Good. (ii) Nil. (iii) Yield of zira. (iv) (a) 1964-66 (1965 is N.A.). (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 355 Kg/ha. (ii) 120.2 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of zira in Kg/ha.

Treatment	D ₁	D ₂	D ₃	D ₄
Av. yield	309	642	266	202

C.D.=192.2 Kg/ha.

Crop :- Tea.

Ref :- H.P. 63(156), 64(148).

Site :- Govt. Tea Farm, Palampur.

Type :- 'M'.

Object :-To study the effect of different times of manuring on the yield of Tea.

1. BASAL CONDITIONS :

(i) N.A. (ii) Heavy clay. (iii) By seed. (iv) China Hybrid. (v) 19 42., 1.52m. x 0.76m. (vi) 1½ to 2 years. (vii) Nil. (viii) N.A. (ix) Nil. (x) Un-irrigated. (xi) N.A. (xii) April to Oct. during every year.

2. TREATMENTS:

5 different times of application of 134.4 Kg/ha. of N as A/s:—T₁=Whole in February, T₂=Whole in March, T₃=Whole in July, T₄=Half in February and half in July and T₅=Half in March and half in July.

3. DESIGN:

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 32. (v) and (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Weight of Tea leaves. (iv) 1963-contd. (v) to (viii) Nil.

5. RESULTS:

63(156) :

(i) 5164 Kg/ha. (ii) 915.5 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of green tea leaves in Kg/ha.

Treatment	T ₁	T ₂	T ₃	T ₄	T ₅
Av. yield	5851	5368	4936	4984	4680

64(148) :

(i) 7650 Kg/ha. (ii) 756.6 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of tea leaves in Kg/ha.

Treatment	T ₁	T ₂	T ₃	T ₄	T ₅
Av. yield	7696	8196	7519	7504	7335

Crop :- Tea.

Ref :- H.P. 63 (154), 64(144),

Site :- Govt. Tea Farm, Palampur.

Type :- 'M'.

Object :-To study the effect of different methods of application of manures on the yield of Tea.

1. BASAL CONDITIONS:

(i) N.A. (ii) Heavy clay. (iii) By seed. (iv) China Hybrid. (v) N.A., 1.52m. × 1.52m. (vi) 1½ to 2 years. (vii) Nil. (viii) N.A. (ix) Nil. (x) Un-irrigated. (xi) N.A. (xii) April to Oct. during every year.

2. TREATMENTS:

5 methods of application of manures :—M₁=Broad casting, M₂=Disc, M₃=Eye brow, M₄=Half Disc and M₅=Bangle.

Details of manures applied not available.

3. DESIGN :

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 36. (v) and (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Weight of tea leaves. (iv) 1963-contd. (v) to (viii) Nil.

5. RESULTS :

63(154)

(i) 2722 Kg/ha. (ii) 387.5 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of green leaves in Kg/ha.

Treatment	M ₁	M ₂	M ₃	M ₄	M ₅
Av. yield	2696	2491	3050	2681	2691

64(144)

(i) 2595 Kg/ha. (ii) 332.4 Kg/ha. (iii) Treatment differences are not significant (iv) Av. yield of tea leaves in Kg/ha.

Treatment	M ₁	M ₂	M ₃	M ₄	M ₅
Av. yield	2501	2342	2583	2824	2727

Crop : Tea.

Ref :- H.P. 64(247), 65(202).

Site :- Tea Exptl. Farm, Palampur.

Type :- 'M'.

Object :-To find the suitable method of fertilizer application for Tea plantation.

1. BASAL CONDITIONS :

(i) N.A. (ii) (a) Heavy clay (b) Nil. (iii) By seed (iv) China hybrid. (v) Planted in 1850 with 1.53m. × 0.61 m. spacing (vi) 1½ to 2 years. (vii) and (viii) N.A. (ix) Nil. (x) Unirrigated. (xi) 126.8cm. (xii) Plucking from April to Oct. at an interval of 10 days.

2. TREATMENTS :

5 times of application of 135 Kg/ha. of N :—T₁=Full dose in Feb., T₂=Full dose in March, T₃=Full dose in July, T₄=Half dose in Feb.+half dose in July and T₅=Half dose in March+half dose in July.

3. DESIGN :

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 30 bushes. (v) and (vi) Yes.

4. GENERAL :

(i) Fair. (ii) Nil. (iii) Yield of green leaves. (iv) 1964-66. (v) to (viii) Nil.

5. RESULTS :

64(24)

(i) 602 Kg/ha. (ii) 52.9 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of green leaves in Kg/ha.

Treatment	T ₁	T ₂	T ₃	T ₄	T ₅
Av. yield	631	617	591	620	552

65 (202)

(i) 667 Kg/ha. (ii) 93.7 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of green leaves in Kg/ha.

Treatment	T ₁	T ₂	T ₃	T ₄	T ₅
Av. yield	803	658	685	627	564

Crop :- Tea.**Ref :- H.P. 63(157), 64(146), 65(193).****Site :- Govt. Tea Farm, Palampar.****Type :- 'M'.**

Object :- To study the effect of different doses of N on the yield of Tea.

1. BASAL CONDITIONS:

(i) N.A. (ii) (a) Heavy clay. (b) N.A. (iii) By seed. (iv) China Hybrid. (v) Planted in 1850 in pits with 1.52m. x 1.52m. spacing and one seedling per hole. (vi) 1½ to 2 years. (vii) to (ix) Nil. (x) Un-irrigated (xi) N.A. (xii) April to end of Oct.

2. TREATMENTS:

4 levels of N as A/S :- N₀=0, N₁=44.8, N₂=89.6 and N₃ changed every year. It is 67.2 Kg/ha., 89.6Kg/ha, 112.0Kg/ha, 134.4Kg/ha. and 134.4Kg/ha. in 1963, 1964, 1965, 1966 and 1967 respectively.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 4 (iv) (a) N.A. (b) 36. (v) and (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Wt. of tea leaves. (iv) 1962-67 (1962 is N.A.) (v) No. (vi) and (vii) Nil (viii) N.A.

5. RESULTS :

63(157)

(i) 6233Kg/ha. (ii) 1133.6Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of green tea leaves in Kg/ha.

Treatment	N ₀	N ₁	N ₂	N ₃
Av. yield	6151	6162	6070	6551

64(146)

(i) 3449Kg/ha. (ii) 501.5Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of green tea leaves in Kg/ha.

Treatment	N ₀	N ₁	N ₂	N ₃
Av. yield	3056	3452	3875	3412

65(193)

(i) 3122Kg/ha. (ii) 450.2Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of green tea leaves in Kg/ha.

Treatment	N ₀	N ₁	N ₂	N ₃
Av. yield	2931	3071	3388	3098

Crop :- Tea.**Ref :- H.P. 62(138), 63(153), 64(143).****Site :- Govt. Tea Farm, Palampur.****Type :- 'C'.****Object :-**To study the effect of pruning at distances from the ground on the yield of Tea.**1. BASAL CONDITIONS :**

(i) N.A. (ii) (a) Heavy clay. (b) N.A. (iii) By seeds. (iv) China Hybrid. (v) N.A. ; 1'5cm. x 1'5cm. spacing. (vi) 1½ to 2 years. (vii) Nil. (viii) Pruning done as per treatments. (ix) Nil. (x) Un-irrigated. (xi) N.A. (xii) April to October.

2. TREATMENTS :4 distances of pruning from the ground :- D₁=8, D₂=15, D₃=23 and D₄=30cm.**3. DESIGN :**

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 3 ; 3 ; 2. (iv) (a) N.A. (b) 25. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Weight of tea leaves. (iv) 1962-contd. (1965-N.A.) (v) to (viii) Nil.

5. RESULTS:**62(138)**

(i) 864Kg/ha. (ii) 170.4Kg/ha. (iii) Treatment differences are not significant (iv) Av. yield of green leaves in Kg/ha.

Treatment	D ₁	D ₂	D ₃	D ₄
Av. yield	835	984	841	796

63(153)

(i) 2034Kg/ha. (ii) 529.7Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of green leaves in Kg/ha.

Treatment	D ₁	D ₂	D ₃	D ₄
Av. yield	1948	1994	2383	1813

64(143)

(i) 2574Kg/ha. (ii) 304.8Kg/ha. (iii) Treatment differences are significant. (iv) Av. yield of green leaves in Kg/ha.

Treatment	D ₁	D ₂	D ₃	D ₄
Av. yield	2422	1776	3506	2593

C.D. = 686.0Kg/ha.

Crop :- Tea.**Ref :- H.P. 62(131), 63(149), 64(142).****Site :- Govt. Tea Farm, Palampur.****Type :- 'C'.****Object :-**To study the effect of different levels of pruning in different years on the yield of Tea.**1. BASAL CONDITIONS :**

(i) N.A. (ii) (a) Heavy clay. (iii) By seed. (iv) China Hybrid. (v) N.A. ; 1'52cm. x 1'52cm. spacing. (vi) 1½ to 2 years. (vii) Nil. (viii) N.A. (ix) Nil. (x) Un-irrigated. (xi) N.A. (xii) April to end of October.

2. TREATMENTS:

4 levels of pruning: T₁=Biennial pruning: 1st year prune 2.5cm. above the last pruning level and 2nd year unpruned, T₂=Triennial pruning. 1st year prune at 2.5cm. new wood, 2nd and 3rd year unpruned but levelling of skiff, T₃=Triennial pruning: 1st year prune at 2.5cm new wood, 2 year unpruned but levelling off skiff and 3rd year skiff lighting to about 5cm above the 2nd year tipping level and T₄=Quadriennial pruning: 1st year pruned at 2.5cm new wood, 2nd year unpruned but levelling off skiff, 3rd year medium skiff to initial heights of plucking in the 2nd year and 4th year unpruned but levelling off skiff.

3. DESIGN:

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 3 for 62 and 64; 4 for 63. (iv) 24 for 62 and 64; 30 for 63. (v) N.A. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Weight of tea leaves. (iv) 1962—contd. (Data for 1965—N.A.) (v) to (viii) Nil.

5. RESULTS:

62(131)

(i) 1227Kg/ha. (ii) 60.9Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of tea leaves in Kg/ha.

Treatment	T ₁	T ₂	T ₃	T ₄
Av. yield	1333	1328	1246	1000

C.D.=86.6Kg/ha.

63(149)

(i) 1621Kg/ha. (ii) 178.4Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of tea leaves in Kg/ha.

Treatment	T ₁	T ₂	T ₃	T ₄
Av. yield	1625	1649	1575	1635

C.D.=201.7Kg/ha.

64(142)

(i) 2990Kg/ha. (ii) 310.0Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of green leaves in Kg/ha.

Treatment	T ₁	T ₂	T ₃	T ₄
Av. yield	2670	2881	3116	3291

Crop :- Tea.

Ref :- H.P. 62(130), 63(155), 64(141).

Site :- Govt. Tea Farm, Palampur.

Type :- 'C'.

Object :- To study the effect of pruning on different dates on the yield of Tea.

1. BASAL CONDITIONS:

(i) N.A. (ii) (a) Heavy clay. (b) N.A. (iii) By seed. (iv) China Hybrid. (v) N.A.; 1.52m. x 0.76m. for spacing. (vi) 1½ to 2 years. (vii) Nil. (viii) N.A. (ix) Nil. (x) Un-irrigated. (xi) N.A. (xii) April to October.

2. TREATMENTS :

4 dates of pruning : D₁=15th November, D₂=15th December, D₃=15th January and D₄=15th June.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 30. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Weight of green leaves. (iv) 1962-contd. (65 N.A.) (v) to (viii) Nil.

5. RESULTS :

62(130)

(i) 4155Kg/ha. (ii) 688.9Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of green leaves in Kg/ha.

Treatment	D ₁	D ₂	D ₃	D ₄
Av. yield	3106	3137	2852	7527

C.D.=779.0Kg/ha.

63(155)

(i) 3140Kg/ha. (ii) 399.8Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of green leaves in Kg/ha.

Treatment	D ₁	D ₂	D ₃	D ₄
Av. yield	3329	3352	3125	2756

64(141)

(i) 2630Kg/ha. (ii) 246.0Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of green leaves in Kg/ha.

Treatment	D ₁	D ₂	D ₃	D ₄
Av. yield	2184	2291	2414	3629

C.D.=278.2Kg/ha.

Crop :- Apple.

Site :- Reg. Fruit Res. Stn., Mashobra.

Ref :- H.P. 60(180).

Type :- 'CV'.

Object :-To study the effect of root stock of Apple.

1. BASAL CONDITIONS:

(i) to (iii) N.A. (iv) As per treatments. (v) Spring 57. (vi) to (x) N.A.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 6 root stocks :-R₁=Red delicious, R₂=Golden delicious, R₃=Royal delicious, R₄=Rus pippia, R₅=Crabeapple Machuba and R₆=Crabeapple ghalli

(2) 3 varieties :-V₁=Red delicious, V₂=Golden delicious and V₃=Granny smith.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 18. (b) N.A. (iii) 4. (iv) (a) - (b) 4 (v) - (vi) Yes.

4. GENERAL

(i) and (ii) Nil. (iii) Av. increase in cm. of scion portion and Av. increase in cm. of root stock portion.
(iv) N.A. (v) and (vi) Nil. (vii) and (viii) —

5. RESULTS:

Girth (Scion)

(i) 1.73 cm./tree. (ii) 0.46 cm./tree. (iii) Main effect of V alone is highly significant. (iv) Av. increase in girth in cm of scion portion of plants.

	V ₁	V ₂	V ₃	Mean
R ₁	2.03	1.61	1.22	1.62
R ₂	2.40	1.54	1.69	1.88
R ₃	1.50	1.88	1.61	1.66
R ₄	1.67	1.56	1.38	1.53
R ₅	1.97	1.95	1.33	1.75
R ₆	2.11	2.20	1.57	1.96
Mean	1.94	1.79	1.47	1.73

C.D. for V marginal means = 2.66 cm./tree.

Girth (stock)

(i) 2.21 cm./tree. (ii) 0.59 cm./tree. (iii) Main effect of V alone is significant. (iv) Av. increase of girth in cm. of root stock portion of plants.

	V ₁	V ₂	V ₃	Mean
R ₁	2.45	1.98	1.67	2.04
R ₂	3.19	1.99	2.18	2.45
R ₃	1.92	2.51	2.25	2.23
R ₄	2.01	2.19	1.88	2.02
R ₅	2.63	2.55	1.98	2.39
R ₆	2.35	2.39	1.77	2.17
Mean	2.43	2.27	1.95	2.21

C.D. for V marginal means = 3.42 cm./tree

Crop :- Apricot.

Ref :- H.P. 64(245), 65(114).

Site :- Reg. Fruit Res. Sub-Stn., Kandoghat.

Type :- 'M'.

Object :—To study the effect of different levels of N, P and K on the cumulative girth of Apricot.

1. BASAL CONDITIONS:

(i) N.A. (ii) (a) Loam. (b) N.A. (iii) N.A. (iv) New castie. (v) Planted in January 62 spacing 6m. (in the form of equilateral triangle). (vi) N.A. (vii) 56 gm./plant of F.Y.M. (viii) N.A. (ix) Nil. (x) Irrigated. (xi) N.A. (xii) 1964.

2. TREATMENTS :

All combinations of. (1), (2) and (3)+One Extra treatment :

(1) 2 levels of N :— $N_0=0$ and $N_1=56$ gm./plant.

(2) 2 levels of P_2O_5 :— $P_0=0$ and $P_1=56$ gm./plant.

(3) 2 levels of K_2O :— $K_0=0$ and $K_1=168$ gm./plant.

Extra treatment : $E_1=56$ gm./plant of F.Y.M.

Fertilizer applied at the time of planting.

3. DESIGN :

(i) R.B.D. (ii) (a) 9. (b) N.A. (iii) 6. (iv) and (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Girth measurements in cm. and yield of fruits. (iv) 1964— contd, (v) to (viii) Nil.

5. RESULTS :

64(245)

(i) 4.97 Kg/plant. (ii) 4.19 Kg/plant. (iii) Main effect of N alone is highly significant. (iv) Av. yield of Apricot in Kg/plant.

Extra treatment=2.72 Kg/plant.

	P_0	P_1	K_0	K_1	Mean
N_0	2.25	3.22	2.56	2.91	2.74
N_1	7.79	8.26	6.75	8.80	7.77
Mean	4.77	5.74	4.66	5.85	5.26
K_0	4.64	4.67			
K_1	4.90	6.81			

C.D. for N marginal means=2.44 Kg/plant.

65(114)

(i) 5.29 Kg/plant. (ii) 0.82 Kg/plant. (iii) Main effects of N, P, K and interaction $N \times P$, $P \times K$ and control Vs others are highly significant while $N \times P \times K$ interaction is significant. (iv) Av. yield of Apricot in Kg/plant.

Extra treatment=3.50 Kg/plant.

	P_0	P_1	K_0	K_1	Mean
N_0	4.49	4.54	3.60	5.42	4.51
N_1	5.24	7.80	5.07	7.97	6.52
Mean	4.86	6.17	4.34	6.70	5.52
K_0	2.94	5.73			
K_1	6.78	6.61			

C.D. for any marginal mean=0.23 Kg/plant.

C.D. for any the body of $N \times P$ or $P \times K$ table=0.55 Kg/plant.

C.D. for control Vs others=0.66 Kg/plant.

Girth

64(245)

(i) 15.97 cm./plant. (ii) 2.79 cm./plant. (iii) Main effect of N and extra Vs. others are highly significant while that of P and interaction $N \times P \times K$ is significant. (iv) Av. girth of plant in cm.

$$E_1 = 12.90 \text{ cm.}$$

	P ₀	P ₁	K ₀	K ₁	Mean
N ₀	13.66	15.34	14.12	14.90	14.50
N ₁	16.93	19.48	17.50	18.92	18.20
Mean	15.29	17.41	15.81	16.91	16.35
K ₀	14.61	16.99			
K ₁	15.98	17.83			

C.D. for N or P marginal means = 1.62 cm./plant.

C.D. for extra Vs. others = 2.76 cm./plant.

65(114)

(i) 20.32 cm./plant. (ii) 3.56 cm./plant. (iii) Main effects of N, P and Extra VS. others are highly significant. (iv) Av. girth of plant in cm.

$$E_1 = 16.53 \text{ cm.}$$

	P ₀	P ₁	K ₀	K ₁	Mean
N ₀	17.60	20.16	17.44	20.31	18.88
N ₁	21.46	23.98	22.58	22.86	22.72
Mean	19.53	22.07	20.01	21.59	20.80
K ₀	18.96	21.07			
K ₁	21.10	23.08			

C.D. for N or P marginal means = 2.08 cm./plant.

C.D. for extra Vs. others = 3.52 cm./plant.

Crop :- Malta.

Ref :- H.P. 61(79).

Site :- Fruit Res. Sta., Dhaula Kuan.

Type :- 'M'.

Object :- To study the effect of different manures on the girth of Malta trees.

1. BASAL CONDITIONS

(i) N.A. (ii) Clayey loam. (iii) Budding. (iv) V. kinnow. (v) 1959. (vi) N.A. (vii) 28 gm./plant of N as F.Y.M. (viii) 1 weeding + 1 hoeing. (ix) Irrigated. (x) Nil. (xi) 175 cm. (xii) 1st week of Nov.

2. TREATMENTS:

9 manurial treatments:— $T_0=0$, $T_1=F.Y.M.$, $T_2=A/S$, $T_3=Super$, $T_4=Pot. Sul.$, $T_5=A/S+Super$,
 $T_6=A/S+Pot. Sul.$, $T_7=Super+Pot. Sul.$ and $T_8=A/S+Super+Pot. Sul.$

Dose of manures—N.A.

3. DESIGN:

(i) R.B.D. (ii) 9. (iii) 4. (iv) (a) 6'10 m. x 24'38 m. (b) 4. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Girth data, 7.6 cm. above the bud. (iv) 1961. (v) to (viii) Nil.

5. RESULTS:

(i) 4.96 cm./plant. (ii) 1.36 cm./plant. (iii) Treatment differences are not significant. (iv) Av. girth of the plant (7.6 cm. above the bud) in cm.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8
Av. yield	4.99	4.32	3.70	4.62	4.72	6.15	5.61	4.84	5.68

Crop :- Malta.

Ref:-H.P. 61(78), 62(176).

Site :- Fruit Res.Stn., Dhaula Kuan.

Type :- 'M'.

Object:—To study the effect of different manures on the girth of the Malta trees.

1. BASAL CONDITIONS:

(i) N.A. (ii) Clayey loam. (iii) Budding. (iv) Blood-red. (v) 1959. (vi) N.A. (vii) 28 gm./plant of N as F.Y.M. (viii) 1 weeding + 1 hoeing. (ix) Nil. (x) Irrigated. (xi) 175 cm.; N.A. (xii) 1st week of Nov.

2. TREATMENTS:

Same as in expt. no. 61(79) on page No. 330.

3. DESIGN:

(i) R.B.D. (ii) 9. (iii) 4. (iv) (a) 6'10 m. x 24'38 m. (b) 4. (v) Pine-apple/Jambari. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Girth data 7.6 cm. above the bud. (iv) 1959-62 (60 N.A.) (v) to (viii) Nil.

5. RESULTS:

61(78)

(i) 4.68 cm./tree. (ii) 1.23 cm./tree. (iii) Treatment differences are not significant. (iv) Av. girth of the plant (90 cm. above the bud) in cm.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8
Av. girth.	3.41	4.70	4.61	6.01	4.79	4.97	3.89	5.39	5.28

62(176)

(i) 10.38 cm./plant, (ii) 6.77 cm./plant. (iii) Treatment differences are not significant. (iv) Av. girth of the plant in cm. (90 cm. above plant).

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8
Av. girth	10.17	9.92	10.22	9.69	10.38	9.11	11.70	11.05	11.15

Crop :- Malta.**Ref :- H.P. 61(80).****Site :- Fruit Res. Stn., Dhaula Kuan.****Type :- 'C'.****Object :—**To study the effect of spacing between plants on the growth of the tree.**1. BASAL CONDITIONS :**

(i) N.A. (ii) Clayey loam. (iii) Budding. (iv) Malta. (v) 23.7.58. (vi) N.A. (vii) 28 gm./plant of N as F.Y.M. (viii) 1 weeding+1 hoeing. (ix) Nil. (x) Irrigated. (xi) 175 cm. (xii) 1st week of Nov. (girth data).

2. TREATMENTS:3 spacings between plants:— $S_1=3.05\text{ m.} \times 3.05\text{ m.}$, $S_2=4.57\text{ m.} \times 4.57\text{ m.}$ and $S_3=6.10\text{ m.} \times 6.10\text{ m.}$ **3. DESIGN :**(i) R.B.D. (ii) (a) 3. (b) N.A. (iii) 4. (iv) (a) $18.29\text{ m.} \times 18.29\text{ m.}$; (b) Number of plants according to spacing are 36,16,9/plot. (v) N.A. (vi) Yes.**4. GENERAL :**

(i) Normal. (ii) N.A. (iii) Girth Data, 7.6 cm. above the bud. (iv) 1959-63 (60 N.A.). (v) to (viii) Nil.

5. RESULTS :

(i) 12.35 cm./plant. (ii) 0.61 cm./plant. (iii) Treatment differences are not significant. (iv) Av. girth of the plant (7.6 cm. above the bud) in cm.

Treatment.	S_1	S_2	S_3
Av. girth.	12.37	12.92	11.76

Crop :- Malta.**Ref :- H.P. 63(198).****Site :- Fruit Res. Stn., Dhaula Kuan.****Type :- 'C'.****Object :—**To study the effect of different spacings on the number of fruits.**1. BASAL CONDITIONS :**

(i) N.A. (ii) Clay loam. (iii) Budding. (iv) Blood red & Jamberi. (v) July, 58. (vi) N.A. (vii) 28 gm./plant of N as F.Y.M. (viii) 1 hoeing. (ix) Nil. (x) Irrigated. (xi) N.A. (xii) —.

2. TREATMENTS and 3. DESIGN.

Same as in expt. no. 61(80) given above.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Fruits/plot. (iv) 1958-63 (62 N.A.). (v) to (viii) Nil.

5. RESULTS :

(i) 3042 fruits, (ii) 249 fruits. (iii) Treatment differences are highly significant. (iv) Av. number of fruits per plot.

Treatment	S_1	S_2	S_3
Av. number	5280	2542	1303

C.D.=430.8 fruits

Crop :- Sweet Orange.

Ref :- H.P. 62(180).

Site :- Fruit Res. Stn., Dhaulakuan.

Type :- 'M'.

Object:—To study the effect of different manures on the growth of Sweet Orange trees.

1. BASAL CONDITIONS :

(i) N.A. (ii) Clayey loam. (iii) Budding. (iv) Blood-red. (v) July, 58. (vi) N.A. (vii) 28 gm./plant of N as F.Y.M. (viii) 1 weeding and 1 hoeing. (ix) Nil. (x) Irrigated. (xi) N.A. (xii) Feb., 62.

2. TREATMENTS

Same as in expt. no. 61 (79) on Malta crop. at page no. 331.

3. DESIGN :

(i) R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) 6'10 m. x 24'38 m. (b) 4. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Girth data, 7.6 cm. above the bud. (iv) 1962-only. (v) to (viii) Nil.

5. RESULTS :

(i) 16.25 cm./plant. (ii) 2.84 cm./plant. (iii) Treatment differences are not significant. (iv) Av. girth of the plant (90cm. above the bud) in cm.

Treatment.	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈
Av. girth.	15.59	16.07	16.12	14.62	15.51	15.40	19.04	16.44	17.42

Crop :- Sweet Orange.

Ref :- H.P. 62(178).

Site :- Fruit Res. Stn., Dhaulakuan.

Type :- 'C'.

Object:—To study the effect of different spacings in trees on the yield of Sweet orange.

1. BASAL CONDITIONS :

(i) N.A. (ii) Clay loam. (iii) Budding. (iv) Blood-red. (v) July, 58. (vi) N.A. (vii) 28gm./plant of N as F.Y.M. (viii) 1 weeding and 1 hoeing. (ix) Nil. (x) Irrigated. (xi) N.A. (xii) Feb., 62.

2. TREATMENTS AND 3. DESIGN :

Same as in expt. no. 61(80) on page No. 332.

4. GENERAL

(i) Normal. (ii) N.A. (iii) Number of fruits/plant (iv) 1962-only. (v) to (viii) Nil.

5. RESULTS :

(i) 22.90 fruits/plant. (ii) 3.26 fruits/plant. (iii) Treatment differences are not significant. (iv) Av. no. of fruits per plant.

Treatment	S ₁	S ₂	S ₃
Av. no.	21.80	24.96	21.94

Crop :- Sweet Orange.**Ref :- H.P. 62(179).****Site :- Fruit Res. Stn., Dhaula Kuan.****Type :- 'C'.****Object :-** To study the effect of different spacings between plants on the girth measurements.**1. BASAL CONDITIONS :**

(i) N.A. (ii) Clayey loam. (iii) Budding. (iv) Nil. (v) July, 58. (vi) and (vii) N.A. (viii) 1 weeding and 1 hoeing. (ix) Nil. (x) Irrigated. (xi) N.A. (xii) Feb., 62.

2. TREATMENTS to 4. GENERAL

Same as in expt. no. 61(80) on page No. 332.

5. RESULTS :

(i) 19'08cm./plant. (ii) 1'20cm./plant. (iii) Treatment differences are not significant. (iv) Av. girth of the plant in cm.

Treatment	S ₁	S ₂	S ₃
Av. girth	18.90	20.38	17.95

Crop :- Sweet Orange.**Ref :- H.P. 62(182).****Site :- Fruit Res. Stn., Dhaula Kuan.****Type :- 'C'.****Object :-** To study the effect of different spacings between trees, on the growth and yield of sweet orange trees.**1. BASAL CONDITIONS :**

(i) N.A. (ii) Clayey loam. (iii) Budding. (iv) Blood-red. (v) July, 58. (vi) and (vii) N.A. (viii) 1 weeding and 1 hoeing. (ix) Nil. (x) Irrigated. (xi) N.A. (xii) Feb., 62.

2. TREATMENTS to 4. GENERAL

Same as in expt. no. 61(80) on page No. 332.

5. RESULTS :**Number of fruits**

(i) 116 fruits/plant. (ii) 16.7 fruits/plant. (iii) Treatment differences are not significant. (iv) Av. number of fruits/plant.

Treatment	S ₁	S ₂	S ₃
Av. number of fruits	112	131	106

Girth measurements

(i) 24.52 cm./plant. (ii) 1.53 cm./plant. (iii) Treatment differences are not significant. (iv) Av. girth of the plant in cm.

Treatment	S ₁	S ₂	S ₃
Av. girth	23.91	26.15	23.49

Crop :- Orange.**Ref :- H.P. 63(187).****Site :- Fruit Res, Stn., Dhaula Kuan.****Type :- 'M'.****Object :-** To study the effect of different manurial treatments on the growth of Orange trees.**1. BASAL CONDITIONS :**

(i) N.A. (ii) Clayey loam. (iii) Budding. (iv) Blood-red. (v) 7th July, 59. (vi) N.A. (vii) 28gm./plant of N as F.Y.M. (viii) 1 weeding and 1 hoeing (ix) Nil. (x) Irrigated. (xi) N.A. (xii) Feb., 63.

2. TREATMENTS and 3. DESIGN.

Same as in expt. no. 61(79) on Malta at page no. 331.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Girth data, 90cm. above the bud. (iv) 1962-63. (v) to (viii) Nil.

5. RESULTS :

(i) 15.47 cm./plant. (ii) 2.31 cm./plant. (iii) Treatment differences are not significant. (iv) Av. girth of plant (90cm. above the bud) in cm.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈
Av. girth	13.22	13.76	17.57	16.07	14.79	17.89	17.04	14.28	14.60

Crop :- Orange.**Ref :- H.P. 62(177).****Site :- Fruit Res, Stn., Dhaula Kuan.****Type :- 'M'.****Object :-** To study the effect of fertilizers on the growth of Orange trees.**1. BASAL CONDITIONS :**

(i) N.A. (ii) Clayey loam. (iii) Budding. (iv) Kinnow. (v) 7th July, 59. (vi) N.A. (vii) 28gm./plant of N as F.Y.M. (viii) 1 weeding and 1 hoeing. (ix) Nil (x) Irrigated. (xi) N.A. (xii) Feb., 62.

2. TREATMENTS and 3 DESIGN

Same as in expt. no. 61(79) on Malta at page no. 331.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Girth measurement (90cm. above the bud). (iv) 1962-63. (v) to (viii) Nil.

5. RESULTS ;

(i) 9.98 cm./plant. (ii) 2.15 cm./plant. (iii) Treatment differences are not significant. (iv) Av. girth of the plant (90cm. above the bud) in cm.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈
Av. Girth	9.63	8.49	11.14	11.01	9.74	11.49	10.19	9.03	9.11

Crop :- Orange.**Ref :- H.P. 61(81), 63(197).****Site :- Fruit Res. Stn., Dhaula Kuan.****Type :- 'C'.**

Object :- To assess the performance of K-lime trees raised from one tree by 3 different methods of propagation.

1. BASAL CONDITIONS:

(i) N.A. (ii) Clayey loam. (iii) As per treatments. (iv) K-lime. (v) 30.6.61. (vi) N.A. (vii) 28gm./plant of N as F.Y.M. (viii) 1 Weeding and 1 hoeing. (ix) Nil. (x) Irrigated. (xi) 175 cm.; N.A. (xii) 1st week of Nov.

2. TREATMENTS:

3 methods of propagations: P₁—Seedlings, P₂—Layered and P₃—Budded.

3. DESIGN:

(i) R.B.D. (ii) (a) 3. (b) N.A. (iii) 6. (iv) (a) 4.57m. x 18.29m. (b) 4. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Girth data, 90cm. above the bud. (iv) 1961 63(62-N.A.). (v) to (viii) Nil.

5. RESULTS:**61(81)**

(i) 1.96 cm./plant. (ii) 0.50cm./plant. (iii) Treatment differences are significant. (iv) Av. girth of the plant (90 cm. above the bud) in cm.

Treatment	P ₁	P ₂	P ₃
Av. girth	1.40	2.31	1.89

C.D.—0.64cm./plant

63(197)

(i) 1.57cm/plant. (ii) 0.47cm/plant. (iii) Treatment differences are highly significant. (iv) Av. girth of plant in cm.

Treatment	P ₁	P ₂	P ₃
Av. girth	1.00	1.81	0.60

C.D.—0.60cm./plant.

Crop :- Plum.**Ref :- H.P. 64(246), 65(115).****Site :- Reg. Fruit Res. Sub-Stn., Kandaghat.****Type :- 'M'.**

Object :- To study the effect of manures on the yield of Plum.

1. BASAL CONDITIONS:

(i) N.A. (ii) (a) Loam. (b) N.A. (iii) N.A. (iv) Santa rosa. (v) Planted in 1961, 6m. spacing from plant to plant. (vi) to (viii) N.A. (ix) Nil. (x) Irrigated. (xi) N.A. (xii) April, 65.

2. TREATMENTS:

Treatments are same as in Expt. no. 64(245) and 65 (114) on page No. 328

3. DESIGN:

(i) R.B.D. (ii) (a) 9. (b) N.A. (iii) 5. (iv) and (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Girth measurements and yield of fruits. (iv) (a) 1964-contd. (b) Nil. (v) (a) and (b) N.A. (vi) and (vii) Nil.

64 (246)

(i) 18.28Kg/plant. (ii) 7.21Kg/plant. (iii) None of the effects is significant. (iv) Av. yield of plum in Kg/plant.

Extra treatment=18.60Kg/plant.

	P ₀	P ₁	K ₀	K ₁	Me
N ₀	13.00	19.10	15.00	17.10	1.5
N ₁	20.50	20.20	20.20	20.50	20.35
Mean	16.75	19.65	17.60	18.80	18.20
K ₀	15.90	19.30			
K ₁	17.60	20.00			

65 (115)

(i) 50.86 Kg/plant. (ii) 4.58Kg/plant. (iii) All effects are highly significant while P×K interaction is not significant. (iv) Av. yield of plum in Kg/plant.

Extra treatment=42.58Kg/plant.

	P ₀	P ₁	K ₀	K	
N ₀	43.03	50.69	40.68	53.04	46.86
N ₁	57.93	60.07	58.36	59.64	59.00
Mean	50.48	55.38	49.52	56.34	52.93
	46.82	52.22			
K ₁	54.14	58.54			

C.D. for any marginal mean=2.95Kg/plant

C.D. for the body of N×P, N×K table=4.18Kg/plant.

C.D. for control VS. others=4.43 Kg/plant.

Girth

64 (246)

(i) 28.28cm./plant. (ii) 4.97cm./plant. (iii) None of the effects is significant. (iv) Av. girth of plum in cm. plant.

Extra treatment=27.78cm./plant.

	P ₀	P ₁	K ₀	K ₁	Mean
N ₀	27.89	29.40	27.50	29.79	28.64
N ₁	28.40	27.97	26.64	29.73	28.18
Mean	28.14	28.68	27.07	29.76	28.41
K ₀	27.49	26.65			
K ₁	28.80	30.72			

65 (115)

(i) 36.16cm./plant. (ii) 5.11cm./plant. (iii) Main effect of K and interaction N×P and N×P×K are highly significant.

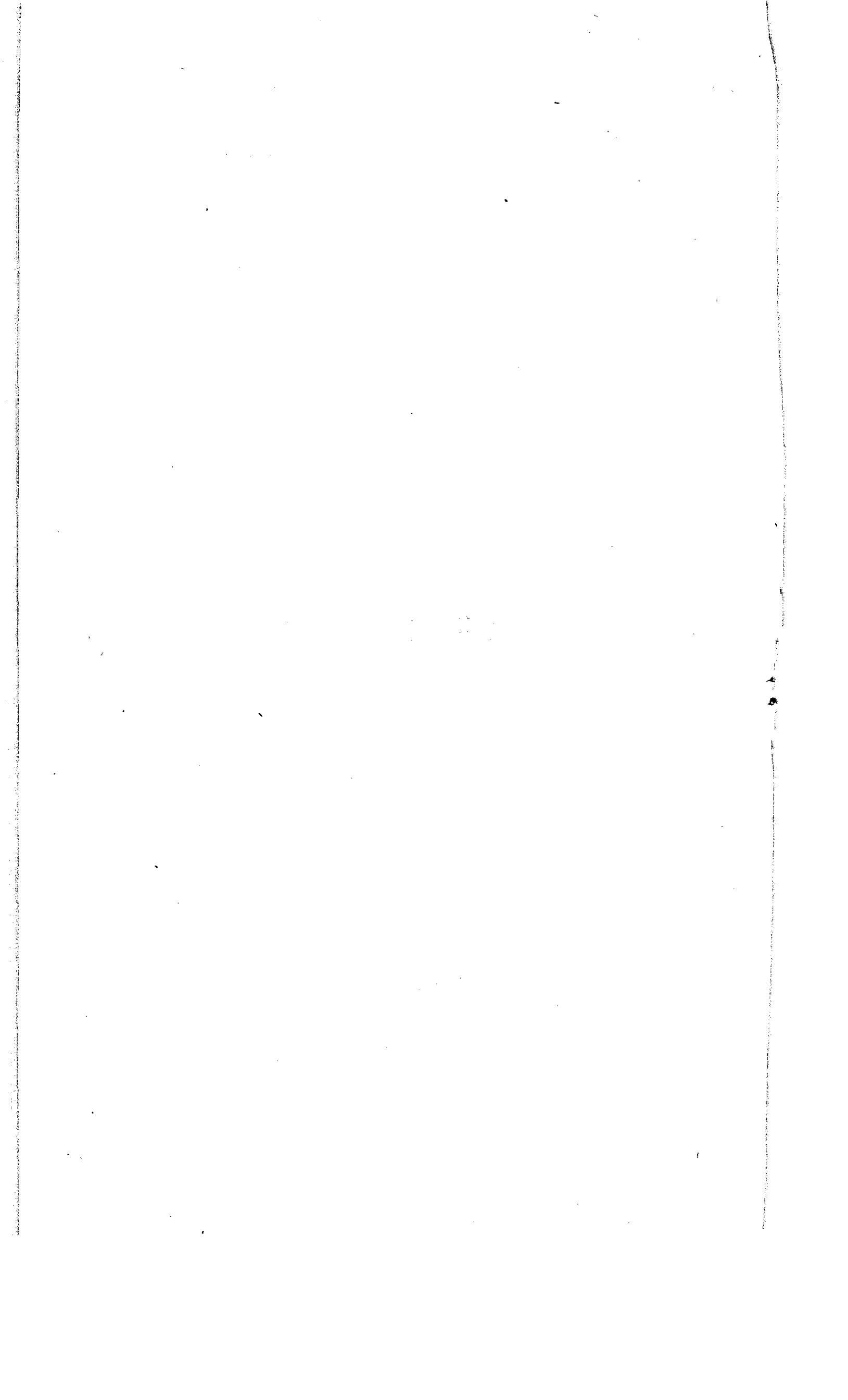
Extra treatment=37.10cm./plant.

	P ₀	P ₁	K ₀	K ₁	Mean
N ₀	31.75	38.65	31.50	38.90	35.20
N ₁	38.15	35.15	33.55	39.75	36.65
Mean	34.95	36.90	32.52	39.32	35.92
K ₀	31.65	33.40			
K ₁	38.25	40.40			

C.D. for K marginal means=3.30cm./plant.

C.D. for the body of N×P table=4.66cm./plant.

JAMMU & KASHMIR



Crop :- Paddy (Kharif).

Ref :- J.&K. 65(170).

**Site :- Jammu Provincial Agri. Exptl. Farm,
Jammu.**

Type :- 'M'.

Object :- To study the effect of different fertilizers and their times of application on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) and (c) N.A. (ii) Sandy loam. (iii) 15.3.65. (iv) (a) 3-4 ploughings and digging. (b) Transplanting. (c) N.A. (d) 20 cm. x 15 cm. (e) 2-3. (v) N.A. (vi) Ch-1039. (vii) Irrigated. (viii) and (ix) N.A. (x) 10th July, 65.

2. TREATMENTS :

Main-plot treatments :-

3 sources of N : $S_1=A/S$, $S_2=Urea$ and $S_3=C/A/N$.

Sub-plot treatments :-

2 levels of N : $L_1=22$ and $L_2=44$ Kg/ha. of N.

Sub-Sub-plot treatments :-

3 times of application. $T_1=$ In two-split doses, half at puddling stage and other half at per-flowering stage; $T_2=$ In one dose at puddling stage and $T_3=$ In one dose at pre-flowering stage.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication; 2 sub-plots/main-plot; 3 sub-sub-plots/sub-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3'00 m. x 1'50 m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1965—only. (b) and (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 2434 Kg/ha. (ii) (a) 316.3 Kg/ha. (b) 272.8 Kg/ha. (c) 452.0 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	L_1	L_2	T_1	T_2	T_3	Mean
S_1	2487	2559	2644	2330	2594	2523
S_2	2450	2272	2514	2230	2339	2361
S_3	2359	2478	2289	2378	2589	2418
Mean	2432	2436	2482	2313	2507	2434
T_1	2561	2403				
T_2	2235	2391				
T_3	2499	2515				

Crop :- Paddy (Kharif).

Ref :- J.&K. 64(265), 65(150).

Site :- Regional Paddy Res. Stn., Ponnechik.

Type :- 'M'.

Object :- To study the effect of different levels of N, P and K on the yield of Paddy crop.

I. BASAL CONDITIONS :

(i) (a) Nil. (b) Berseem. (c) N.A. (ii) Sandy loam. (iii) Mid of June, 64 and 65. (iv) (a) 2 ploughings, and 2 puddlings. (b) Transplanting. (c) 25 Kg/ha. in nursery. (d) 25 cm. x 20 cm. (e) 2-3. (v) Nil. (vi) Basmati-370. (vii) Irrigated. (viii) 2 hand weedings (ix) N.A. (x) Mid of Nov. 64 and 65.

2. TREATMENTS:

All combinations of (1), (2) and (3).

(1) 3 levels of N: $N_1=50$, $N_2=100$ and $N_3=150$ Kg/ha.

(2) 3 levels of P_2O_5 : $P_0=0$, $P_1=50$ and $P_2=100$ Kg/ha.

(3) 3 levels of K_2O : $K_0=0$, $K_1=50$ and $K_2=100$ Kg/ha.

$2/3$ N applied at puddling and $1/3$ N at pre-flowering stage. P and K applied at sowing.

3. DESIGN:

(i) 3rd confd. (effects W, X and Y confd.) (ii) (a) 9 plots/block, 3 blocks/replication. (b) N.A. (iii) 3

(iv) (a) 4.60 m. \times 2.84 m.; 5.06 m. \times 2.70 m. (b) 4.10 m. \times 2.44 m.; 4.56 m. \times 2.30 m. (v) 25 cm. \times 20 cm.

(vi) Yes.

4. GENERAL:

(i) Good. (ii) Nil. (iii) Yield of grain. (iv) (a) 1964-66. (b) No. (c) Nil. (v) No. (vi) Nil. (vii) Since the expt. is continued beyond 65, results of individual years are presented under 5. Results.

5. RESULTS:

64(265)

(i) 2566 Kg/ha. (ii) 405.9 Kg/ha. (iii) Main effect of N and interactions $N \times P$, $N \times K$ and $P \times K$ are significant. (iv) Av. yield of grain in Kg/ha.

	P_0	P_1	P_2	K_0	K_1	K_2	Mean
N_1	2271	2271	2548	2492	2603	1994	2363
N_2	2659	3046	2603	2880	2825	2603	2769
N_3	2548	2215	2936	2492	2382	2825	2566
Mean	2492	2511	2696	2622	2603	2474	2566
K_0	2603	2714	2548				
K_1	2714	2271	2825				
K_2	2160	2548	2714				

C.D. for N marginal means = 222.5 Kg/ha.

C.D. for the body of any table = 385.5 Kg/ha.

65(150)

(i) 3307 Kg/ha. (ii) 124.6 Kg/ha. (iii) Main effects of N and P are significant. (iv) Av. yield of grain in Kg/ha.

	P_0	P_1	P_2	K_0	K_1	K_2	Mean
N_1	3297	3347	3237	3267	3360	3254	3294
N_2	3574	3661	3571	3626	3628	3557	3602
N_3	2956	3119	3003	3007	3067	3004	3026
Mean	3276	3376	3270	3300	3352	3270	3307
K_0	3284	3369	3247				
K_1	3300	3427	3328				
K_2	3243	3331	3236				

C.D. for N or P marginal means = 63.8 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- J.&K. 64(223).

Site :- Paddy Res. Stn., Ponnechik

Type :- 'M'.

Object :- To study the effect of different levels of N, P and K on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) to (c) Nil (ii) Clay loam. (iii) June, 64. (iv) (a) N.A. (b) Transplanting. (c) to (e) N.A. (v) N.A. (vi) Basmati-370. (vii) Irrigated. (viii) and (ix) N.A. (x) Nov., 64.

2. TREATMENTS:

All combinations of (1), (2) and (3).

(1) 3 levels of N: $N_1=22$, $N_2=44$ and $N_3=66$ Kg/ha.

(2) 3 levels of P_2O_5 : $P_0=0$, $P_1=22$ and $P_2=44$ Kg/ha.

(3) 3 levels of K_2O : $K_0=0$, $K_1=22$ and $K_2=44$ Kg/ha.

3. DESIGN:

(i) 3^3 confd. (effects X, Y and Z are confd.). (ii) (a) 3 blocks/replication; 9 plots/block. (b) N.A. (iii) 3. (iv) (a) 4.58 m. \times 2.74 m. (b) 4.12 m. \times 2.44 m. (v) 23 cm. \times 15 cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1964—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 2717 Kg/ha. (ii) 224.4 Kg/ha. (iii) Main effects of N and P are highly significant. Interactions $N \times P$, $N \times K$ and $P \times K$ are highly significant. (iv) Av. yield of grain in Kg/ha.

	P_0	P_1	P_2	K_0	K_1	K_2	Mean
N_1	2138	2465	2489	2387	2061	2644	2364
N_2	2606	2609	3079	2681	3031	2582	2765
N_3	3006	2949	3110	2954	3165	2946	3022
Mean	2583	2674	2893	2674	2752	2724	2717
K_0	2600	2633	2789				
K_1	2606	2855	2796				
K_2	2544	2535	3093				

C.D. for N or P marginal means=123.0 Kg/ha.

C.D. for the body of $N \times P$, $N \times K$ or $P \times K$ table=213.1 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- J. & K. 63, 65(M.A.E.)

Site :- M.A.E. Centre, Khudwani.

Type :- 'M'.

Object :- Type XI—To determine the effect of micronutrients application and to study the relative merits of two methods of application.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) to (x) N.A.

2 TREATMENTS:

15 micronutrient treatments: T_0 =Control (no fertilizer), T_1 =NPK applied to soil only, T_2 = T_1 +Spartin at 395Kg/ha. by soil application, T_3 = T_1 +Manganese as $Mn SO_4$ at 60 Kg/ha, T_4 = T_1 +Zn as $Zn SO_4$ at 30Kg/ha, T_5 = T_1 + C_4 as $C_4 SO_4$ at 30 Kg/ha, T_6 = T_1 +Boron as Borax at 17.5 Kg/ha, T_7 = T_1 +Molybdenum as Sod. Molybdate at 1.25Kg/ha., T_8 = T_1 +Mn+Zn+Cu+ B_0 + M_0 , T_9 = T_1 +Mn as $Mn SO_4$ at 17.5 Kg/ha, T_{10} = T_1 +Zn as $Zn SO_4$ at 12.5 Kg/ha, T_{11} = T_1 +Cu as $Cu SO_4$ at 12.5 Kg/ha, T_{12} = T_1 +Boron as Borax at 6.2 Kg/ha. T_{13} = T_1 +Molybdenum as sod. Molybdate at 0.62Kg/ha and T_{14} = T_1 +Mn+Zn+Cu+ B_0 + M_0 .

Treatments T_2 to T_8 by soil application and T_9 to T_{14} by foliar spray, T_1 =33.6Kg/ha. of N+33.6Kg/ha. of P_2O_5 +33.6 Kg/ha of K_2O for 63 and 35Kg/ha. of each N, P and K for 65.

3. DESIGN

(i) R.B.D. (ii) (a) 15. (b) N.A. (iii) N.A. (iv) (a) and (b) N.A. (v) N.A. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1963-65 (64 N.A.). (b) N.A. (c) Nil. (v) Nil. (vi) N.A. (vii) Nil.

5. RESULTS:

63 (M.A.E.)

(i) 4882Kg/ha. (ii) and (iii) N.A. (iv) Av. yield of grain in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	
Av. yield	4542	4723	4957	5164	5034	
	T_5	T_6	T_7	T_8	T_9	T_{10}
	4930	5086	4960	4723	4956	4852
	T_{11}	T_{12}	T_{13}	T_{14}		
	4620	4826	4800	5060		

65 (M.A.E.)

(i) 3293 Kg/ha. (ii) and (iii) N.A. (iv) Av. yield of grain in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7
Av. yield	2874	3259	3436	3078	3572	3479	3572	3875
	T_8	T_9	T_{10}	T_{11}	T_{12}	T_{13}	T_{14}	
	3815	3473	3490	2274	3341	3264	2588	

Crop :- Paddy. (Kharif)

Ref :- J. & K. 65(M.A.E.).

Site :- M A E. Centre, Khudwani.

Type :- 'M'.

Object :-Type V (a) To study the effect of different methods of application of N on Paddy.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sub-mountain brown hill soil. (iii) N.A. (iv) (a) to (c) N.A. (v) 33.6Kg/ha. of P_2O_5 as Super. (vi) to (x) N.A.

2. TREATMENTS:

All combinations of (1) and (2)+a control.

(1) 3 levels of N: N_1 =33.6, N_2 =50.4 and N_3 =67.2Kg/ha.

(2) 4 methods of application: M_1 =Broadcast just before last puddling and incorporated in the soil (sub-surface application), M_2 =Broadcast at planting, M_3 =Broadcast half at planting and half about a month after planting and M_4 =Application in the form of pellets about three weeks after planting.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 13. (b) N.A. (iii) to (vi) N.A.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) N.A. (b) No. (c) Nil. (v) Nil. (vi) N.A. (vii) Nil.

5. RESULTS:

(i) 3252Kg/ha. (ii) N.A. (iii) Main effect of N alone is significant. (iv) Av. yield of grain in Kg/ha.

Control=2676Kg/ha.

Treatment	M ₁	M ₂	M ₃	M ₄	N ₁	N ₂	N ₃
Av. yield	3571	3371	3621	3439	3335	3451	3716

C.D.=328 Kg/ha.

Crop :- Paddy (*Kharif*).

Ref :- J. & K. 60, 61, 62 (M.A.E.).

Site :- M.A.E. Centre, Khudwani.

Type :- 'M'.

Object.—To study the effect of different times of application of N on the yield of Paddy.

1. BASAL CONDITIONS:

(i) Paddy-Fallow for 60; N.A. for others. (b) Fallow for 60; N.A. for others. (c) Nil for 60; N.A. for others. (ii) Loamy clay for 60; N.A. for others. (iii) 5.5.60/10.6.60; 6.5.61/6.6.61; 5.5.62/6.6.62. (iv) (a) 4 ploughings and 3 hoeings for 60; N.A. for others. (b) Transplanting for 60; N.A. for others. (c) 22.4 Kg/ha. 44.8Kg/ha; N.A. (d) 23cm. × 15cm. for 60 and 61; N.A. (e) Nil. (v) 5604Kg/ha of F.Y.M and Super applied at transplanting (vi) Ch.—1039. (vii) Irrigated. (viii) 3 weedings for 60; N.A. for others. (ix) N.A. (x) N.A.; 15.9.61; 19.9.62.

2. TREATMENTS:

All combinations of (1) and (2)+a control.

(1) 2 sources of 44.8Kg/ha. of N: S₁=A/S and S₂=Urea.

(2) 7 times of application: T₁=Full dose before planting, T₂=Full dose at planting, T₃=Full dose at tillering, T₄=½ before planting and ½ at tillering, T₅=½ at tillering+½ at planting, T₆=½ before planting+½ at tillering+½ at flowering and T₇=½ at planting+½ at tillering+½ at flowering.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 15. (b) N.A. (iii) N.A. for 60 and 61; 3. (iv) (a) 17.71m. × 3.05 m. (b) 17.71m. × 3.05m.; 16.95m. × 1.99m.; 17.26m. × 2.29m. (v) Nil; 38cm. × 53cm.; 22.5cm. × 38cm. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-62, (b) N.A. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

60 (M.A.E.)

(i) 6266Kg/ha. (ii) 1234Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

Control=4932

	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	Mean
S ₁	6613	6613	6277	6669	6669	6277	6465	6509
S ₂	6221	5716	6165	6109	6368	6669	6221	6213
Mean	6417	6164	6221	6389	6528	6473	6333	6361

61 (M.A.E.)

(i) 6599Kg/ha. (ii) 625.4Kg/ha. (iii) "Control Vs. others" alone is significant. (iv) Av. yield of grain in Kg/ha.

Control=4990

	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	Mean
S ₁	6834	6364	7452	7175	6742	6788	6585	6849
S ₂	6521	6355	6742	6355	6816	6705	6567	6580
Mean	6678	6359	7097	6765	6779	6746	6576	6714

C.D. for "Control Vs. others"=765.4Kg/ha.

62 (M.A.E.)

(i) 5504Kg/ha. (ii) 204.7Kg/ha. (iii) Main effect of T, interaction T×S and "control Vs. others" are highly significant. Main effect of S is significant. (iv) Av. yield of grain in Kg/ha.

Control=3706

	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	Mean
S ₁	5914	5987	5652	5926	5900	5626	4965	5710
S ₂	5568	5718	5186	4960	5963	5732	5748	5553
Mean	5741	5852	5419	5443	5931	5679	5356	5632

C.D. for S marginal means=129.4Kg/ha.

C.D. for T marginal means=242.0Kg/ha.

C.D. for the body of S×T table=342.2Kg/ha.

C.D. for "control Vs others"=250.5Kg/ha.

Crop :- Paddy (Kharif)

Ref :- J. & K 60, 61, 62, 63, 64 (M.A.E.).

Site :- M.A.E. Centre, Khudwani.

Type :- 'M'.

Object :- Type II :- To study the effect of N, P, K and F.Y.M. on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) Paddy-Fallow for 60; N.A. for others. (b) Fallow for 60; N.A. for others. (c) Nil for 60; N.A. for others. (ii) Loamy clay. (iii) 5.5.60/10.6.60; 6.5.61/6.6.61; 5.5.62/6.6.62; 7.6.63; 9.6.64. (iv) 4 ploughings and 3 hoeings for 60; N.A. for others. (b) Transplanting for 60; N.A. for others. (c) 22.4Kg/ha.; 44.8Kg/ha. N.A. for others. (d) 23cm.×15cm. for 60 and 61; N.A. for others. (e) Nil. (v) As per treatments. (vi) Ch.-1039. (vii) Irrigated. (viii) 3 weedings for 60; N.A. for others. (ix) N.A. (x) 15.9.60; 15.9.61; 20.9.62; 21.9.63; 20.9.64.

2. TREATMENTS:

All combinations of (1), (2), (3) and (4).

(1) 3 levels of N as A/s : N₀=0, N₁=33.6 and N₂=67.2Kg/ha.

(2) 3 levels of P₂O₅ as super : P₀=0, P₁=33.6 and P₂=67.2Kg/ha.

(3) 3 levels of K₂O as pot. chloride : K₀=0, K₁=33.6 and K₂=67.2Kg/ha.

(4) 2 levels of F.Y.M. : F₀=0 and F₁=5604 Kg/ha.

AIS applied in two doses, 1st at transplanting and 2nd one month after transplanting. Potash and Super applied at transplanting.

3. DESIGN :

(i) $3^3 \times 2$ confd. (ii) (a) 9 plots/block, 6 blocks/replication. (b) N.A. (iii) 1. (iv) (a) 17.71m. \times 3.05m. for 60 to 62; N.A. for others. (b) 17.71m. \times 3.05m.; 16.95m. \times 1.99m.; 17.26m. \times 2.29m.; N.A. for 63 and 64. (v) Nil; 38cm. \times 23cm.; 22.5cm. \times 38cm.; N.A. for 63 and 64. (vi) Yes.

4. GENERAL :

(i) Normal for 60; N.A. for others. (ii) Nil for 60, N.A. for others. (iii) Yield of grain. (iv) (a) 1960-64 (b) N.A. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

60 (M.A.E.)

(i) 5495Kg/ha. (ii) 438.1 Kg/ha. (iii) Main effect of N is highly significant and that of F is significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	4651	5772	6463	5454	5660	5773	5529	5641	5716	5629
F ₁	4670	5417	5997	5249	5361	5473	5287	5249	5547	5361
Mean	4660	5594	6230	5351	5510	5623	5408	5445	5631	5495
K ₀	4540	5407	6277	5240	5296	5688				
K ₁	4791	5744	5800	5323	5492	5520				
K ₂	4649	5631	6613	5490	5742	5661				
P ₀	4287	5548	6218							
P ₁	4875	5491	6164							
P ₂	4818	5743	6308							

C.D. for N marginal means=302.3Kg/ha.

C.D. for F marginal means=246.8Kg/ha.

61 (M.A.E.)

(i) 5814Kg/ha. (ii) 426.9Kg/ha. (iii) Main effect of N is highly significant. Interaction N \times F is significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	4215	5506	6318	5202	5451	5386	5774	5460	5405	5346
F ₁	5573	6392	6878	6266	6237	6340	6208	6400	6235	6281
Mean	4894	5949	6598	5734	5844	5863	5691	5930	5820	5814
K ₀	4897	5783	6392	5626	5663	5783				
K ₁	4897	6097	6797	5857	6032	5902				
K ₂	4888	5967	6604	5718	5838	5903				
P ₀	4851	5792	6558							
P ₁	4768	6152	6613							
P ₂	5063	5903	6622							

C.D. for N marginal means=294.6Kg/ha.

C.D. for the body of N \times F table=416.6Kg/ha.

62 (M.A.E.)

(i) 5312Kg/ha. (ii) 429.2Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	3809	4777	5869	4720	4776	4960	4939	4825	4692	4818
F ₁	5069	5781	6558	5707	5938	5763	5878	5916	5615	5804
Mean	4440	5280	6215	5215	5358	5363	5410	5372	5155	5312
K ₀	4404	5204	6622	5313	5500	5417				
K ₁	4578	5428	6109	5254	5483	5378				
K ₂	4339	5210	5915	5079	5091	5294				
P ₀	4414	5249	5983							
P ₁	4334	5237	6504							
P ₂	4574	5355	6160							

C.D. for N marginal means=296.1 Kg/ha.

63 (M.A.E.)

(i) 4558Kg/ha. (ii) 357.9Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	3920	4628	5142	4616	4560	4514	4422	4640	4628	4563
F ₁	3965	4674	5017	4594	4388	4674	4640	4537	4480	4552
Mean	3942	4651	5080	4605	4474	4594	4531	4588	4554	4558
K ₀	3960	4491	5142	4662	4302	4628				
K ₁	3873	4834	5057	4560	4594	4611				
K ₂	3994	4628	5040	4594	4525	4542				
P ₀	4148	4697	4971							
P ₁	3754	4542	5126							
P ₂	3925	4714	5143							

C.D. for N marginal means=247.0 Kg/ha.

64 (M.A.E.)

(i) 4716Kg/ha. (ii) 576.6Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	4055	4503	4926	4453	4619	4413	4450	4622	4413	4495
F ₁	4385	5138	5287	4897	4649	5264	4934	5204	4672	4937
Mean	4220	4821	5107	4675	4634	4838	4692	4913	4542	4716
K ₀	4076	4670	5331	4617	4734	4726				
K ₁	4386	5233	5120	4783	4643	5312				
K ₂	4197	4560	4870	4624	4526	4477				
P ₀	4288	4636	5101							
P ₁	4118	4613	5172							
P ₂	4254	5214	5047							

C.D. for N marginal means=397.8Kg/ha.

Crop :- Paddy (Kharif).

Ref :- J. & K. 63(12).

Site : Paddy Res. Farm, Khudwani

Type : MV

Object :—To study the effect of different varieties and manures on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) Paddy-fallow-paddy. (b) Fallow. (c) Nil. (ii) N.A. (iii) 3rd week of May, 63. (iv) (a) 3 ploughings. (b) Transplanting. (c) 46Kg/ha. (d) 15cm.×23cm. (e) 2-3. (v) Nil. (vi) As per treatments. (vii) Irrigated. (viii) 3 weedings. (ix) N.A. (x) Last week of Sept., 63.

2. TREATMENTS :

Main-plot treatments

8 varieties :— $V_1=K\ 60-8$, $V_2=K\ 60-32$, $V_3=K\ 60-42$, $V_4=K\ 60\ Bulk$, $V_5=Norm\ 8\times Ch.\ 47-34-36-46-67-10$, $V_6=Zinbo\times Ch.\ 972-8-30-38-71-28$, $V_7=Zinbo\times Ch.\ 972-8-30-38-76-32$ and $V_8=Ch.-1039$.

Sub-plot treatments

All combinations of (1) and (2)

(1) 3 levels of N as A/S : $N_1=22.4$, $N_2=44.8$ and $N_3=67.3\ Kg/ha$.(2) 3 manures : $M_0=control$, $M_1=22.4\ Kg/ha$ of P_2O_5 and $M_2=M_1+22.4\ Kg/ha$ of K_2O .

3. DESIGN :

(i) Split-plot. (ii) (a) 8 main-plots/replication, 9 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) 1.83 m.×3.66m. (b) 1.52m.×3.20m. (v) 15cm.×23cm. (vi) Yes.

4. GENERAL

(i) Good. (ii) Nil. (iii) Yield of grain. (iv) (a) 1963—only. (b) No. (c) Nil. (v) Shalimar. (vi) and (vii) Nil.

5. RESULTS :

(i) 5585 Kg/ha. (ii) (a) 468.7. Kg/ha. (b) 463.1 Kg/ha. (iii) Main effects of V,N and M are highly significant while interaction $V\times N\times M$ is significant. (iv) Av. yield of grain in Kg/ha.

	V_1	V_2	V_3	V_4	V_5	V_6	V_7	V_8	M_0	M_1	M_2	Mean
N_0	5083	5157	4775	4892	5056	5564	4934	5045	4925	4990	5275	5063
N_1	5583	5632	5335	5318	5452	6334	5467	5433	5564	5540	5603	5569
N_2	5931	6283	6067	5975	6130	6814	5693	6087	6043	6095	6230	6123
Mean	5532	5691	5392	5395	5546	6237	5365	5522	5511	5542	5703	5585
M_0	5514	5516	5326	5366	5612	6098	5157	5496				
M_1	5453	5658	5385	5391	5399	6174	5418	5458				
M_2	5631	5898	5466	5429	5627	6440	5520	5611				

C.D. for V marginal means=229.8 Kg/ha.

C.D. for M or N marginal means=131.0 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- J. & K. 62(10).

Site :- Kashmir Provincial Agri. Exptl. Farm, Shalimar.

Type :- 'MV'.

Object : To study the effects of different, manures and varieties on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) Paddy-fallow-paddy. (b) Fallow. (c) Nil. (ii) Clay loam. (iii) 1.5.62. (iv) (a) 3 ploughings 3-clod breakings, 2-puddlings. (b) Transplanting. (c) 46Kg/ha. (d) 15cm.×23cm. (e) 2-3. (v) 184.5 Q/ha. of F.Y.M. (vi) As per treatments. (vii) Irrigated. (viii) 3 weedings. (x) 11,14, 10.62.

2. TREATMENTS :

All combinations of (1), (2) and (3).

(1) 3 varieties: V_1 =Ch.-1039, V_2 =K-60 (Ch. 47×Rikee 132) and V_3 =Norix 8×Ch. 47-34-46-67-10.

(2) 3 levels of N: N_1 =22.4, N_2 =44.8 and N_3 =67.3 Kg/ha.

(3) 2 levels of P_2O_5 : P_1 =20.2 and P_2 =40.4 Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 18. (b) N.A. (iii) 4. (iv) (a) 4.27m.×3.66m. (b) 3.96m.×3.20m. (v) 15cm.×23cm. (vi) Yes.

4. GENERAL :

(i) Fair. (ii) Nil. (iii) Yield of grain. (iv) (a) 1962—only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 3006Kg/ha. (ii) 348.0Kg/ha. (iii) Main effects of V and N are highly significant. (iv) Av. yield of grain in Kg/ha.

	V_1	V_2	V_3	N_1	N_2	N_3	Mean
P_1	2847	3086	3093	2661	3101	3263	3008
P_2	2696	3039	3258	2547	3206	3259	3004
Mean	2772	3072	3176	2604	3154	3261	3006
N_1	2353	2560	2900				
N_2	2970	3352	3139				
	2992	3304	3488				

C.D. for V or N marginal means=201.8Kg/ha.

Crop :- Paddy (Kharif)

Ref : J.&K. 63(11)

Site :- Kashmir Provincial Agri. Exptl. Farm, Shalimar.

Type : 'MV'.

Object:—To study the effect of different varieties and manures on the yield of Paddy,

1. BASAL CONDITIONS :

(i) (a) Paddy-fallow-paddy. (b) Fallow. (c) Nil. (ii) N.A. (iii) 2nd week of May, 63. (iv) (a) 3 ploughings, 3 clod breakings, 2 puddlings. (b) Transplanting (c) 15cm.×23cm. (d) 184.5 Q/ha. of F.Y.M. (v) and (vi) As per treatments. (vii) Irrigated. (viii) 3 weedings. (ix) N.A. (x) 3rd week of Sept., 63.

2. TREATMENTS :

Same as in expt. no. 63(12) on page No. 349.

3. DESIGN :

(i) Split-plot (ii) (a) 8 main-plots/replication; 9 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) 2.74m. × 2.74 m. (b) 2.44m. × 2.29m. (v) 15cm. × 23cm. (vi) Yes.

4. GENERAL :

(i) Good. (ii) Nil. (iii) Yield of grain. (iv) (a) 1962—only. (b) No. (c) Nil. (v) Khudwani. (vi) and (vii) Nil.

5. RESULTS :

(i) 4058 Kg/ha. (ii) (a) 686.8 Kg/ha. (b) 375.4 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av yield of grain in Kg/ha.

	V ₁	V ₂	V ₃	V ₄	V ₅	V ₆	V ₇	V ₈	M ₀	M ₁	M ₂	Mean
N ₀	3584	3521	3373	3393	3592	3825	3860	3532	3549	3657	3550	3585
N ₁	4061	3942	3793	4033	4023	4223	4246	4030	4012	4015	4105	4044
N ₂	4402	4752	4389	4410	4596	4767	4577	4469	4522	4466	4648	4545
Mean	4016	4072	3852	3945	4070	4272	4228	4010	4028	4046	4101	4058
M ₀	3949	3947	3741	3922	4275	4233	4126	4029				
M ₁	4018	4069	3949	3972	3870	4198	4328	3960				
M ₂	4079	4199	3865	3940	4067	4384	4231	4041				

C.D. for N marginal means=106.2 Kg/ha.

Crop :- Paddy (Kharif)

Ref :- J.&K.64(220)

Site :- Paddy Res. Stn. Ponnechik (Jammu).

Type :- 'C'.

Object:—To study the effect of spacings and seedlings on Paddy crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) June, 64. (iv) (a) N.A. (b) Transplanting. (c) — (d) and (e) As per treatments (v) 22 Kg/ha. of N applied at puddling+22 Kg/ha. of N applied at pre-flowering, 22 Kg/ha of P₂O₅ at puddling. (vi) Basmati—370. (vii) Irrigated, (viii) and (ix) N.A. (x) Nov., 64.

2. TREATMENTS :

Main-plot treatments :—

3 levels of spacing ; D₁=15cm. × 15cm, D₂=15cm. × 23cm. and D₃=23cm. × 23cm.

Sub-plot treatments :—

3 no. of seedlings per hole :—S₁=2, S₂=3 and S₃=4 seedlings/hole

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication, 3 sub-plots/main—plot. (b) N.A. (iii) 3. (iv) (a) 4.57m. × 3.66m. (b) 4.11m. × 3.35m. (v) 23cm. × 15cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1964-only' (b) No. (c) Nil. (v) Shalimar, Khudwani. (vi) and (vii) Nil.

5. RESULTS :

(i) 1611 Kg/ha. (ii) (a) 639.2 Kg/ha. (b) 308.0 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	D ₁	D ₂	D ₃	Mean
S ₁	1691	1691	1691	1691
S ₂	1691	1812	1329	1611
S ₃	1691	1570	1329	1530
Mean	1691	1691	1450	1611

Crop :- Paddy. (Kharif)

Ref :- J.&K.64(222).

Site :-Paddy Res. Stn., Khudwani.

Type :- 'CV'.

Object :- To study the effect of spacings and seedlings on different varieties of paddy.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 1.7.64. (iv) (a) N.A. (b) Transplanting. (c) — (d) and (e) As per treatments. (v) 22 Kg/ha. of N at puddling + 22 Kg/ha. of N at pre-flowering + 20 Kg/ha. of P₂O₅ at puddling. (vi) As per treatments. (vii) Irrigated. (viii) and (ix) N.A. (x) Nov., 64.

2. TREATMENTS :

Main-plot treatments :

2 varieties : V₁=China—1039 and V₂=K-60-42.

Sub-plot treatments :

3 levels of spacing ; D₁=15cm. × 15cm, D₂=15cm. × 23cm. and D₃=23cm. × 23cm.

Sub-sub-plot treatments :

3 levels of seedlings : S₁=2, S₂=3. and S₃=4.

3. DESIGN :

(i) Split-plot. (ii) (a) 2 main-plots/replication, 3 sub-plots/main-plot, 3 sub-sub-plots/sub-plot (b) N.A. (iii) 4. (iv) (a) 3.66m. × 3.66m. (b) 3.35m. × 3.20m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1964—only. (b) No. (c) Nil. (v) Shalimar (vi) and (vii) Nil.

5. RESULTS:

- (i) 5460 Kg/ha. (ii) (a) 603.1 Kg/ha. (b) 718.1 Kg/ha. (c) 788.6 Kg/ha. (iii) Main effect of D is highly significant and that of S is significant. (iv) Av. yield of grain in Kg/ha.

	D ₁	D ₂	D ₃	S ₁	S ₂	S ₃	Mean
V ₁	5666	5633	4936	5226	5458	5552	5412
V ₂	5920	5668	5939	4981	5600	5945	5509
Mean	5793	5651	4938	5104	5529	5748	5460
S ₁	5600	5168	4543				
S ₂	4792	5564	5231				
S ₃	5387	6221	5038				

C.D for D marginal means=462.1 Kg/ha.

C.D for S marginal means=451.7 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- J.&K. 64(221).

Site :- Kashmir Provincial Agri. Exptl. Farm, Shalimar.

Type :- 'CV'.

Object :- To study the effect of spacing and seedlings on different varieties of Paddy.

1. BASAL CONDITIONS :

- (i) (a) to (c) N.A. (ii) Clay loam. (iii) 1.7.64. (iv) (a) N.A. (b) Transplanting. (c) - (d) and (e) As per treatments (v) 22 Kg/ha. of N at puddling + 22 Kg/ha of N at pre-flowering + 20 Kg/ha of P₂O₅ at puddling. (vi) As per treatments. (vii) Irrigated. (viii) and (ix) N.A. (x) Nov., 64.

2. TREATMENTS :

Main-plot treatments :

2 varieties : V₁=Norain-8 and V₂=China-1039.

Sub-plot treatments :

3 spacings : D₁=15cm. × 15cm. D₂=23cm. × 15cm. and D₃=23cm. × 23cm.

Sub-Sub-plot treatments :

3 no. of seedlings/hole : S₁=2. S₂=3 and S₃=4 seedlings/hole.

3. DESIGN :

- (i) Split-plot, (ii) (a) 2 main-plots/replication, 3 sub-plots/main-plot and 3 sub-sub-plots/sub-plot. (b) N.A. (iii) 4. (iv) (a) 2.74m. × 2.74m. (b) 2.44m. × 2.29m. (v) 15cm. × 23cm. (vi) Yes.

4. GENERAL :

- (i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1964—only. (b) No. (c) Nil. (v) Khudwani. (vi) and (vii) Nil.

5. RESULTS :

- (i) 3649 Kg/ha. (ii) (a) 634.2 Kg/ha. (b) 269.8 Kg/ha. (c) 268.5 Kg/ha. (iii) Main effect of D is highly significant and that of S is significant. (iv) Av. yield of grain in Kg/ha.

	D ₁	D ₂	D ₃	S ₁	S ₂	S ₃	mean
V ₁	3692	3662	3328	3447	3574	3661	3561
V ₂	3964	3813	3438	3611	3703	3901	3738
Mean	3828	3737	3383	3529	3639	3781	3649
S ₁	3716	3664	3206				
S ₂	3864	3721	3331				
S ₃	3905	3826	3611				

C.D. for D marginal means = 169.7 Kg/ha.

C.D. for S marginal means = 157.3 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- J.&K. 63(M.A.E).

Site :- M A.E. Centre, Khudwani.

Type :- 'M'.

Object :- Type VII—To study the effect of manures and cultural practices on Paddy.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) As per treatments. (iv) (a) and (b) N.A. (c) — (d) and (e) As per treatments. (v) N.A. (vi) CH-1039. (vii) Irrigated.

2. TREATMENTS :

Main-plot treatments :

All combinations of (1), (2) and (3).

(1) 3 dates of planting: D₁=15 days before normal, D₂=Normal and D₃=15 days after normal.

(2) 3 spacings: S₁=15cm.×15cm., S₂=20cm.×20cm. and S₃=25cm.×25cm.

(3) 3 rates of planting: R₁=2, R₂=4 and R₃=6 seedlings/hole.

Sub-plot treatments :

All combinations of (1) and (2).

(1) 2 levels of N as A/S: N₀=0 and N₁=44.8 Kg/ha.

(2) 2 levels of P₂O₅ as Super: P₀=0 and P₁=44.8 Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 blocks/replication, 9 main-plots/block, 4 sub-plots/main-plot. (b) N.A. (iii) 1. (iv) to (vi) N.A.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) to (vii) N.A.

5. RESULTS :

(i) 4152 Kg/ha. (ii) (a) 1155.5 Kg/ha. (b) 410.5 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	S ₁	S ₂	S ₃	D ₁	D ₂	D ₃	R ₁	R ₂	R ₃	P ₀	P ₁	Mean
N ₀	3798	3533	3966	4112	3642	3543	3526	3925	3847	3791	3740	3766
N ₁	4783	4251	4580	4807	4338	4469	4444	4471	4699	4559	4517	4538
Mean	4291	3892	4273	4460	3990	4006	3985	4198	4273	4175	4129	4152
P ₀	4241	3978	4306	4522	4014	3989	3964	4243	4317			
P ₁	4340	3806	4240	4397	3967	4023	4006	4153	4228			
R ₁	4169	3555	4231	4200	4002	3753						
R ₂	4401	3997	4196	4601	3974	4019						
R ₃	4302	4123	4393	4579	3994	4245						
D ₁	4585	4214	4580									
D ₂	4169	3722	4079									
D ₃	4119	3739	4166									

C.D. for N marginal means = 159.5 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- J.&K.64(254)

Site :- Seed Multiplication Farm, Choagal Hardwara.

Type :- 'D'.

Object: —To study the effect of weedicide as against local method of weeding on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) and (c) N.A. (ii) Clay loam (iii) Last week of June, 64. (iv) (a) N.A. (b) Transplanting. (c) — (d) 23 cm. (e) 2-3. (v) Nil (vi) Ch-1039. (vii) Irrigated. (viii) As per treatments. (ix) N.A. (x) Oct., 64.

2. TREATMENTS :

6 weedicidal treatments: T₀=Control, T₁=Local method (hand weeding), T₂=1 post-emergence application of weedicide, T₃=2 post-emergence application of weedicide, T₄=T₂+cultural method of weeding and T₅=Cultural method of weeding.

Weedicide, Sod, Salt 2,4-D applied at 1.12 Kg/ha. 4 and 6 weeks after transplanting.

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) 24.69m. × 2.74m. (b) 24.38m. × 2.44m. (v) 15cm. × 15cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1964 only. (b) No. (c) Nil. (v) Shalimar. (vi) and (vii) Nil.

5. RESULTS:

(i) 2554 Kg/ha. (ii) 489.4 Kg/ha. (iii) Treatment differences are highly significant, (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅
Av. yield	1533	3740	2250	2594	3052	2157

C.D.=737.3 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- J.&K. 64(262).

Site :- Seed Multiplication Farm, Pombay (Kulgaon).

Type :- 'D'.

Object :- to study the method of application of weedicides.

1. BASAL CONDITIONS:

(i) (a) Nil. (b) and (c) N.A. (ii) Clay loam. (iii) N.A. (iv) (a) 3 to 4 ploughings & puddling. (b) Transplanting (c) — (d) 23cm. (e) 2-3. (v) Nil. (vi) Ch-1039 (vii) Irrigated. (viii) As per treatments. (ix) and (x) N.A.

2. TREATMENTS:

10 weedicial treatments: T₀=Control, T₁=Local method, T₂=1 pre-emergence application of weedicide., T₃=1 post-emergence application of weedicide, T₄=2 post-emergence applications of weedicide, T₅=T₂+T₃, T₆=T₁+T₂, T₇=T₁+T₃, T₈=T₁+T₂+T₃ and T₉=Local method (twice).

Weedicide : Tropotox applied at 1.40 litre/ha. pre-emergence 3 days after sowing. Post emergence 4 and 6 weeks after sowing.

3. DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 7.62m. × 3.96m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1964—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 2600 Kg/ha. (ii) 198.6 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	2028	2864	2272	2657	2582	2704	2779	2657	2817	2638

C.D.=288.1 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- J.&K. 64(255).

Site :- Seed Multiplication Farm Pombay (Kulgaon).

Type :- 'D'.

Object :- To determine the optimum dose and suitable time of spraying of herbicides on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) and (c) N.A. (ii) Clay loam. (iii) 23/24.6.64. (iv) (a) N.A. (b) Transplanting (c) — (d) 23 cm. (e) 2-3. (v) N.A. (vi) Ch-1039. (vii) Irrigated. (viii) As per treatments, (ix) and (x) N.A.

2. TREATMENTS :

6 weedicidal treatments : T_0 —Control, T_1 —Local method, T_2 —1 post-emergence application, T_3 —2 post emergence applications, T_4 — T_1 +Cultural method and T_5 —Cultural method.

Weedicide-Sod. Salt 2,4-D applied at 1.12 Kg/ha. (4 and 6 weeks after transplanting).

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 7.62m. × 4.57m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1964—only. (b) No. (c) Nil. (v) Hardwara and Shalimar. (vi) and (vii) Nil.

5. RESULTS :

(i) 1706 Kg/ha. (ii) 101.7 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5
Av. yield	1497	2018	1465	1660	1872	1725

C.D.—153.1 Kg/ha.

Crop :- Paddy.

Ref :- J.&K. 63(245).

Site :- Seed Multiplication Farm, Padgampura.

Type :- 'D'.

Object :—To compare the effect of different weedicides against local method of weeding on the yield of Paddy.

1. BASAL CONDITIONS:

(i) (a) Nil. (b) and (c) N.A. (ii) Clay loam. (iii) N.A. (iv) (a) 2 — 3 ploughings and puddling. (b) Transplanting. (c) — (d) 23cm. (e) 2-3. (v) Nil. (vi) Ch-1039. (vii) Irrigated. (viii) As per treatments. (ix) and (x) N.A.

2. TREATMENTS

8 weedicidal treatments : T_0 —Control, T_1 —Local method (Hand weeding), T_2 —Fenoxone at 0.56Kg/ha., T_3 —Fenoxone at 1.12Kg/ha., T_4 —Fenoxone at 1.56Kg/ha., T_5 —Dicotox acid at 0.56Kg/ha., T_6 —Dicotox acid at 1.12Kg/ha. and T_7 —Dicotox acid at 1.68Kg/ha. Weedicides were sprayed, 4 weeks after transplanting.

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 5. (iv) (a) 8.53m. × 7.62m. (b) 1/296.5ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1963—only. (b) No. (c) Nil. (v) Shalimar. (vi) and (vii) Nil.

5. RESULTS:

(i) 2662Kg/ha. (ii) 267·8Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇
Av. yield	2286	3040	2483	2811	2690	2542	2838	2609

C.D. = 346·6Kg/ha.

Crop :- Paddy (Kharif).

Ref :- J.&K 64(264).

Site :- Reg. Paddy Res., Stn. Ponnechik.

Type :- 'D'.

Object :- To study the effect of weedicides on Paddy crop.

1. BASAL CONDITIONS:

(i) (a) Nil. (b) and (c) N.A. (ii) Clay loam. (iii) June, 64. (iv) (a) 3-4 ploughings and diggings. (b) Transplanting. (c) 25Kg/ha. (d) 23cm. (e) 2-3 (v) 22·4 Kg/ha. of N, P, K each as basal dose. + 22·4Kg/ha. of N at pre-flowering. (vi) Basmati-370. (vii) Irrigated. (viii) As per treatments. (ix) N.A. (x) Nov., 64.

2. TREATMENTS:

6 weedicidal treatments: T₀=Control, T₁=Copper. Mur. 1%, T₂=Dithine Z-78·3%, T₃=Blitox. 2%, T₄=Fytolon. ·002% and T₅=Blue copper.

3. DESIGN:

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) 7·32m. × 2·74m. (b) 7·01m. × 2·29m. (v) 15cm. × 23cm. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1964—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 2261 Kg/ha. (ii) 37·9 Kg/ha. (iii) Treatment differences are highly significant (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅
Av. yield	2228	2331	2246	2250	2294	2219

C.D. = 57·1Kg/ha.

Crop :- Paddy (Kharif).

Ref :- J.&K.65(152).

Site :- Paddy Res. Stn., Ponnechik.

Type :- 'D'.

Object :- To control the stem borer by spraying insecticides on the yield of Paddy.

1. BASAL CONDITIONS:

(i) (a) Nil. (b) Wheat. (c) N.A. (ii) Clay loam. (iii) June, 65. (iv) (a) 3 to 4 ploughings and diggings. (b) Transplanting. (c) — (d) 23cm. (e) 2-3. (v) 22·4Kg/ha. of N, P, K each as basal dose + 22·4Kg/ha. of N as top dressing. (vi) Basmati—370. (vii) Irrigated. (viii) As per treatments. (ix) N.A. (x) Nov., 65.

2. TREATMENTS:

6 weedicial treatments: T_0 =Control, T_1 =Endrin, T_2 =Folidol, T_3 =Dimecron, T_4 =E kotox and T_5 =B coctin.

3. DESIGN:

(i) R.B.D (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) 7.32m. \times 1.83m. (b) 7.01m. \times 1.37m. (v) 15cm. \times 23cm. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1965--only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 2025Kg/ha. (ii) 252.6Kg/ha. (iii) Treatment differences are significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5
Av. yield	1932	2124	2243	1687	1963	2101

C.D. = 390.5Kg/ha.

Crop :- Paddy (Kharif).

Ref :- J.&K. 65(151).

Site :- Paddy Res., Stn., Ponnechik.

Type :- 'D'.

Object :- To study the effect of seed treatments in different chemicals on the yield of Paddy.

1. BASAL CONDITIONS:

(i) (a) Nil. (b) and (c) N.A. (ii) Sandy loam. (iii) Mid of June, 65. (iv) (a) 2 to 3 ploughings and 8 diggings. (b) Transplanting. (c) - (d) 20cm. \times 15cm. (e) 2:3. (v) and (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) Last week of Sept. 65.

2. TREATMENTS:

9 seed treatments: T_0 =Control, T_1 =Seed treatment (seed soaked for 12 hours in mixture of carson net 1000ppm and Steptocycline 25ppm at room temperature), T_2 = T_1 +spraying the crop with Agrosan 100 ppm, T_3 = T_1 +spraying the crop with Steptocycline 25ppm., T_4 = T_1 +spraying the crop with Dethone-Z-78.003%, T_5 = T_1 +spraying the crop with Cumor. 1%, T_6 = T_1 +spraying the crop with Flit-406 0.2%, T_7 = T_1 +spraying the crop with Fytelon 0.2% and T_8 =Only spraying with Streptocycline 100 ppm.

3. DESIGN:

(i) R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3.00m. \times 1.50m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Good. (ii) N.A. (iii) Yield of grain. (iv) (a) 1965--only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 3875Kg/ha. (ii) 827.0Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	4700	4039	4056	3356	4006	3511	3606
	T ₇	T ₈					
	3550	4056					

Crop :- Paddy (Kharif).

Ref:- J.&K. 60(173), 61(172)

Site :- Kashmir Provincial Agri. Exptl. Farm,
Shalimar.

Type :- 'D'.

Object :—To compare the local method of weeding with weedicides for the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) and (c) N.A. (ii) Clay loam. (iii) 4.4.60; 16.4.61. (iv) (a) 2—3 ploughings and puddings (b) Broadcasting (c) 91Kg/ha. (d) 23cm. (e) 2—3. (v) Nil. (vi) Ch-1039. (vii) Irrigated. (viii) As per treatments (ix) N.A. (x) Last week of Sept., 60; Oct., 61.

2. TREATMENTS :

10 weedicidal treatments : T₀=Control, T₁=Local method (hand weeding), T₂=Pre-emergence spraying application of 2, 4-D at 1.68Kg/ha, 3 days after germination, T₃=Post emergence application of Fernoxone at 1.68 Kg/ha, 44 days after sowing, T₄=Post emergence application of Fernoxone at 1.68Kg/ha, twice, 44 and 71 days after sowing, T₅=T₂+T₃, T₆=T₁+T₂, T₇=T₃+T₁, T₈=T₁+T₂+T₃ and T₉=Local method (twice).

3. DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) 8.53m. × 4.11m. (b) 7.92m. × 3.66m. (v) 30cm. × 23cm. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-61. (b) No. (c) Results of combined analysis are given under 5. Results. (v) No. (vi) Nil. (vii) Error variances are heterogeneous and Treatments × Years interaction is present.

5. RESULTS:

Pooled results

(i) 3944Kg/ha. (ii) 1121.1Kg/ha. (with 9 d.f. based on Treatments × Years interaction). (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	3775	4186	3042	3854	3502	4264	3946	4362	4455	4050

Individual results

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	Sig.	G.M.	S.E./plot
Year													
1960	4186	4753	2514	3912	3951	4675	4577	5164	5076	4832	**	4364	792.2
1961	3364	3619	3570	3795	3052	3854	3316	3560	3834	3267	N.S.	3523	510.7
Pooled	3775	4186	3042	3854	3502	4264	3946	4362	4455	4050	N.S.	3944	1121.1

Crop :- Paddy (Kharif).

Ref :- J.&K. 60(172), 61(171)

**Site :- Kashmir Provincial Agri. Exptl. Farm,
Shalimar.**

Type :- 'D'.

Object :- To compare the effect of different weedicides against local method of weeding on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) and (c) N.A. (ii) Clay loam (iii) N.A. (iv) (a) 2-3 ploughings and puddings. (b) Transplanting. (c) — (d) 23cm. (e) 2-3. (v) Nil. (vi) Ch-1039. (vii) Irrigated. (viii) As per treatments (ix) N.A. (x) Last week of Sept. 60, N.A.

2. TREATMENTS:

8 weedicial treatments : T_0 =Control, T_1 =Local method (hand weeding), T_2 =Fenoxone at 0.56 Kg/ha. T_3 =Fenoxone at 1.12 Kg/ha., T_4 =Fenoxone at 1.68Kg/ha., T_5 =Dicotox acid at 0.56Kg/ha., T_6 =Dicotox acid at 1.12Kg/ha. and T_7 =Dicotox acid at 1.68Kg/ha.

Spraying of the weedicides was done 4 weeks after transplanting.

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 5. (iv) (a) 8.53m. x 4.57m. (b) 8.08m. x 4.11m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-61. (b) No. (c) Results of combined analysis are given under 5. Results. (v) and (vi) Nil. (vii) Error variances are homogeneous and Treatments x Years interaction is absent.

5. RESULTS :

Pooled Results

(i) 3179Kg/ha. (ii) 535.2Kg/ha. (based on 63 d.f. made up of pooled error and Treatments x Years interaction). (iii) Treatment differences are significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7
Av. yield	2864	3638	3275	2940	2954	3257	3256	3250

C.D.=478.5Kg/ha.

Individual Results

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7	Sig.	G.M.	S.E./plot
Year 1960	3147	3780	3174	2962	3084	3071	3030	3043	N.S.	3161	451.0
1961	2582	3497	3376	2918	2824	3443	3483	3456	N.S.	3198	592.1
Pooled	2864	3638	3275	2940	2954	3257	3256	3250	*	3179	535.2

Crop :- Paddy. (Kharif)

Ref :- J.&K. 65(141).

**Site :- Kashmir Provincial Agri. Exptl. Farm,
Shalimar,**

Type :- 'D'.

Object :- To find out the effective dose of weedicide in controlling weeds.

1. BASAL CONDITIONS:

(i) (a) Nil. (b) and (c) N.A. (ii) Clay loam. (iii) N.A. (iv) (a) 3 to 4 ploughings & puddlings. (b) Transplanting. (c) — (d) 23 cm. (e) 2-3. (v) Nil. (vi) Ch-1039. (vii) Irrigated. (viii) As per treatments. (ix) N.A. (x) Sep, 65.

2. TREATMENTS

8 weedicidal treatments: T_0 =Control, T_1 =Local method, T_2 =Sod. Salt, 2,4-D at 0.56 Kg/ha. T_3 =Sod. Salt, 2,4-D at 1.12 Kg/ha., T_4 =Sod, salt 2,4-D at 1.68Kg/ha., T_5 =Ethyle ester of 2,4-D at 0.56 Kg/ha., T_6 = Ethyle ester of 2,4-D at 1.12 Kg/ha. and T_7 =Ethyle ester of 2,4-D at 1.68 Kg/ha.

Weedicides sprayed 4 weeks after transplanting.

3. DESIGN:

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) 8.53m. × 7.62m. (b) 8.08m. × 7.16m. (v) 23cm. × 23cm. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain (iv) (a) 1965—only. (b) and (c) Nil. (v) No. (vi) and (vii) Nil.

5. RESULTS:

(i) 1545 Kg/ha. (ii) 113.6 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7
Av. yield	1284	1823	1441	1568	1490	1480	1705	1568

C.D.=167.0 Kg/ha.

Crop :- Paddy (*Kharif*).
Site :- Kashmir Provincial Agri.
Exptl. Farm, Shalimar.

Ref :- J.&K. 60(174), 61(173), 63(247),
64(257), 65(142).
Type :- 'D'.

Object :- To compare the different methods of weed control on the yield of Paddy.

1. BASAL CONDITIONS:

(i) (a) and (b) Nil. (c) N.A. (ii) Clay loam. (iii) Transplanted during the month of July (actual dates N.A.). (iv) (a) 2-3 ploughings and puddling. (b) Transplanting. (c) — (d) 23cm. (e) 2-3. (v) Nil. (vi) Ch-1039. (vii) Irrigated (viii) As per treatments. (ix) N.A. (x) Last week of Sept.

2. TREATMENTS:

6 weedicidal treatments: T_0 =Control, T_1 =Local method, T_2 = 1 post-emergence application of Fernoxone, T_3 =2 post-emergence applications of Fernoxone, T_4 = T_2 +cultural method and T_5 =Cultural method

Weedicides applied at 1.12 Kg/ha with an interval of 26 days.

3. DESIGN:

(i) R.B.D. (ii) (a) 6 (b) N.A. (iii) 6 for 61 and 63; 4 for 64 and 65. (iv) (a) 7.92m. × 5.48m. for 60; 8.22m. × 5.79m. for 61 and 63; 8.52m. × 6.69m. for 64 and 65. (b) 7.70m. × 5.26m. for 60; 7.92m. × 5.49m. for 61 and 63; 8.08m. × 6.25m. for 64 and 65. (v) 11cm. × 11cm. for 60, 15cm. × 15cm. for 61 and 63; 22cm. × 22cm. for 64 and 65. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain (iv) (a) 1960 to 65 (not conducted in 1962). (b) No. (c) Results of combined analysis are given under 5. Results. (v) Kulga on, Hardwara. (vi) Nil. (vii) Error variances are heterogeneous and Treatments × Years interaction is present.

5. RESULTS:

Pooled Results

(i) 3625 Kg/ha. (ii) 889.1 Kg/ha. (based on 20 d. f. made up of Treatments \times Years interaction) (iii) Treatment differences are significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅
Av. yield	3212	4076	3444	3662	3814	3540

C.D. = 514.3 Kg/ha.

Individual Results

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	Sig.	G.M.	S.E./plot
Years									
1960	3704	4054	3570	3905	3933	4082	N.S.	3875	596.1
1961	3895	3573	4025	4051	4051	3538	N.S.	3856	547.5
1963	4495	5773	4860	5103	5182	5208	**	5103	414.2
1964	932	1988	1056	1157	1449	1224	**	1301	250.4
1965	1806	4406	2651	3056	3595	2542	**	3009	576.6
Pooled	3212	4076	3444	3662	3814	3540	*	3625	889.1

Crop :- Wheat (*Rabi*).

Ref :- J.&K. 62(258), 63(251),
64(260), 65(146).

Site :- Kashmir Provincial Agri. Exptl.
Farm, Shalimar.

Type :- 'D'.

Object :- To compare the effect of various weedicides with local method on the yield of Wheat.

1. BASAL CONDITIONS:

(i) (a) Nil. (b) and (c) N.A. (ii) Clay loam. (iii) N.A. (iv) (a) 3-4 ploughings, (b) Line sowing. (c) 100 Kg/ha. (d) 24cm. (e) — (v) Nil. (vi) N.A. (vii) Irrigated (viii) As per treatments. (ix) and (x) N.A.

2. TREATMENTS:

5 weedicial treatments: T₀ = Control, T₁ = Local method, T₂ = one post-emergence application of sod. Salt 2,4-D at 0.56 Kg/ha. T₃ = 2 applications of T₂, and T₄ = T₂ + cultural method.

Post-emergence application 3 weeks after sowing.

3. DESIGN:

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 6. (iv) (a) 9.02m. \times 4.58m.; 9.28m. \times 5.98m.; 9.28m. \times 4.44m.; 9.18m. \times 4.58m. (b) 8.54m. \times 4.10m.; 8.54m. \times 5.50m.; 8.54m. \times 3.96m.; 8.70m. \times 4.10m. (v) 48cm. \times 48cm.; 64cm. \times 48cm.; 64cm. \times 48cm.; 48cm. \times 48cm. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain (iv) (a) 1962 to 65 (b) No. (c) Results of combined analysis are given under 5. Results. (v) No. (vi) Nil. (vii) Error variances are heterogeneous and Treatments \times Years interaction is present.

5. RESULTS:

Pooled Results

(i) 550 Kg/ha. (ii) 147.6 Kg/ha. (based on 12 d. f. made up of Treatments \times Years interaction). (iii) Treatment differences are highly significant (iv, Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄
Av. yield	467	665	500	527	591

C.D.=92.8 Kg/ha.

Individual Results.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	Sig.	G.M.	S.E./plot
Year								
1962	449	504	381	442	438	N.S.	443	134.8
1963	549	735	630	573	666	**	630	80.3
1964	151	458	162	341	386	**	300	50.9
1965	719	962	825	751	872	**	826	105.2
Pooled	467	665	500	527	591	**	550	147.6

Crop :- Maize (Kharif).**Ref. :- J.&K. 64(269).****Site :- Seed Multiplication Farm, Choagal, Hardawara. Type : 'D'.**

Object :- To study the efficiency of chemical, cultural and local methods for controlling weeds,

1. BASAL CONDITIONS:

(i) (a) Nil. (b) and (c) N.A. (ii) Clay loam (iii) May, 64. (iv) (a) 3 to 4 ploughings (b) Line sowing (c) 15 Kg/ha. (d) 61cm. (e) — (v) Nil. (vi) Anantnag (Local) (vii) Unirrigated. (viii) As per treatments. (ix) N.A. (x) Sept., 64.

2. TREATMENTS:

10 weedicidal treatments: T₀=Control, T₁=Local method, T₂=pre-emergence application of weedicide, T₃=1 post-emergence application, T₄=2 post-emergence applications, T₅=T₂+T₃, T₆=T₃+cultural method, T₇=T₂+cultural method, T₈=T₂+T₃+cultural method and T₉=Cultural method.

Weedicide Ethyle Ester 2,4-D applied at 1.49 litre/ha. Pre-emergence application 3 days after sowing and post-emergence application 4 and 6 weeks after sowing.

3. DESIGN:

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 12.19m. x 3.05m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1964—only (b) and (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 126 Kg/ha. (ii) 26.9 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	91	183	118	106	110	106	114	145	152	137

C.D.=39.0 Kg/ha.

Crop :- Maize (Kharif).
Site :- Seed Multiplication Farm, Choagal
Hardawara.

Ref :- J.&K. 64(267).
Type :- 'D'.

Object —To study the efficiency of chemical, cultural and local methods for controlling weeds.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) and (c) N.A. (ii) Clay loam. (iii) May, 64. (iv) (a) 3 to 4 ploughings. (b) Line sowing. (c) 15 Kg/ha. (d) 61cm. (e) — (v) Nil. (vi) Anantnag (Local). (vii) Unirrigated, (viii) As per treatments. (ix) N.A. (x) Sept., 64.

2. TREATMENTS TO 4. GENERAL :

Same as in expt. no. 64 (269) on page No. 364.

3. RESULTS:

(i) 444 Kg/ha. (ii) 63.0 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	267	387	336	465	496	450	427	488	465	458

C.D=91.4 Kg/ha.

Crop :- Maize. (Kharif)

Ref :- J.&K. 60(175), 61(174),
62(255), 63(248), 65(143).

Site :- Damodar Kuwa Farm, Srinagar.

Type :- 'D'.

Object :—To compare the effect of weedicide with local method of weeding on the yield of Maize.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) and (c) N.A. (ii) Sandy loam. (iii) 1st week of May, 60; May, 61; June, 62; N.A. (iv) (a) 2 and 3 ploughings. (b) Line sowing. (c) 15 Kg/ha. (d) 60cm. between rows for 61 to 63; 30cm. for 65. (e) — (v) Nil. (vi) Anant nag (Local). (vii) Unirrigated. (viii) As per treatments. (ix) N.A. (x) Last week of Sept., 60, Oct., 61, Nov., 62, and N.A. for 63 & 65.

2. TREATMENTS:

10 weedicidal treatments: T₀=Control, T₁=Local method, T₂=1 pre-emergence application of weedicide, T₃=1 post-emergence application of weedicide, T₄=2 post-emergence applications of weedicide., T₅=T₂+T₃, T₆=T₃+Cultural method, T₇=T₃+Cultural method, T₈=T₃+T₄+Cultural method and T₉=Cultural method

Sod. Salt 2,4-D applied at N 56 Kg/ha. pre-emergence application 3 days after sowing. Post emergence application 4 and 8 weeks after sowing.

3 DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) 8.82m. × 7.30m; 10.66m. × 5.08m. for 61 and 62; 1/153 ha; 9.14m. × 6.10m. (6) 7.62m. × 6.10m.; 9.76m. × 4.88m. for 61 and 62; 1/215 ha ; 8.54m. × 5.50m. (v) 60cm. × 60cm; 45cm. × 60cm. for 61 and 62; N.A.; 30cm. × 30cm. (vi) Yes.

4. GENERAL :

(i) and (ii) N A. (iii) Yield of grain. (iv) (a) 1960-65 (In 1964 different treatments were tried.). (b) No. (c) Results of combined analysis are given under 5. Results. (v) and (vi) Nil. (vii) Error variances are heterogeneous and Treatments × Years interaction is present.

5. RESULTS:

Pooled Results

(i) 683 Kg/ha. (ii) 297.0 Kg/ha. (based on 36 d. f. made up of Treatments \times Years interaction). (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	507	935	502	665	710	658	638	779	718	720

C.D.=190.6 Kg/ha

Individual Results

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	Sig.	G.M.	S.E/plot
Year													
1960	384	1202	635	1062	1050	922	897	1422	1208	952	**	973	234.0
1961	1585	1788	1227	1466	1621	1502	1311	1513	1549	1758	N.S.	1532	287.1
1962	256	989	316	364	358	399	465	405	328	399	**	428	56.6
1963	67	207	85	116	152	122	146	189	146	122	**	135	43.2
1965	242	490	245	318	369	346	369	364	357	367	**	347	55.3
Pooled	507	935	502	665	710	658	638	779	718	720	**	683	297.0

Crop : Maize (Kharif)

Ref : J.&K. 64(302).

Site :-Damodar KuwaFarm, Srinagar.

Type : 'D'.

Object :--To compare the weedicides with local method on the yield of Maize.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) and (c) N.A. (ii) Sandy loam (iii) N.A. (iv) (a) 3 and 4 ploughings. (b) Line sowing. (c) 16 Kg/ha. (d) 61cm. (e) — (v) Nil. (vi) Anantnag (local). (vii) Un-irrigated. (viii) As per treatments. (ix) — (x) N.A.

2. TREATMENTS:

10 weedicidal treatments : T₀=Control, T₁=Local method, T₂=Pre-emergence application of weedicide, T₃=1 post-emergence application, T₄=2 post-emergence applications, T₅=T₂+T₃, T₆=T₂+Cultural method., T₇=T₃+Cultural method, T₈=T₂+T₃+Cultural method and T₉=Cultural method.

Planotox applied at 2.10 litre/ha.

Pre-emergence application 3 days after sowing and post-emergence application 4 and 8 weeks after sowing.

3. DESIGN:

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 9.14m. \times 6.10m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1964—only (b) N.A. (c) Nil. (v) No. (vi) and (vii) Nil.

5. RESULTS :

(i) 1014 Kg/ha. (ii) 435.4 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	661	1393	956	641	854	722	1109	1282	1475	1048

Crop :- Maize (Kharif).

Ref :- J. & K. 64(258)

Site :- Damodar Kuwa Farm Srinagar.

Type :- 'D'.

Object :—To study the effect of different weedicides on the yield of Maize.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) and (c) N.A. (ii) Sandy loam, (iii) May, 64. (iv) (a) 3 to 4 ploughings. (b) Line sowing (c) 15 Kg/ha. (d) 61cm. (e) — (v) Nil. (vi) Anantnag (local) (vii) Unirrigated. (viii) As per treatments. (ix) N.A. (x) Sept., 64.

2. TREATMENTS :

12 weedicial treatments: T_0 =Control, T_1 =Local method, T_2 =Ferrox at 0.56 Kg/ha., T_3 =Ferrox at 1.12 Kg/ha., T_4 =Dicotox at 0.70 Kg/ha., T_5 =Dicotox at 0.98 Kg/ha., T_6 =Tropotax at 0.56 Kg/ha., T_7 =Tropotax at 1.12 Kg/ha., T_8 =Plantox at 0.84 Kg/ha., T_9 =Plantox at 1.12 Kg/ha., T_{10} =Sponotox 0.70 Kg/ha. and T_{11} =Sponotox at 0.98 Kg/ha.

Weedicides sprayed 4 weeks after sowing in T_1 to T_{11} and 3 weeks after sowing in T_1 .

3. DESIGN :

(i) R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 10 67m. x 4 88m (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain (iv) (a) 1964—only. (b) No. (c) Nil. (v) No. (vi) and (vii) N.A.

5. RESULTS :

(i) 1119 Kg/ha. (ii) 154.6 Kg/ha. (iii) Treatment differences are highly significant. (iv) A.v. yield of grain in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8
Av. yield	774	1330	1177	1193	1210	1106	1003	1101	1286
	T_9	T_{10}	T_{11}						
	1052	1019	1177						

C.D=222.5 Kg/ha.

Crop :- Maize (Kharif).

Ref :- J. & K. 64(270)

Site :- Damodar Kuwa Farm, Srinagar.

Type :- 'D'.

Object—To compare the weedicides with local method for controlling weeds in Maize crop.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) and (c) N.A. (ii) Sandy loam (iii) N.A. (iv) (a) 3 to 4 ploughings. (b) Line sowing. (c) 15 Kg/ha. (d) 60cm. (e) — (v) Nil. (vi) Anantnag (Local). (vii) Unirrigated. (viii) As per treatments. (ix) N.A. (x) Sept., 64.

2. TREATMENTS TO 4. GENERAL :

Same as in expt. no 64(302) on page No. 366.

Weedicide was Tropotax applied at 2.10 litre/ha.

Pre-emergence application 3 days after sowing and post-emergence application 4 and 8 weeks after sowing.

5. RESULTS :

(i) 1437 Kg/ha. (ii) 665.1 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	804	2039	1109	1144	1017	936	1887	1617	1953	1866

Crop :- Maize. (Kharif)

**Ref :- J. & K. 60(176), 61(175),
62(256), 63(249).**

Site :- Damodar Kuwa Farm Shrinagar.

Type :- 'D'.

Object :—To find out the optimum dose of weedicides in controlling weeds in Maize crop.

1. BASAL CONDITIONS:

(i) (a) Nil. (b) and (c) N.A. (ii) Sandy loam. (iii) June, 60; May, 61; May, 62; June, 63. (iv) (a) 3 to 4 ploughings. (b) Line sowing. (c) 15 Kg/ha. (d) 61cm. (e) — (v) Nil. (vi) Anant nag (Local). (vii) Unirrigated. (viii) As per treatments. (ix) N.A. (x) Sept., 60; Sept., 61; Sept., 62; Oct., 63.

2. TREATMENTS :

8 weedicidal treatments : T₀=Control, T₁=Local method, T₂=Fenoxone at 0.56 Kg/ha., T₃=Fenoxone at 1.12 Kg/ha., T₄=Fenoxone at 1.68 Kg/ha., T₅=Dicotox at 0.56 Kg/ha., T₆=Dicotox at 1.12 Kg/ha. and T₇=Dicotox at 1.68 Kg/ha.

Weedicides sprayed 4 weeks after sowing.

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 6 for 62; 5 for others (iv) (a) 7.32m. × 7.01m. (b) 6.71m. × 5.79m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960 to 63. (b) No. (c) Results of combined analysis are given under 5. Results. (v) No. (vi) Nil. (vii) Error variances are heterogeneous and Treatments × Years interaction is present.

5. RESULTS :

Pooled Results

(i) 738 Kg/ha. (ii) 439.5 Kg/ha. (based on 21 d. f. made up of Treatments × Years interaction). (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇
Av. yield	430	1085	627	717	765	736	811	734

C.D.=282.0 Kg/ha.

Individual results

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	Sig.	G.M.	S.E./plot
Year											
1960	263	1105	394	790	1010	631	841	537	*	696	414.4
1961	1040	1513	1565	1437	1273	1629	1588	1664	N.S.	1464	608.6
1962	326	1372	457	477	584	540	599	564	**	615	80.2
1963	111	292	128	210	228	182	257	204	**	202	51.3
Pooled	430	1085	627	717	765	736	811	734	**	738	439.5

Crop :- Maize**Ref :- J.&K. 64(259), 65(145)****Site :- Kashmir Provincial Agri.
Exptl. Farm, Shalimar.****Type :- 'D'.****Object: -To compare the effect of weedcides with local method on the yield of Maize.****1. BASAL CONDITIONS :**

(i) (a) Nil. (b) and (c) N.A. (ii) Clay loam. (iii) End of Nov., 64 and 65. (iv) (a) 4-5 ploughings. (b) Line sowing. (c) 100 Kg/ha. (d) 23 cm. (e) - (v) Nil. (vi) NP-818. (vii) Irrigated. (viii) As per treatments. (ix) N.A. (x) July, 65; June, 66.

2. TREATMENTS:8 weedcidal treatments: T₀=Control, T₁=Local method, T₂=Sod. Salt, 2,4-D at 0.56 Kg/ha., T₃=Sod 2,4-D at 1.12 Kg/ha., T₄=Sod. Salt 2,4-D at 1.68 Kg/ha., T₅=Ethyle ester, 2,4-D at 0.56 Kg/ha., T₆=Ethyle ester, 2,4-D at 1.12 Kg/ha. and T₇=Ethyle ester, 2,4-D at 1.68 Kg/ha.

Weedcides sprayed 6 weeks after sowing.

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) 9.14m. x 5.94m; 9.14m. x 4.57m. (b) 8.69m. x 5.49m; 8.69m. x 4.11m. (v) 23cm. x 23cm. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1964-65 (b) No. (c) Results of combined analysis are given under 5. Results. (v) and (vi) Nil. (vii) Error variances are homogeneous and Treatments x Years interaction is present.

5. RESULTS:**Pooled Results**

(i) 208 Kg/ha. (ii) 87.8 Kg/ha. (based on 7 d. f. made up of Treatments x Years interaction). (iii) Treatment differences are significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇
Av. yield	123	280	150	201	198	168	268	278

C.D. = 103.8 Kg/ha.

Individual Results

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	Sig.	G.M.	S.E./plot
Years											
1964	143	291	149	172	190	184	220	214	**	195	30.5
1965	103	270	151	230	206	151	317	341	**	221	42.4
Pooled	123	280	150	201	198	168	268	278	**	208	87.8

Crop :- Peas (Rabi).**Ref :- J.&K. 63(218)****Site :- Kashmir Provincial Agri.
Exptl. Farm, Shalimar.****Type :- 'M'.****Object: -To study the effect of different levels of Dal weed and F.Y.M. on the yield of Peas.**

1. BASAL CONDITIONS

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 26.11.63. (iv) (a) to (e) N.A. (v) N.A. (vi) T-163. (vii) Unirrigated. (viii) N.A. (ix) 53cm. (x) June, 64

2. TREATMENTS:

Main-plot treatments:
3 levels of Dalweed: $D_1=92.2$, $D_2=184.4$ and $D_3=276.6$ Q/ha.

Sub-plot treatments:
3 levels of F.Y.M.: $F_1=92.2$, $F_2=184.4$ and $F_3=276.6$ Q/ha.

3. DESIGN:

(i) Split-plot. (ii) (a) 3 main-plots/replication, 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) $3.96m. \times 2.13m.$ (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of green pods. (iv) (a) 1963-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 2370 Kg/ha. (ii) (a) 544.0 Kg/ha. (b) 780.2 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of green pods in Kg/ha.

	D_1	D_2	D_3	Mean
F_1	1691	2194	3031	2306
F_2	2514	2227	2369	2370
F_3	2114	2679	2511	2435
Mean	2106	2367	2637	2370

Crop :- Peas (Rabi).

Ref :- J.&K. 63(219)

**Site :- Kashmir Provincial Agri.
Exptl. Farm, Shalimar.**

Type :- 'M'.

Object :-To study the effect of different levels and methods of application of 'P' on the yield of Pea.

1. BASAL CONDITIONS

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 9.11.63. (iv) (a) to (e) N.A. (v) N.A. (vi) T-163. (vii) Unirrigated. (viii) N.A. (ix) 53cm. (x) 26.5.64 to 14.6.64.

2. TREATMENTS:

Main-plot treatments:
4 levels of P_2O_5 : $P_0=0$, $P_1=56$, $P_2=112$ and $P_3=168$ Kg/ha.

Sub-plot treatments:
3 methods of application: A_1 =By broadcasting, A_2 =5cm. below seed and A_3 =
Band placement.

3. DESIGN:

(i) Split-plot. (ii) (a) 4 main-plots/replication, 3 sub-plots/main-plot. (b) N.A. (iii) 3. (iv) (a) and (b) N.A. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Green pods. (iv) (a) 1963-65 (Treatments modified in 1964). (b) No. (v) to (vii) Nil.

5. RESULTS :

(i) 3934 Kg/ha. (ii) (a) 1069.0 Kg/ha. (b) 1049.0 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of pods in Kg/ha.

	A ₁	A ₂	A ₃	Mean
P ₀	3893	4706	4054	4218
P ₁	4928	3156	4144	4076
P ₂	3140	3301	4138	3526
P ₃	3600	3678	4485	3914
Mean	3890	3710	4205	3934

Crop:- Peas (*Rabi*).

Ref :- J.&K. 64(218), 65(110)

Site:- Kashmir Provincial Agri.

Exptl. Farm, Shalimar.

Type :- 'M'.

Object :- To study the effect of phosphorus and methods of its application.

1. BASAL CONDITIONS

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 5.11.64; 21.10.65. (iv) (a) to (e) N.A. (v) N.A. (vi) T-163. (vii) Un-irrigated. (viii) N.A. (ix) 69cm; N.A. (x) 23.6.65; 10.6.66.

2. TREATMENTS:

Main-plot treatments :

4 levels of P₂O₅: P₀=0, P₁=56, P₂=112, and P₃=168 Kg/ha.

Sub-plot treatments :

4 methods of application of P₂O₅: M₁=Broad casting, M₂=5cm. on both sides of the row, M₃=5cm. on one side of the row and M₄=5cm. under the seed.

3. DESIGN:

(i) Split-plot. (ii) (a) 4 main-plots/replication; 4 sub-plots/main-plot. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 2.44m. x 2.44m. (v) N.A. (vi) Yes.

4. GENERAL

(i) Normal. (ii) N.A. (iii) Green pods. (iv) (a) 1963-65 (Treatments modified in 1964). (b) No. (v) to (vii) Nil.

5. RESULTS :

Pooled Results

(i) 64.2 Q/ha. (ii) (a) 16.87 Q/ha. (based on 15 d.f. made up of Pooled error and Treatments x Years interaction). (b) 17.28 Q/ha (based on 60 d.f made up of Pooled error and Treatments x Years Interaction) (iii) None of the effects is significant. (iv) Av. yield of peas in Q/ha.

	P ₀	P ₁	P ₂	P ₃	Mean
M ₁	58.0	62.5	77.6	75.1	68.0
M ₂	65.0	67.0	57.7	66.4	64.0
M ₃	67.8	67.3	59.4	67.0	65.4
M ₄	55.2	61.4	51.6	68.7	59.2
Mean	61.5	64.5	61.6	69.3	64.2

Individual results.

Treatments	P ₀	P ₁	P ₂	P ₃	Sig.	M ₀	M ₁	M ₂	M ₃	Sig.	G.M.	S.E./plot	
												Main-plot	Sub-plot
Year 1964	62.5	63.5	63.1	65.6	N.S.	64.7	67.0	60.5	62.4	N.S.	63.6	9.07	18.73
1965	60.5	65.6	60.1	73.0	N.S.	71.8	61.1	70.2	56.0	*	64.8	20.38	14.17
Pooled	61.5	64.5	61.6	69.3	N.S.	68.3	64.0	65.4	59.2	N.S.	64.2	16.87	17.28

Crop :- Potato (*Kharif*.)

Ref:- J.&K. 60(9)

Site :- Potato Res.Stn.Gulmarg.

Type :- 'M'.

Object :—To study the effect of fertilizers on the yield of Potato.

1. BASAL CONDITIONS

(i) (a) to (c) N.A. (ii) (a) Clay loam. (iii) 19.6.60. (iv) (a) to (e) N.A. (v) Nil. (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) 26.10.60.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 4 levels of N as F.Y.M.:—N₀=0, N₁=56, N₂=112 and N₃=168 Kg/ha.(2) 3 levels of P₂O₅ as Super : P₀=0, P₁=84 and P₂=168 Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3.66m. × 2.13m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Good. (ii) N.A. (iii) Yield of tuber. (iv) (a) N.A. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 183.9 Q/ha. (ii) 37.2 Q/ha. (iii) Interaction N × P alone is significant. (iv) Av. yield of tuber in Q/ha.

	N ₀	N ₁	N ₂	N ₃	Mean
P ₀	151.1	205.6	172.1	182.7	177.9
P ₁	165.6	227.4	182.3	162.0	184.3
P ₂	183.0	154.7	225.2	194.7	189.4
Mean	166.6	195.9	193.2	179.8	183.9

C.D. for the body of N × P table = 53.5 Q/ha.

Crop :- Potato (*Kharif*.)

Ref:- J.&K. 61(160)

site :- Potato Res. Stn. Gulmarg

Type :- 'M'.

Object :—To study the effect of different levels of N and P on the yield of Potato.

1. BASAL CONDITIONS

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 8.6.61. (iv) (a) and (b) N.A. (c) 18.4 Kg/ha. (d) and (e) N.A. (v) N.A. (vi) Up-to-date. (vii) to (ix) N.A. (x) 21.10.61.

2. TREATMENTS

Main-plot treatments :

3 levels of P_2O_5 : $P_0=0$, $P_1=84$ and $P_2=168$ Kg/ha.

Sub-plot treatments :

4 levels of N : $N_0=0$, $N_1=56$, $N_2=112$ and $N_3=168$ Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication; 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) $4.57m \times 2.06m$. (v) N.A. (vi) Yes.

4. GENERAL

(i) Normal. (ii) Nil. (iii) Yield of tuber. (iv) (a) 1961-62 (modified in 62). (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS

(i) 189.4 Q/ha. (ii) (a) 43.5 Q/ha. (b) 22.3 Q/ha. (iii) Main effect of N is highly significant. Interaction $P \times N$ is highly significant. (iv) Av. yield of tuber in Q/ha.

	P_0	P_1	P_2	Mean
N_0	158.8	170.3	177.5	168.9
N_1	170.0	230.9	170.6	190.5
N_2	198.3	196.2	167.6	187.4
N_3	215.8	191.4	225.7	211.0
Mean	185.7	197.2	185.4	189.4

C.D for N marginal means = 18.1 Q/ha.

C.D for N means at the same level of $P=32.3$ Q/ha.C.D for P means at the same level of $N=48.6$ Q/ha.**Crop:-Potato (Khatif)**

Site :- Potato Res. Stn., Gulmarg

Ref:-J.&K. 62(239)

Type :- 'M'.

Object :- To study the effect of different levels of N and P on the yield of Potato.

1. BASAL CONDITIONS

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 29.5.62. (iv) (a) and (b) N.A. (c) 18.4 Q/ha. (d) and (e) N.A. (v) N.A. (vi) Up-to-date (vii) to (ix) N.A. (x) 20.10.62.

2. TREATMENTS

Main-plot treatments :

3 levels of P_2O_5 : $P_0=0$, $P_1=90$ and $P_2=180$ Kg/ha.

Sub-plot treatments :

4 levels of N : $N_0=0$, $N_1=56$, $N_2=112$ and $N_3=168$ Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication; 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) $3.66m \times 2.44m$. (v) N.A. (vi) Yes.

4. GENERAL

(i) Normal. (ii) Nil. (iii) Yield of tuber. (iv) (a) 1961-62 (modified in 62). (b) N.A. (c) Nil. (v) to (vii) Nil.

5. RESULTS

(i) 162.7 Q/ha. (ii) (a) 36.0 Q/ha. (b) 36.5 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of tuber in Q/ha.

	P ₀	P ₁	P ₂	Mean
N ₀	147.9	143.5	168.9	153.4
N ₁	136.5	155.6	152.4	148.1
N ₂	177.1	176.5	156.2	169.9
N ₃	184.8	186.0	167.6	179.5
Mean	161.6	165.4	161.3	162.7

Crop :- Potato (Kharif.)

Ref:-J.&K. 63(224)

Site :- Potato Res. Stn., Gulmarg

Type :- 'M'.

Object :-To study the effect of different levels of N, P and K on the yield of Potato.

1. BASAL CONDITIONS

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 20.6.63. (iv) (a) and (b) N.A. (c) 18.4 Q/ha. (d) and (e) N.A. (v) 276.7 Q/ha. of F.Y.M. (vi) Up-to-date. (vii) Irrigated. (viii) Weeding. (ix) 32.6cm. (x) 29.10.63.

2. TREATMENTS

Main-plot treatments :

3 levels of N : N₁=56, N₂=140, and N₃=224 Kg/ha.

Sub-plot treatments :

3 levels of P₂O₅ : P₁=56, P₂=140 and P₃=224 Kg/ha.

Sub-Sub-plot treatments :

3 levels of K₂O : K₁=56, K₂=140 and K₃=224 Kg/ha.

3. DESIGN:

(i) Split-plot. (ii) (a) 3 main-plots/replication; 3 sub-plots/main-plot, 3 sub-sub-plots/sub-plot. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 4.27m. x 2.13m. (v) N.A. (vi) Yes.

4. GENERAL

(i) Normal. (ii) Nil. (iii) Yield of tuber. (iv) (a) 1963-only. (b) and (c) Nil. (v) to (vii) Nil.

5. RESULTS

(i) 215.2 Q/ha. (ii) (a) 59.6 Q/ha. (b) 53.4 Q/ha. (c) 50.5 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of tuber in Q/ha.

	P ₁	P ₂	P ₃	K ₁	K ₂	K ₃	Mean
N ₁	196.3	204.8	226.0	208.1	218.3	200.6	209.0
N ₂	223.8	214.0	223.3	222.5	226.0	212.6	220.4
N ₃	191.6	249.6	207.2	211.0	222.9	214.6	216.2
Mean	203.9	222.8	218.8	213.8	222.4	209.3	215.2
K ₁	196.0	231.3	214.2				
K ₂	210.6	239.2	217.5				
K ₃	205.1	198.0	224.8				

Crop :- Potato (Kharif).

Ref:-J.&K. 64(228)

Site :- Potato Res.Stn.;Gulmarg

Type :- 'M'.

Object :-To study the effect of different levels of N,P and K on the yield of Potato.

1. BASAL CONDITIONS

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 3.6.64. (iv) (a) N.A. (b) Tubering. (c) 18.4 Q/ha. (d) 53cm. x 22cm. (e) N.A. (v) N.A. (vi) S-4234. (vii) to (ix) N.A. (x) 29 10.64.

2. TREATMENTS

All combinations of (1), (2) and (3)

(1) 3 levels of N :— $N_1=56.0$, $N_2=140.1$ and $N_3=224.2$ Kg/ha.

(2) 3 levels of P_2O_5 :— $P_1=56.0$, $P_2=112.1$ and $P_3=168.1$ Kg/ha.

(3) 3 levels of K_2O :— $K_1=56.0$, $K_2=112.1$ and $K_3=168.1$ Kg/ha.

3. DESIGN :

(i) 3^3 Fact. (ii) (a) 27. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 5.49m. x 2.44m. (v) N.A. (vi) Yes.

4. GENERAL

(i) Normal. (ii) N.A. (iii) Yield of tuber. (iv) (a) 1964-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS

(i) 76.5 Q/ha. (ii) 22.9 Q/ha. (iii) only interaction $P \times K$ is significant (iv) Av. yield of tuber in Q/ha.

	P_1	P_2	P_3	K_1	K_2	K_3	Mean
N_1	71.0	65.7	74.4	67.2	66.3	77.6	70.4
N_2	75.5	79.5	79.6	79.9	73.6	81.0	78.2
N_3	82.0	86.6	74.1	67.1	92.7	82.9	80.9
Mean	76.1	77.3	76.0	71.4	77.5	80.5	76.5
K_1	61.0	87.6	65.5				
K_2	86.5	73.0	73.1				
K_3	80.9	71.2	89.5				

C.D. for the body of $P \times K$ table = 21.7 Q/ha.

Crop :- Potato (Kharif).

Ref :- J.&K. 63(226).

Site :- Potato Res. Stn., Gulmarg.

Type :- 'M'.

Object :- To study the effect of potash on the yield of Potato.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 20.6.63. (iv) (a) N.A. (b) Tubering. (c) 19.4 Q/ha. (d) 53cm. x 23cm. (e) N.A. (v) N.A. (vi) S-4215. (vii) to (ix) N.A. (x) 26th Oct.,-1963.

2. TREATMENTS :

5 levels of K_2O : $K_0=0$, $K_1=56$, $K_2=112$, $K_3=168$ and $K_4=224$ Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3.66m. x 2.74m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of tuber. (iv) (a) 1963-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 240.5 Q/ha. (ii) 38.21 Q/ha. (iii) Treatment differences are not significant, (iv) Av. yield of tuber in Q/ha.

Treatment	K ₀	K ₁	K ₂	K ₃	K ₄
Av. yield	204.7	208.8	261.4	276.8	250.6

Crop :- Potato (Kharif)

Ref :- J.&K.6 4(226), 65(113).

Site :- Kashmir Provincial Agri.

Exptl. Farm, Shalimar.

Type :- 'M'.

Object :—To study the effect of different levels of F.Y.M. and Dal-weed on the yield of Potato.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 1.5.64; 25.3.65. (iv) (a) and (b) N.A. (c) 18.4 Q/ha. (d) and (e) N.A. (v) N.A. (vi) S-4234 (vii) Irrigated. (viii) N.A.; 4-5 weedings. (ix) 32.3cm; N.A. (x) 29.9.64; 10.9.65.

2. TREATMENTS :

Main-plot treatments :

3 levels of F.Y.M. : F₁=123.6, F₂=247.1 and F₃=370.7 Q/ha.

Sub-plot treatments :

3 levels of Dalweed : D₁=123.6, D₂=247.1 and D₃=370.7 Q/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication; 3 sub-plots/main-plot, (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3.96m. × 2.13m; 4.11m. × 2.29m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of tuber. (iv) (a) 1964—contd. (b) No. (c) Nil. (v) and (vi) Nil. (vii) Since the expt. is contd. beyond 1965, hence individual years results are presented under 5 Results.

5. RESULTS:

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(i) 108.1 Q/ha. (ii) (a) 25.6 Q/ha. (b) 21.9 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of tuber in Q/ha.

	F ₁	F ₂	F ₃	Mean
D ₁	103.5	114.1	95.2	104.3
D ₂	97.6	107.0	124.8	109.8
D ₃	117.7	107.6	105.0	110.1
Mean	106.3	108.3	108.3	308.1

65(113)

(i) 107.7 Q/ha. (ii) (a) 26.5 Q/ha. (b) 14.9 Q/ha. (iii) Main effect of D is highly significant. Interaction F × D is significant. (iv) Av. yield of tuber in Q/ha.

	F ₁	F ₂	F ₃	Mean
D ₁	121.7	121.4	118.5	120.5
D ₂	76.3	99.4	121.2	99.0
D ₃	107.4	107.9	95.7	103.7
Mean	101.8	109.6	111.8	107.7

C.D for D marginal means=12.8 Q/ha.

C.D for D means at the same level of F=22.1 Q/ha.

C.D for F means at the same level of D=34.9 Q/ha.

Crop :- Potato (Rabi)

Ref :- J.&K. 64(225), 65(112).

**Site :- Kashmir Provincial Agri.
Exptl. Farm, Shalimar.**

Type :- 'M'.

Object :-To study the effect of different times of application of manures on the yield of Potato.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 30.4.64; 15.3.65. (iv) (a) and (b) N.A. (c) 18.4 Q/ha. (d) and (e) N.A. (v) N.A. (vi) S-4234. (vii) Irrigated. (viii) and (ix) N.A. (x) 27.9.64; 19.9.65.

2. TREATMENTS :

6 times of application of N : T₁=Full dose at basal dressing, T₂=Full dose after complete germination, T₃=1/3 at basal dressing+1/3 at germination+1/3 2 weeks after germination, T₄=1/2 at basal dressing+1/2 after complete germination, T₅=1/2 at germination+1/2 2 weeks after germination and T₆=1/2 at basal dressing+1/2 4 weeks after germination.

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3.96m. x 3.05m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of tuber. (iv) (a) 1964— contd. (b) No. (c) Nil. (v) and (vi) Nil. (vii) Since the expt. is contd. beyond 1965, hence individual years results are presented under 5. Results.

5. RESULTS :

64(225)

(i) 124.2 Q/ha. (ii) 14.7 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of tuber in Q/ha.

Treatment	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	112.2	115.3	143.0	126.9	123.0	124.8

65(112)

(i) 122.3 Q/ha. (ii) 21.0 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of tuber in Q/ha.

Treatment	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	115.5	126.0	135.8	120.9	123.2	112.2

Crop :- Potato (Kharif)**Ref :- J.&K. 64(229).****Site :- Potato Res. Stn., Gulmarg.****Type :- 'C'.****Object :-**To see the effect of different dates of sowing on the yield of Potato.**1. BASAL CONDITIONS :**

(i) (a) to (c) N.A. (ii) Clay loam. (iii) As per treatments. (iv) (a) N.A. (b) Tubering. (c) 18.4 Q/ha. (d) 53cm x 22cm. (e) N.A. (v) N.A. (vi) S-4234. (vii) to (ix) N.A. (x) 30.10.64.

2. TREATMENTS :5 dates of sowing : $D_1=2.6.64$. $D_2=9.6.64$. $D_3=18.6.64$. $D_4=23.6.64$. $D_5=30.6.64$.**3. DESIGN :**

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 5. (iv) (a) N.A. (b) 1/1107 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of tuber, (iv) (a) 1964-only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 111.9 Q/ha. (ii) 40.8 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of tuber in Q/ha.

Treatment	D_1	D_2	D_3	D_4	D_5
Av. yield	91.9	136.2	116.8	128.4	86.3

Crop :- Potato (Kharif).**Ref :- J.&K. 64(231).****Site :- Potato Res. Stn., Gulmarg.****Type :- 'C'.****Object :-**To study the effect of spacings between rows and plants on the yield of Potato.**1. BASAL CONDITIONS :**

(i) (a) to (c) N.A. (ii) Clay loam. (iii) N.A. (iv) (a) N.A. (b) Tubering. (c) 18.4 Q/ha. (d) As per treatments. (e) N.A. (v) N.A. (vi) S-4234. (vii) to (x) Nil.

2. TREATMENTS :

All Combinations of (1) and (2).

(1) 2 row spacings: $R_1=61$, $R_2=46$ cm.(2) 3 plant spacings: $P_1=15$, $P_2=23$ and $P_3=30$ cm.**3. DESIGN :**

(i) Fact. in R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 5.49m. x 1.98m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of tuber. (iv) (a) 1964-only. (b)-(c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 181.9 Q/ha. (ii) 42.32 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of tuber in Q/ha.

	P_1	P_2	P_3	Mean
R_1	182.8	162.2	153.0	166.0
R_2	200.1	182.8	210.4	197.8
Mean	119.4	172.5	181.7	181.9

Crop :- Potato (Rabi).**Ref :- J.&K. 65(171)****Site : Kashmir Provincial Agri.****Exptl. Farm, Shalimar.****Type :- 'C'.**

Object—To study the effect of seasons and methods of sowing on the yield of Potato.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) and (c) N.A. (ii) Clay loam. (iii) As per treatments. (iv) (a) N.A. (b) As per treatments. (c) to (e) N.A. (v) N.A. (vi) S. 4234. (vii) to (ix) N.A. (x) 13.8.66.

2. TREATMENTS :

All combinations of (1) and (2).

(1) 2 seasons of sowing: D_1 = Tubers sown in Autumn, D_2 = Tubers sown in spring.(2) 4 methods of sowing: T_1 = full tuber—sud of Shalimar, T_2 = cut tuber—of sud of shalimar, T_3 = Full tuber seed of Gulmarg, T_4 = cut tuber sud of Gulmarg.**3. DESIGN :**

(i) Fact. in R.B.D. (ii) (a) 8. (b) N.A. (iii) .6. (iv) (a) N.A. (b) 1'83m. × 2'14m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Good. (ii) Nil. (iii) Yield of tuber. (iv) (a) 1965-only. (b) and (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 142.2 Q/ha. (ii) 33.38 Q/ha. (iii) Main effects of D is significant and that of T is highly significant. (iv) Av. yield of tuber in Q/ha.

	T_1	T_2	T_3	T_4	Mean
D_1	146.7	93.6	151.4	132.1	130.9
D_2	159.9	122.7	178.3	152.6	153.4
Mean	153.3	122.7	178.3	142.4	142.2

C.D. for D marginal means = 19.57 Q/ha.

C.D. for T marginal means = 27.68 Q/ha.

Crop :- Potato (Rabi).**Ref :- J.&K. 64(288).****Site :- Potato Res. Stn., Gulmarg.****Type :- 'CV'.**

Object—To see the effect of seed treatments on different varieties of Potato.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) N.A. (iv) (a) 3-4 diggings. (b) on the ridges (c) to (e) N.A. (vi) As per treatments. (vii) to (x) N.A.

2. TREATMENTS :**Main-plot treatments :**4 varieties: V_1 = S-4234; V_2 = S-4215, V_3 = S-4102 and V_4 = S-4252.**Sub-plot treatments :**2 seed treatments: T_1 = Untreated and T_2 = Treated.

3. DESIGN:

(i) Split-plot. (ii) (a) 4 main-plots/replication 2 sub-plots/main-plot. (b) N.A. (iii) 5. (iv) (a) N.A. (b) 3.66m. x 2.13m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of tuber. (iv) (a) 1964-on ly. (b) N.A. (c) Nil. (v) No, (vi) and (vii) Nil.

5. RESULTS:

(i) 54.9 Q/ha. (ii) (a) 24.33 Q/ha. (b) 12.13 Q/ha. (iii) Main effects of T alone is significant. (iv) Av. yield of tuber in Q/ha.

	V ₁	V ₂	V ₃	V ₄	Mean
T ₁	38.0	45.9	45.0	64.5	50.6
T ₂	45.3	59.9	63.6	68.0	59.2
Mean	41.7	52.9	58.8	66.3	54.9

C.D. for T marginal means = 8.13 Q/ha.

Crop :- Potato (Rabi)

Ref : J.&K. 64(224), 65(111)

Site :- Jammu Provincial Agri. Exptl. Farm, Jammu Type :- 'CM'.

Object—To study the effect of different levels of N and spacing on of the yield of Potato.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 18.10.64; 13.11.65. (iv) (a) and (b) N.A. (c) 18.4Q/ha. (d) As per treatments. (v) 277Q/ha. o F.Y.M; N.A. (vi) S-2434. (vii) Irrigated (viii) N.A. (x) 3.3.65; 16.4.66

2. TREATMENTS :

Main-plot treatments:

4 levels of N: N₀=0, N₁=56, N₂=112 and N₃=168 Kg/ha.

Sub-plot treatments :

3 levels of spacing. S₁=46cm. x 15cm., S₂=46cm. x 22cm. and S₃=46cm. x 30cm.

3. DESIGN:

(i) Split-plot. (ii) (a) 4 main-plots/replication, 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3.66m. x 2.74m. (v) N.A. (vi) Yes.

4. GENERAL

(i) Normal. (ii) Nil. (iii) Yield of tuber. (iv) (a) 1964-65. (b) N.A. (c) Results of combined analysis are presented under 5. Results. (v) and (vi) Nil. (vii) Error variances of main-plots as well as sub-plots are homogeneous and Treatments x Years Interactions are present in sub-plot but not present in main-plot.

5. RESULTS :

Pooled results

(i) 66.2 Q/ha. (ii) (a) 15.82 Q/ha. (based on 21 d.f. made up of pooled error and Treatments x Years interaction.) (b) 45.42 Q/ha (based on 8 d.f. made up of Treatments x Years interaction.) (iii) Main effect of N alone is highly significant. (iv) Av. yield of tuber in Q/ha.

	N ₀	N ₁	N ₂	N ₃	Mean
S ₁	54.5	71.5	75.5	67.5	67.2
S ₂	42.0	68.0	73.5	78.0	65.3
S ₃	47.5	67.5	86.0	63.5	66.1
Mean	48.0	69.0	78.3	69.6	66.2

C.D. for S marginal means = 26.2 Q/ha.

Individual results :

Treatment	N ₀	N ₁	N ₂	Sig.	S ₁	S ₂	S ₃	Sig.	G.M.	S.E. plot		
										Main-plot	Sub-plot	
Year 1964	35.0	64.9	73.1	57.9	**	44.4	56.4	72.4	**	57.7	17.58	13.78
1965	61.0	73.1	83.5	81.0	**	90.0	74.4	59.5	**	74.6	10.68	13.01
Pooled	48.0	69.0	78.3	69.6	**	67.2	65.3	66.1	N.S.	66.2	66.2	45.42

Crop :- Potato. (Kharif)

Ref :- J.&K. 63(225).

Site :- Potato Res. Stn., Gulmarg.

Type :- 'D'.

Object—To study the effect of Algol application on Potato.

1. BASAL CONDITIONS:

(a) to (c) N.A. (ii) Clay loam. (iii) 21.6.63. (iv) (a) and (b) N.A. (c) 18.4 Q/ha. (d) and (e) N.A. (v) N.A. (vi) S--4215. (vii) to (vii) to (ix) N.A. (x) 30.10.63.

2. TREATMENTS:

5 insecticidal treatments: T₀=Control, T₁=0.12% Algol with water. T₂=0.25% Algol with water. T₃=0.37% Algol with water. T₄=0.50% Algol with water.

3. DESIGN:

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 5. (iv) (a) N.A. (b) 2.44 m X 1.07 m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of tuber, (iv) (a) 1963-only. (b) and (c) No. (v) to (vii) Nil.

5. RESULTS:

(i) 138.6 Q/ha. (ii) 87.85 Q/ha. (iii) Treatment differences are not significant (iv) Av. yield of tuber in Q/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄
Av. yield	117.0	143.3	153.8	130.6	148.1

Crop :- Potato (Kharif)**Ref :- J.&K. 64(230).****Site :- Potato Res. Stn., Gulmarg.****Type :- 'D'.****Object—To study the effective use of weedicides on the yield of Potato.****1. BASAL CONDITIONS**

(i) (a) to (c) N.A. (ii) Clay loam. (iii) N.A. (iv) (a) N.A. (b) Tubering. (c) 18.4 Q/ha. (d) 47 cm. × 22cm. (e) N.A. (v) N.A. (vi) S-4234. (vii) N.A. (viii) As per treatments. (ix) and (x) N.A.

2. TREATMENTS :6 weedicial treatments : T_0 = Control. T_1 = Local method of weeding., T_2 = Pre-emergence application of weedicide of the 5 days of planting., T_3 = Pre-emergence application of weedicide of the 10 days of planting. T_4 = T_2 + Cultural method of weeding and T_5 = T_3 + Cultural method of weeding.**3. DESIGN :**

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 5.18m. × 1.99m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of tuber. (iv) (a) 1964—only. (b) — (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 188.9 Q/ha. (ii) 48.8 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of tuber in Q/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5
Av. yield	132.5	211.0	186.6	211.0	216.4	175.8

Crop :- Potato (Kharif).**Ref :- J. & K. 63(223), 64(227).****Site :- Potato Res. Stn., Gulmarg.****Type :- 'D'.****Object—To study the effect of fungicides and its time of application on the yield of Potato.****1. BASAL CONDITIONS :**

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 6.6.63; 18.5.64 (iv) (a) N.A. (b) Tubering. (c) 18.4Q/ha. (d) 52. cm. × 22cm. (e) N.A. (v) N.A. (vi) S-4102; alumarii soloni. (vii) to (ix) N.A. (x) 14.10.63; 19.10.64.

2. TREATMENTS :**Main-plot-treatments:**4 fungicidal treatments: S_0 = control, S_1 = 33% of fytolan in 112.2 lit. of water/ha., S_2 = 12% of Flit-406 at 2.24 Kg/ha, S_3 = Bardeaux mixture at 11.2Kg/ha.**Sub-plot treatments:**3 intervals of spray: T_1 = 10, T_2 = 15 and T_3 = 20 days.**3. DESIGN :**

(i) Split -plot. (ii) (a) 4 main-plots/replication, 3 sub-plots / main-plot. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 3.66m. × 2.13m.; 4.42m × 3.66m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) As per treatments. (iii) Yield of tuber. (iv) (a) 1963-64. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) and (vi) Nil. (vii) Error variances of main-plots as well as sub-plots are homogeneous, and Treatments \times Years interactions are absent.

3. RESULTS :

pooled results.

(i) 111.00 Q/ha. (ii) (a) 51.21 Q/ha. (based on 15d-d.F. made up of Pooled error and Treatments \times Year interaction.) (b) 50.84 Q/ha. (based on 40d.f. made up of Pooled error and Treatments \times Years Interaction.) (iii) None of the effects is significant. (iv) Av. yield of tuber in Q/ha.

	S ₀	S ₁	S ₂	S ₃	Mean
T ₁	102.5	81.5	96.5	139.0	104.8
T ₂	122.0	103.0	116.0	101.0	110.5
T ₃	89.0	117.5	116.5	147.5	117.8
Mean	104.5	100.6	110.0	129.1	111.0

Treatment	S ₀	S ₁	S ₂	S ₃	Sig.	T ₁	T ₂	T ₃	Sig.	G.M.	S.E./plot	
											Main-plot	Sub-plot
Year 1963	121.9	97.2	139.6	168.2	N.S.	132.9	127.9	134.5	N.S.	131.7	53.45	50.27
1964	87.1	104.1	80.2	90.1	N.S.	76.9	93.0	101.3	N.S.	90.4	26.65	57.10
Pooled	104.1	100.6	110.0	129.1	N.S.	104.8	110.5	117.8	N.S.	111.0	51.21	51.21

Crop :- Potato (Kharif).

Ref :- J.&K. 64(263),

Site :- Potato Development Farm Gulmarg.

Type :- 'D'.

Object — To see the efficiency of weedicides on the yield of Potato.

1. BASAL CONDITIONS

(i) (a) Nil. (b) and (c) N.A. (ii) Clay loam. (iii) May, 64, N.A. (iv) (a) N.A. (b) Line in furrows. (c) 12 to 15 Q/ha. (d) 61cm. (e) 1. (v) Nil. (vi) S-4234. (vii) Irrigated. (viii) As per treatments. (ix) N.A., (x) Oct 64; N.A.

2. TREATMENTS :

6 weedicial treatments: T₀ = Control, T₁ = Local method, T₂ = Pre-emergence application of weedicides 5 days after planting, T₃ = Pre-emergence application of weedicides 10 days after planting; T₄ = T₂ + Cultural method., T₅ = T₃ + Cultural method. Weedicide:— Sod. Salt 2, 4-D/ac? applied at 1.68 kg/ha in 899 litres of water.

3. DESIGN:

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) 5.18m. \times 1.98m. (b) 472m. \times 1.52m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of Tuber. (iv) (a) 1964-65. (b) No. (c) Nil. (v) No. (vi) Nil. (vii) Error variances are homogeneous and Treatments \times Years interaction is absent.

Pooled Results

(i) 473.3Q/ha. (ii) 90.2Q/ha. (based on 35 d.f. made up of Pooled error and Treatments \times Years interaction). (iii) Treatment differences are highly significant. (iv) Av yield of tuber in Q/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅
Av. yield	299.8	569.1	415.6	495.0	488.2	572.4

C.D. = 91.6Q/ha.

Individual Results

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	Sig	G.M.	S.E./plot
Year 1964	299.8	517.0	398.4	495.0	487.8	571.4	*	461.7	100.5
1965	299.8	621.2	432.8	495.0	488.5	572.4	**	484.9	87.9
Pooled	299.8	569.1	415.6	495.0	488.2	572.4	**	473.3	90.2

Crop :- Raddish (*Rabi*).

Ref :- J.&K. 63(220).

Site :- Kashmir Provincial Agri.

Exptl. Farm, Shalimar.

Type :- 'M'.

Object—To study the effect of F.Y.M. and Dalweed on the yield of Raddish.

1. BASAL CONDITIONS :

(i) (a) to (c) Nil. (ii) Clay loam. (iii) 10.9.63. (iv) (a) N.A. (b) Transplanting. (c) to (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) N.A. (ix) 2.4cm. (x) 26.10.63.

2. TREATMENTS

Main-plot treatments :—

3 levels of F.Y.M. : F₁=92.2, F₂=184.5 and F₃=276.7 Q/ha.

Sub-plot treatments :—

3 levels of Dalweed : D₁=92.2, D₂=184.5 and D₃=276.7 Q/ha.

DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication, 3 sub-plots/main-plot. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 3.05m. \times 1.34m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of roots. (iv) (a) 1963—only. (b) N.A. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 117.0 Q/ha. (ii) (a) 8.27 Q/ha. (b) 22.81 Q/ha. (iii) Main effect of F alone is highly significant. (iv) Av. yield of raddish in Q/ha.

	F ₁	F ₂	F ₃	Mean
D ₁	114.9	97.5	113.8	114.7
D ₂	100.7	109.2	118.5	109.5
D ₃	114.2	120.7	145.5	126.8
Mean	109.9	109.1	131.9	117.0

C.D. for F marginal means = 10.82 Q/ha.

Crop :- Tomato.

Ref :- J.&K. 64(219).

**Site :- Kashmir Provincial Agri-
Exptl. Farm, Shalimar.**

Type :- 'CM'.

Object :- To study the effect of F.Y.M. and Dalweed on the yield of Tomato.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 20.5.64. (iv) (a) to (e) N.A. (v) N.A. (vi) Meeruti. (vii) Irrigated. (viii) N.A. (ix) 25cm. (v) 20.9.64.

2. TREATMENTS :

Main-plot treatments :

3 levels of F.Y.M : $F_1=125$, $F_2=250$ and $F_3=375$ Q/ha.

Sub-plot treatments :

3 levels of Dalweed : $D_1=125$, $D_2=250$ and $D_3=375$ Q/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication; 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3.96m. x 2.74m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of fruit. (iv) (a) 1964—contd. (Design changed in 65). (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 93.8 Q/ha. (ii) (a) 18.65 Q/ha. (b) 17.46. Q/ha. (iii) None of the effects is significant. (iv) Av. yield of fruits in Q/ha.

	F_1	F_2	F_3	Mean
D_1	91.1	87.7	79.9	86.2
D_2	104.4	103.5	93.8	100.6
D_3	87.5	97.8	98.6	94.6
Mean	94.3	96.3	90.7	93.8

Crop :- Tomato. (Kharif)

Ref :- J. & K. 65(107).

**Site :- Kashmir Provincial Agri.
Exptl. Farm, Shalimar.**

Type :- 'M'.

Object—To study the effect of F.Y.M. and Dalweed on the yield of Tomato.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) and (c) N.A. (ii) Clay loam. (ii) 22.6.65. (iv) (a) N.A. (b) Transplanting. (c) — (d) and (e) N.A. (vi) Meeruti. (vii) Irrigated. (viii) 4-5 weedings. (ix) N.A. (x) 5.10.65.

2. TREATMENTS:

All combinations of (1) and (2).

(1) 3 levels of F.Y.M. : $F_1=125$, $F_2=250$ and $F_3=375$ Q/ha.

(2) 3 levels of Dalweed : $D_1=125$, $D_2=250$ and $D_3=375$ Q/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 3.96m. × 2.74m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of fruit. (iv) (a) 1964-66. (Design changed in 65.) (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 110.4Q/ha. (ii) 17.01Q/ha. (iii) None of the effects is significant. (iv) Av. yield of tomato in Q/ha.

	D ₁	D ₂	D ₃	Mean
F ₁	107.2	115.2	104.2	108.9
F ₂	110.4	98.0	124.9	111.1
F ₃	108.6	97.7	127.4	111.2
Mean	108.7	103.6	118.8	110.4

Crop :- Cabbage. (Kharif)

Ref :- J.&K. 62(238), 63(217)

Site :- Kashmir Provincial Agri.

Exptl. Farm, Shalimar.

Type :- 'M'.

Object—To study the effect of different levels of N and P on Cabbage crop.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 6.8, 62, 18.8, 63. (iv) (a) N.A. (b) Transplanting. (c) to (e) N.A. (v) N.A. (vi) Drum head (early). (vii) Irrigated. (viii) N.A. (ix) 30.8cm. ; 37.1cm. (x) 20.2, 63; March, 64.

2. TREATMENTS:

Main-plot treatments :

3 levels of P₂O₅ : P₀=0, P₁=84 and P₂=168 Kg/ha.

Sub-plot treatments :

4 levels of N : N₀=0, N₁=56, N₂=112 and N₃=168 Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication; 4 sub-plots/main-plot. (b) N.A. (iii) 4; 2. (iv) (a) N.A. (b) 3.05m. × 1.83m. (v) and (vi) N.A.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cabbage. (iv) (a) 1962-63. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) and (vi) Nil. (vii) Both the error variances are homogeneous. Main-plot Treatments × Years interaction is absent while Sub-plot Treatments × Years interaction is present.

5. RESULTS :

Pooled results

(i) 344.9 Q/ha. (ii) (a) 73.44 Q/ha. (based on 10 d.f. made up of Pooled error and Treatments × Years Interaction.) (b) 91.57Q/ha. (based on 9 d-f made up of Treatments × Years interaction.) (iii) None of the effects is significant. (iv) Av. yield of cabbage in Q/ha.

	N ₀	N ₁	N ₂	N ₃	Mean
P ₀	320.1	350.3	315.5	333.7	338.9
P ₁	299.2	348.1	346.8	355.6	337.5
P ₂	345.4	364.0	343.5	380.0	358.2
Mean	321.6	354.1	347.2	356.4	344.9

Individual results

Treatment	P ₀	P ₁	P ₂	Sig.	N ₀	N ₁	N ₂	N ₃	Sig.	S.E./plot		Sub-plot
										G.M.	Main-plot	
Year												
1962	258.9	238.5	273.6	N.S.	231.2	286.2	257.0	253.6	N.S.	257.0	64.9	53.3
1963	499.0	535.3	527.4	N.S.	502.3	490.0	527.7	562.1	N.S.	520.6	98.5	68.6
Pooled	338.9	337.4	358.2	N.S.	321.6	354.1	347.3	356.5	N.S.	344.9	73.44	91.57

Crop :- Cauliflower.

Ref :- J.&K. 65(148).

Site :- Kashmir Provincial Agri.

Exptl. Farm. Shalimar.

Type :- 'M'.

Object :- To study the effect of different levels of N, P and K on the yield of Cauliflower.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 10.10.65. (iv) (a) N.A. (b) Transplanting. (c) N.A. (d) 61cm. x 61cm. (e) - (v) Nil. (vi) Snow ball. (vii) Irrigated. (viii) 3 weedings, 1-2 hoeings (ix) 4.9cm. (x) 17.7.66.

2. TREATMENTS:

All combinations of (1), (2) and (3)

(1) 3 levels of N: N₁=37.5, N₂=75 and N₃=112.5 Kg/ha.(2) 3 levels of P₂O₅: P₁=50, P₂=62.5 and P₃=75 Kg/ha.(3) 3 levels of K₂O: K₁=50, K₂=62.5 and K₃=75 Kg/ha.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 27. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 4.27m. x 2.44m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Good. (ii) N.A. (iii) Yield of flower. (iv) (a) 1965—only. (b) No. (v) No. (vi) and (vii) Nil.

5. RESULTS:

(i) 62.1 Kg/ha. (ii) 19.38 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of cauliflower in Kg/ha.

	P ₁	P ₂	P ₃	K ₁	K ₂	K ₃	Mean
N ₁	59.2	55.7	51.7	56.5	59.2	50.9	55.5
N ₂	64.4	45.8	65.5	52.5	57.3	65.9	58.6
N ₃	74.5	77.9	64.4	68.7	74.7	73.4	72.3
Mean	66.0	59.8	60.6	59.3	63.7	63.4	62.1
K ₁	61.9	61.2	54.6				
K ₂	68.8	54.6	67.8				
K ₃	67.4	63.5	59.3				

C.D. for N marginal means=10.5 Kg/ha.

Crop :- Cauliflower.

Ref. - J.&K. 63(227), 64(232), 65(172).

Site :- Kashmir Provincial Agri.

Exptl. Farm, Shalimar.

Type :- 'M'.

Object :-To study the effect of F.Y.M and Dalweed on Cauliflower yield.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 15.8.63; 25.8.64; 20.10.65. (iv) (a) N.A. (b) Planting. (c) N.A. (d) 60cm. x 60cm. (e) N.A. (v) N.A. (vi) Snow-ball-16. (vii) Irrigated. (viii) and (ix) N.A. (x) 3rd week of July, 64; 65; 66.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 3 levels of F.Y.M. : F₁=92.2, F₂=184.4 and F₃=368.8 Q/ha

(2) 3 levels of Dalweed : D₁=92.2, D₂=184.4 and D₃=368.8 Q/ha.

3. DESIGN

(i) Fact. in R.B.D. (ii) (a) 9. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 4.88m. x 2.44m. ; (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of flower seeds. (iv) (a) 1963—contd. (b) N.A. (c) No. (v) and (vi) Nil. (vii) As the experiment is continued beyond 65, the results of individual years are given under 5. Results.

5. RESULTS :

63 (227)

(i) 239.7 Kg/ha. (ii) 57.39 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of seeds in Kg/ha.

	F ₁	F ₂	F ₃	Mean
D ₁	269.1	235.5	246.7	250.4
D ₂	260.7	190.6	214.4	221.9
D ₃	242.5	211.6	285.9	246.7
Mean	257.4	212.6	249.0	239.7

64 (232)

(i) 57.7 Kg/ha. (ii) 16.73 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of seeds in Kg/ha.

	F ₁	F ₂	F ₃	Mean
D ₁	55.5	52.7	55.2	54.5
D ₂	42.0	50.2	70.4	54.2
D ₃	54.9	66.7	71.8	64.5
Mean	50.8	56.5	65.8	57.7

65 (172)

(i) 50.5 Kg/ha. (ii) 18.27 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of seeds in Kg/ha.

	F ₁	F ₂	F ₃	Mean
D ₁	44.0	51.3	56.1	50.5
D ₂	33.1	54.1	49.0	45.4
D ₃	57.2	54.1	55.2	55.5
Mean	44.8	53.2	53.4	50.5

Crop :- Cauliflower (Kharif).

Ref :- J.&K. 60(80).

Site :- Kashmir Provincial Agri.

Exptl. Farm, Shalimar.

Type :- 'C'.

Object :- To study the effect of different dates of sowing and transplanting on the yield of Cauliflower.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) Cauliflower. (c) N.A. (ii) Clay loam. (iii) As per treatments. (iv) (a) N.A.
 (b) Transplanting. (c) to (e) N.A. (v) Nil. (vi) N.A. (vii) Irrigated. (viii) 6 weedings. (ix) N.A.
 (x) July, 61.

2. TREATMENTS :

Time of sowing in the nursery	Time of transplanting
T ₁ =5.8.60	15.9.60
T ₂ =15.8.60	25.9.60
T ₃ =25.8.60	5.10.60
T ₄ =5.9.60	20.10.60
T ₅ =15.9.60	5.11.60

3. DESIGN:

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 4.27m. x 4.27m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Satisfactory. (ii) N.A. (iii) Yield of cauliflower seed. (iv) (a) N.A. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 85 Kg/ha. (ii) 29.9 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of seed in Kg/ha.

Treatment	T ₁	T ₂	T ₃	T ₄	T ₅
Av. yield	108	91	88	69	67

Crop :- Cauliflower (Kharif)

Ref :- J.&K. 63(60).

Site :- Kashmir Provincial Agri.

Exptl. Farm, Shalimar.

Type :- 'C'.

Object :- To find out the best sowing time of Cauliflower for seed production under opened and covered conditions.

1. BASAL CONDITIONS:

(i) (a) Nil. (b) Cauliflower. (c) N.A. (ii) Clay loam. (iii) As per treatments (iv) (a) N.A. (b) Transplanting. (c) - (d) 61cm. x 61cm. (e) - (v) Nil. (vi) Snow ball-16. (vii) Irrigated. (viii) 6 weedings. (ix) N.A. (x) 20.6.64 to 10.7.64.

2. TREATMENTS:

Main-plot treatments :

All combinations of (1) and (2)

(1) 4 dates of sowing : D₁=5.8.63, D₂=15.8.63 D₃=25.8.63 and D₄=5.9.63

(2) 2 types of protection during winter: C₀=Uncovered and C₁=Covered

Sub-plot treatments :

3 types of seed of 1962-63 : Q₁=A-grade, Q₂=B-grade and Q₃=C-grade.

3. DESIGN :

(i) Split-plot. (ii) (a) 8 main-plots/replication, 3 sub-plots/main-plot. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 7.32m. x 4.88m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Good. (ii) 2 sprays of fytolan against green aphids. (iii) Cauliflower yield/plot. (iv) (a) 1963-only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 78.9 Kg/ha. (ii) (a) 34.2 Kg/ha. (b) 26.9 Kg/ha. (iii) Main effects of D, C and interaction C x D are highly significant. (iv) Av. yield of cauliflower in Kg/ha.

	D ₁	D ₂	D ₃	D ₄	Q ₁	Q ₂	Q ₃	Mean
C ₀	0.9	5.7	27.4	96.7	34.9	34.0	29.1	32.7
C ₁	89.5	96.8	159.3	155.2	126.8	125.9	122.9	125.2
Mean	45.2	51.3	93.4	125.9	80.9	80.0	76.0	78.0
Q ₁	38.7	53.1	110.0	121.7				
Q ₂	44.5	58.4	82.9	134.1				
Q ₃	52.6	42.3	87.1	122.0				

C.D. for D marginal means=24.5 Kg/ha.

C.D. for C marginal means=17.3 Kg/ha.

C.D. for the body of C×D table=34.7 Kg/ha.

Crop :- Turnip. (Rabi)

Site :- Kashmir Provincial Agri.

Exptl. Farm, Shalimar.

Ref :- J.&K. 63(221).

Type :- 'M'.

Object :-To study the effect of different levels of F.Y.M. and Dalweed on the yield of Turnip.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 10.9.63. (iv) (a) N.A. (b) Transplanting. (c)-(d) and (e) N.A. (v) N.A. (vi) Purple top. (vii) to (ix) N.A. (x) 11.1.64.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 3 levels of F.Y.M. :- F₁=92.2, F₂=184.4 and F₃=276.6 Q/ha.

(2) 3 levels of Dalweed :- D₁=92.2, D₂=184.4 and D₃=276.6 Q/ha.

3. DESIGN.

(i) Fact. in R.B.D. (ii) (a) 9. (b) N.A. (iii) 3 (iv) (a) N.A. (b) 3.05m. × 1.34m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of roots. (iv) (a) 1963—only (b) — (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 230.2 Q/ha. (ii) 40.09 Q/ha, (iii) None of the effects is significant, (iv) Av. yield of turnip in Q/ha.

	D ₁	D ₂	D ₃	Mean
F ₁	225.7	203.5	207.2	212.1
F ₂	210.9	225.8	225.8	220.7
F ₃	236.8	244.2	292.3	257.7
Mean	224.4	224.4	241.7	230.2

Crop :- Turnip (Rabi).
Site :- Kashmir Provincial
Agri. Exptl. Farm, Shalimar.

Ref :- J.&K. 63(222).

Type :- 'M'.

Object :-To study the effect of different levels of N, P on the yield of Turnip.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 3.9.63. (iv) (a) N.A. (b) Transplanting. (c) to (e) N.A. (v) N.A. (vi) Purple top. (vii) to (ix) N.A. (x) 28.12.63.

2. TREATMENTS :

All combinations of (1) and (2).

(1) 3 levels of N :— $N_0=0$, $N_1=33.6$ and $N_2=67.2$ Kg/ha.
 (2) 3 levels of P_2O_5 :— $P_0=0$, $P_1=44.8$ and $P_2=89.2$ Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) N.A. (b) $3.66m. \times 1.83m.$ (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of roots. (iv) (a) 1963—only. (b)—(c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 41.1 Q/ha. (ii) 10.32 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of roots in Q/ha.

	N_0	N_1	N_2	Mean
P_0	35.1	38.1	48.6	40.6
P_1	39.6	43.4	44.5	42.5
P_2	40.7	37.4	42.6	40.2
Mean	38.5	39.6	45.2	41.1

Crop :- Knol-Khol. (Rabi).
Site :- Kashmir Provincial Agri.
Exptl. Farm, Shalimar.

Ref :- J.&K. 61(159).

Type :- 'CM'.

Object :-To study the effect of different levels of manures and spacings on Knol-Khol varieties.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 11.9.61. (iv) (a) N.A. (b) Transplanting. (c)—(d) As per treatments. (e) N.A. (v) N.A. (vi) As per treatments. (vii) and (viii) N.A. (ix) $9.3cm.$ (x) 15.1.62]

2. TREATMENTS :

All combinations of (1), (2), (3) and (4).

(1) 3 levels of P_2O_5 :— $P_0=0$, $P_1=84.1$ Kg/ha. and $P_2=168.2$ Kg/ha.
 (2) 3 levels of N :— $N_0=0$, $N_1=84.1$ and $N_2=168.2$ Kg/ha.
 (3) 3 levels of spacing :— $S_0=30cm. \times 22cm.$ $S_1=30cm. \times 20cm.$ and $S_2=30cm. \times 30cm.$
 (4) 2 varieties : $V_1=$ King of market and $V_2=$ White vienna.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) and (b) N.A. (iii) 3. (iv) (a) $3.05m. \times 2.44m.$ (b) $1.83m. \times 1.83m.$ (v) $61cm. \times 30cm.$ (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of knobs. (iv) (a) 1961—only. (b) No, (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 321.0 Q/ha. (ii) 93.67 Q/ha. (iii) Main effects of N and S are highly significant and Interaction N × V is highly significant. (iv) Av. yield of Knol-Khol in Q/ha.

	N ₀	N ₁	N ₂	S ₀	S ₁	S ₂	V ₁	V ₂	Mean
P ₀	245.3	311.5	364.5	371.8	324.0	225.5	290.9	323.3	307.1
P ₁	287.8	347.1	393.1	387.8	336.4	303.8	343.4	341.9	342.6
P ₂	283.0	300.0	357.2	355.3	331.3	253.7	293.0	333.8	313.4
Mean	272.0	319.5	371.6	371.6	330.6	271.0	309.1	333.0	321.0
V ₁	285.0	311.5	330.8	366.1	317.1	244.1			
V ₂	259.1	237.5	412.4	377.2	344.0	277.8			
S ₀	312.5	366.6	435.9						
S ₁	274.6	345.2	371.9						
S ₂	229.1	246.8	307.0						

C.D. for N or S marginal means = 35.69Q/ha.

C.D. for the body of N × V table = 50.48Q/ha.

Crop :- Knol-Khol. (Rabi)

Ref. : J.&K. 62(237), 63(216).

Site :- Kashmir Provincial Agri

Exptl. Farm, Shalimar.

Type :- 'GM'.

Object :—To study the effect of different spacings and levels of N on Knol-Khol crop.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 2.9.62; 10.9.63. (iv) (a) N.A. (b) Transplanting. (c) N.A. (d) As per treatments. (e) N.A. (v) N.A. (vi) King of market (vii) and (viii) N.A. (ix) 19.8cm; 25.3cm. (x) 11.2.63; 15.1.64.

2. TREATMENTS:

Main-plot treatments:

4 levels of nitrogen: N₀=0, N₁=112, N₂=168 and N₃=224 kg/ha.

Sub-plot treatments:

2 spacings: S₁=30cm. × 10cm. and S₂=23cm. × 10cm.

3. DESIGN:

(i) Split-plot. (ii) (a) 4 main-plots/replication; 2 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/1683.3 ha.; 1/1388.8 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal (ii) N.A. (iii) Yield of knobs. (iv) (a) 1962-63. (b) No. (c) Nil. (v) nad (vi) Nil. (vii) Sub-plot error variances are heterogeneous, results of individual years are given below.

5. RESULTS :

62(237)

(i) 212.1 Q/ha. (ii) (a) 48.28 Q/ha. (b) 42.34 Q/ha. (iii) Main effect of N alone is significant. (iv) Av. yield of Knol-Khol in Q/ha.

	N ₀	N ₁	N ₂	N ₃	Mean
S ₁	168.4	203.5	209.1	233.1	203.5
S ₂	149.9	238.7	209.1	284.9	220.6
Mean	159.1	221.1	209.1	259.0	212.1

C.D. for N marginal means = 54.61 ha.

63(216)

(i) 144.9 Q/ha. (ii) (a) 19.22 Q/ha. (b) 18.18 Q/ha. (iii) Main effect of N alone is significant, (iv) Av. yield of Knol-Khol in Q/ha.

	N ₀	N ₁	N ₂	N ₃	Mean
S ₁	116.0	131.2	151.1	158.7	139.2
S ₂	143.4	146.5	145.0	167.8	150.7
Mean	129.7	138.8	148.0	163.3	144.9

CD for N marginal means = 21.73 Q/ha

Crop :- Knol-Khol.
Site :- Kashmir Provincial Agri.
Exptl. Farm, Shalimar.

Ref :- J.&K. 60(33).

Type :- 'CMV'.

Object :—To study the effect of different spacings and manures on the yield of different varieties of Knol-Khol.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) N.A. (iii) 6.9.60. (iv) (a) to (c) N.A. (d) As per treatments. (e) 1. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) and (ix) N.A. (x) 21.1.61.

2. TREATMENTS :

Main-plot treatments:

2 varieties :—V₁ = White vienna and V₂ = King of market.

Sub-plot treatments :

All combinations of (1), (2) and (3)

(1) 3 levels of P₂O₅ as Super :—P₀ = 0, P₁ = 84 and P₂ = 168 Kg/ha.

(2) 3 levels of N as A/S :—N₀ = 0, N₁ = 84 and N₂ = 168 Kg/ha.

(3) 3 spacings :—S₁ = 30cm. × 10cm.; S₂ = 30cm. × 20cm. and S₃ = 30cm. × 30cm.

3. DESIGN :

(i) Split-plot confd. (Interaction P N² S² confd.). (ii) (a) 2 main-plots/replication ; 3 blocks/main-plot and 9 sub-plots/block. (b) N.A. (iii) 2. (iv) (a) 2.44m. × 2.44m. (b) 1.83m. × 1.83m. (v) 30cm. × 30cm. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of knol-khol and beans. (iv) (a) and (b) No. (c) Nil. (v) (a) and (b) Nil. (vi) and (vii) Nil.

5. RESULTS:

(i) 300.4 Q/ha. (ii) (a) 241.4 Q/ha. (b) 61.11 Q/ha. (iii) Main effect of N is highly significant while that of S is significant. (iv) Av. yield of knol-khol in Q/ha.

	P ₀	P ₁	P ₂	N ₁	N ₂	N ₃	S ₁	S ₂	S ₃	Mean
V ₁	296.5	318.0	304.9	225.0	319.5	374.8	319.4	307.8	291.7	306.4
V ₂	316.0	278.8	288.6	216.1	306.3	360.9	315.5	297.6	270.2	294.4
Mean	306.2	298.4	296.7	220.5	312.9	367.9	317.9	302.7	280.9	300.4
S ₁	319.0	311.9	322.1	240.4	334.5	378.1				
S ₂	310.2	304.6	293.3	198.9	320.4	388.8				
S ₃	289.5	278.6	274.8	222.4	283.7	336.8				
N ₀	223.1	220.4	218.3							
N ₁	322.1	306.9	309.7							
N ₂	373.5	367.9	362.2							

C.D. for N or S marginal means=28.8 Q/ha.

Crop :- Onion

**Site :- Kashmir Provincial Agri
Exptl. Farm, Shalimar.**

Ref :- J.&K. 64(216), 65(109).

Type :- 'C'.

Object :-To study the effect of dates of sowing and ages of seedling on the yield of Onion.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clayey loam. (iii) As per treatments. (iv) (a) N.A. (b) Transplanting. (c) — (d) N.A. (e) As per treatments (v) 276.7 Q/ha. of F.Y.M. (vi) Red globe. (vii) Irrigated. (viii) 4 weedings, (ix) N.A. (x) N.A.; 5.7.66.

2. TREATMENTS:

All combinations of (1) and (2)

- (1) 4 dates of transplanting :—D₁=16th Aug., D₂=1st Sept., D₃=16th Sept. and D₄=1st Oct.
- (2) 4 ages of seedlings :—A₁=45, A₂=60, A₃=75 and A₄=90 days.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 16. (b) N.A. (iii) 3. (iv) (a) N.A. (b) 2.44m. × 1.83m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of bulbs. (iv) (a) 1964—contd. (b) No. (c) Nil. (v) and (vi) Nil. (vii) As the experiment is continued beyond 1965, the results of individual years are presented under 5. Results.

5. RESULTS

64(216)

(i) 136.9 Q/ha. (ii) 23.57 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of onion Q/ha.

	A ₁	A ₂	A ₃	A ₄	Mean
D ₁	138.3	153.2	150.3	164.4	151.5
D ₂	138.3	138.3	133.8	168.2	144.6
D ₃	108.4	97.2	117.4	169.7	123.2
D ₄	108.4	138.3	142.0	124.8	128.4
Mean	123.3	131.7	135.8	156.8	136.9

65(109)

(i) 135.5 Q/ha, (ii) 30.14 Q/ha, (iii) None of the effects is significant. (iv) Av. yield of onion in Q/ha.

	A ₁	A ₂	A ₃	A ₄	Mean
D ₁	157.0	148.0	148.0	155.5	152.1
D ₂	123.3	118.1	133.1	141.3	128.9
D ₃	133.6	97.2	121.1	151.0	125.7
D ₄	138.3	131.6	127.8	143.5	135.3
Mean	138.0	123.7	132.5	147.8	135.5

Crop :- Onion**Ref :- J. & K. 60(171), 61(157).****Site :- Kashmir Provincial Agri.****Exptl. Farm, Shalimar****Type :- 'C'.****Object :-**To study the effect of dates of sowing on the yield of Onion.**1. BASAL CONDITIONS:**

(i) (a) to (c) N.A. (ii) Sandy loam (iii) As per treatments (iv) (a) N.A (b) Transplanting. (c) to (e) N.A. (v) 276.7 Q/ha. (vi) Red globe. (vii) Irrigated. (viii) 4 weedings. (ix) N.A. (x) Aug., 61; July, 62.

2. TREATMENTS :7 dates of sowing :- D₁=1st Sept., transplanted in Dec., D₂=1st Sept., transplanted in March, D₃=16th Sept., transplanted in Dec., D₄=16th Sept., transplanted in March, D₅=1st Oct., transplanted in Dec., D₆=1st Oct., transplanted in March, and D₇=16th Oct., transplanted in March.**3. DESIGN:**

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 3 ; 4. (iv) (a) N.A. (b) 4.57m. x 1.60m. ; 3.66m. x 1.60m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of bulbs. (iv) (a) 1960-61. (b) N.A. (c) Results of combined analysis are given under 5. Results. (v) and (vi) Nil. (vii) Error variances are homogeneous and Treatments x Years interaction is present.

5. RESULTS:**Pooled results**

(i) 357.8 Q/ha. (ii) 221.4 Q/ha. (based on 6 d. f. made up of Treatments x Years interaction.) (iii) Treatment differences are not significant. (iv) Av. yield of bulb in Q/ha.

Treatment	D ₁	D ₂	D ₃	D ₄	D ₅	D ₆	D ₇
Av. yield.	477.9	328.6	472.5	348.6	346.4	295.5	235.1

Individual results:

Treatment	D ₁	D ₂	D ₃	D ₄	D ₅	D ₆	D ₇	Sig.		S.E./plot
Year 1960	508.1	481.3	491.6	526.7	254.1	433.8	254.1	**	421.4	40.3
1961	455.3	214.1	458.2	215.0	415.6	191.8	220.9	**	310.1	57.8
Pooled	477.9	328.6	472.5	348.6	346.4	295.5	235.1	N.S.	357.8	221.4

Crop :- Onion. (Rabi)

Ref :- J.&K. 61(158), 62(236)

Site :- Kashmir Provincial Agri.

Exptl. Farm, Shalimar.

Type : 'CM'.

Object :—To study the effect of different levels of N and spacings on the yield of Onion.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) December. (iv) (a) N.A. (b) Transplanting. (c) — (d) As per treatments. (e) Nil. (v) 276.7 Q/ha. of F.Y.M. (vi) Red globe. (vii) Irrigated. (viii) 4-5 weedings (ix) 36.4cm; 30.3cm. (x) July, 62; Aug., 63.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 3 levels of N : —N₀=0, N₁=56 and N₂=112 Kg/ha.(2) 3 levels of spacings S₁=22.5cm. × 7.5cm., S₂=22.5cm. × 15cm. and S₃=22.5cm × 22.5cm.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) and (b) N.A. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of bulbs. (iv) (a) 1961-62. (b) No. (c) Results of combined analysis are given under 5 Results. (v) and (vi) Nil. (vii) Error variances are homogeneous and Treatments × Years interaction is absent.

5. RESULTS:

Pooled Results

(i) 298.2 Q/ha. (ii) 72.8Q/ha. (based on 56 d.f. made up of Pooled error and Treatments × Years interaction)
 (iii) Main effect of S is highly significant, and that of N is significant. (iv) Av. yield of bulbs in Q/ha.

	N ₀	N ₁	N ₂	Mean
S ₁	320.9	399.0	398.2	372.7
S ₂	283.6	262.2	294.6	280.1
S ₃	199.4	301.0	225.2	241.9
Mean	268.0	320.7	306.0	298.2

C.D. for N or S marginal means=42.1 Q/ha.

Individual results

Treatment	N ₀	N ₁	N ₂	Sig.	S ₁	S ₂	S ₃	Sig.	G.M.	S.E./plot
Year 1961	283.9	318.0	331.1	N.S.	389.8	296.0	247.2	**	311.0	59.2
1962	252.0	323.4	280.9	N.S.	355.6	264.2	236.6	**	285.5	87.8
Pooled	268.0	320.7	306.0	*	372.7	280.1	241.9	**	298.2	72.8

Crop :- Onion.

Ref :- J.&K. 63(215).

Site :- Kashmir Provincial Agri.

Exptl. Farm, Shalimar.

Type :- 'CM'.

Object :- To study the effect of different levels of N and spacings on the yield of Onion.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) Feb., 63, (iv) (a) N.A. (b) Transplanting (c) — (d) As per treatments. (e) Nil. (v) 276.7 Q/ha. of F.Y.M. (vi) Red globe. (vii) Irrigated. (viii) 4-5 weedings (ix) 33.8cm. (x) 28.7.63.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 4 levels of N: N₀=0, N₁=56, N₂=112 and N₃=168 Kg/ha.(2) 2 spacings : S₁=22.5cm×7.5cm, and S₂=15cm.×10cm.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 8, (b) N.A. (iii) 5. (iv) (a) N.A. (b) 3.96m.×2.13m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of bulbs. (iv) (a) 1961—contd. (modified) (b) No, (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 151.9 Q/ha. (ii) 26.2 Q/ha. (iii) Main effect of N alone is highly significant (iv) Av. yield of bulbs in Q/ha.

	N ₁	N ₂	N ₃	N ₄	Mean
S ₁	80.5	157.5	165.2	182.4	146.4
S ₂	90.7	158.8	175.4	204.4	157.3
Mean	85.6	158.2	170.3	193.4	151.9

C.D. for N marginal means=33.9 Q/ha.

Crop :- Onion.**Ref :- J.&K. 64(217)****Site :- Kashmir Provincial Agri.****Exptl. Farm, Shalimar.****Type :- 'CM'.**

Object : To study the effect of different levels of N and spacings on the yield of Onion.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 10.3.64. (iv) (a) N.A. (b) Transplanting. (c) — (d) As per treatments. (e) Nil. (v) N.A. (vi) Red globe. (vii) Irrigated. (viii) 4-5 weedings. (ix) 47.5cm. (x) 20.7.64.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 4 levels of N :— $N_1=56$, $N_2=112$, $N_3=168$ and $N_4=224$ Kg/ha.(2) 2 spacings :— $S_1=22.5\text{cm.} \times 10\text{cm.}$ and $S_2=15\text{cm.} \times 10\text{cm.}$ **3. DESIGN:**(i) Fact. in R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) N.A. (b) $3.96\text{m.} \times 2.13\text{m.}$ (v) N.A. (vi) Yes.**4. GENERAL :**

(i) Normal. (ii) N.A. (iii) Yield of bulbs. (iv) (a) 1961—contd. (modified) (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 214.0 Q/ha. (ii) 24.0 Q/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of bulbs in Q/ha.

	N_1	N_2	N_3	N_4	Mean
S_1	178.9	207.0	220.3	223.3	207.4
S_2	183.3	227.7	230.7	241.0	220.7
Mean	181.1	217.3	225.5	232.2	214.0

C.D. for N marginal means = 25.0 Q/ha.

Crop :- Onion.**Ref :- J. & K. 65(18).****Site :- Kashmir Provincial Agri.****Exptl. Farm, Shalimar****Type :- 'CM'.**

Object :—To study the effect of different levels of N and spacings on the yield of Onion.

1. BASAL CONDITIONS:

(i) (a) Nil. (b) and (c) N.A. (ii) Clay loam. (iii) 5.11.65. (iv) (a) N.A. (b) Transplanting. (c) As per treatments. (d) 1. (v) N.A. (vi) Red globe. (vii) Unirrigated. (viii) and (ix) N.A. (x) 27.7.66.

2. TREATMENTS:**Main-plot treatments :**4 levels of N: $N_1=56$, $N_2=112$, $N_3=168$ and $N_4=224$ Kg/ha.**Sub-plot treatments :**2 spacings : $S_1=23\text{cm.} \times 8\text{cm.}$ and $S_2=15\text{cm.} \times 10\text{cm.}$

3. DESIGN:

(i) Split-plot. (ii) (a) 4 main-plots/replication, 2 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 2.13m. x 1.22m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of bulbs. (iv) (a) 1961-66. (modified) (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 199.9 Q/ha. (ii) (a) 40.9 Q/ha. (b) 34.7 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of bulbs in Q/ha.

	N ₁	N ₂	N ₃	N ₄	Mean
S ₁	182.7	226.1	206.7	184.6	200.0
S ₂	197.1	226.0	192.3	183.6	199.7
Mean	189.9	226.0	199.5	184.1	199.9

Crop :- Apple**Ref :- J.&K. 63(244)****Site :- Kashmir Provincial Agri.****Exptl. Farm, Shalimar****Type :- 'CM'.**

Object :—To see the comparative study of different fungicides in controlling the scale on Apples.

1. BASAL CONDITIONS:

(i) N.A. (ii) Clay loam. (iii)— (iv) Ambari. (v) 6.10m. x 6.10m. (vi) 3-4 years. (vii) and (viii) N.A. (ix) Nil. (x) Irrigated. (xi) and (xii) N.A.

2. TREATMENTS

7 fungicidal treatments : T₀=Control, T₁=Coptan at 2gm./litre per plant, T₂=Terzil at 1.5gm./litre per plant, T₃=Melprex at 1.20gm./litre per plant, T₄=Cunran at 18gm./litre per plant, T₅=Diathene (z-78) 2gm./litre per plant, T₆=Diathene (M₂₂) at 2.5gm./litre per plant.

4 spacings with the interval of 20 days. 1st spray was done on 3rd April, 1963.

3. DESIGN:

(i) R.B.D. (ii) (a) 7. (b) 2194.56m. (iii) 4. (iv) (a) N.A. (b) 28. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Good. (ii) N.A. (iii) Infection measurements (iv) 1963—only. (v) No. (vi) and (vii) Nil.

5. RESULTS:

(i) 6.9 degree. (ii) 0.57 degree (iii) Treatment differences are highly significant. (iv) Mean infestation in degree.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Mean angle	10.0	5.8	6.3	6.7	7.0	6.2	6.2

C.D.=0.64 degree

Crop :- Saffron.**Ref :- J.&K. 61(5), 62(11), 63(13).****Site :- Kashmir Provincial Agri.****Exptl. Farm, Shalimar.****Type :- 'M'.**

Object:—To find the best combination of N, P and F.Y.M. for the maximum yield of Saffron.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) N.A. (iii) Dibbling (transplanting). (iv) Local. (v) 1.9.58. (vi) N.A. (vii) Nil. (viii) 4 hoeings. (ix) N.A. (x) Unirrigated. (xi) N.A. (xii) Oct. and Nov. every year.

2. TREATMENTS:

All combinations of. (1), (2) and (3)

(1) 3 levels of F.Y.M. : $F_0=0, F_1=69.2$ and $F_2=138.3$ Q/ha.(2) 3 levels of N as A/S : $N_0=0, N_1=138$ and $N_2=277$ Kg/ha.(3) 3 levels of P_2O_5 as Super— $P_0=0, P_1=138$ and $P_2=277$ Kg/ha.**3. DESIGN :**(i) Fact. in R.B.D. (ii) (a) 27. (b) N.A. (iii) 2. (iv) (a) N.A. (b) Bedsize= $1/2152.2$ ha. (v) Nil. (vi) Yes.**4. GENERAL :**

(i) Normal. (ii) N.A. (iii) No. of flowers (iv) (a) 1958-contd. (60,64,65 N.A.) (b) N.A. (v) (a) and (b) N.A. (vi) and (vii) Nil.

5. RESULTS:

61 (5)

(i) 19175 flowers/ha. (ii) 5509.7 flowers/ha. (iii) Main effect of F and P are highly significant. While interaction $F \times N$ is significant. (iv) Av. no of saffron flowers/ha.

	N_0	N_1	N_2	P_0	P_1	P_2	Mean
F_0	14334	14355	18660	15066	15066	17218	15783
F_1	27979	19736	18294	17584	23675	24751	22003
F_2	16852	20080	22254	15066	19370	24751	19729
Mean	19722	18057	19736	15905	19370	22240	19175
P_0	14334	15776	17584				
P_1	22233	17218	18660				
P_2	22599	21178	32965				

C.D. for P or F marginal means= 3776.9 flowers/ha.C.D. for the body of $F \times N$ table= 6539.1 flowers/ha.

62 (11)

(i) 24473 flowers/ha. (ii) 7361 flowers/ha. (iii) Main effects of N and F are highly significant. Interaction $N \times F$ and $N \times F \times P$ are highly significant. (iv) Av. no. of saffron flowers/ha.

	N_0	N_1	N_2	P_0	P_1	P_2	Mean
F_0	10761	15432	32284	19370	19370	19736	19492
F_1	49136	18660	22964	26903	30131	33726	30253
F_2	11837	24751	34436	26143	17584	27247	23675
Mean	23911	19614	29895	24139	22362	26903	24473
P_0	20446	21157	30842				
P_1	24385	17584	25117				
P_2	26903	20102	33726				

C.D. for N or F marginal means= 5044.6 flowers/ha.C.D. for the body of $N \times F$ table= 8737.3 flowers/ha.

63 (13)

(i) 21922 flowers/ha. (ii) 5187 flowers/ha. (iii) Main effects of N, F are highly significant and that of P is significant. Interaction F×P is highly significant and that of N×P is significant. (iv) Av. no. of saffron flowers/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	Mean
F ₀	9319	15060	46639	17928	16508	36588	23675
F ₁	43411	19370	17218	29765	29055	21178	26666
F ₂	15431	12567	18294	22233	11837	12203	15424
Mean	22720	15668	27377	23309	19133	23323	21922
P ₀	21888	21522	26538				
P ₁	22964	8974	25461				
P ₂	23309	16508	30131				

C.D. for any marginal mean=3556 flowers/ha.

C.D. for the body of F×P or N×P table=6158 flowers/ha.

Crop :- Saffron.

Ref :- J.&K. 60(5), 61(6), 62(12), 63(14)

Site :- Kashmir Provincial Agri.

Exptl. Farm, Shalimar.

Type :- 'C'.

Object :- To find out the effect of different spacings on the yield of Saffron.

1. BASAL CONDITIONS :

(i) and (ii) N.A. (iii) Dibbling (Transplanting) (iv) Local (v) 1.9.58. (vi) N.A. (vii) Nil. (viii) 4 hoeings. (ix) Nil. (x) Unirrigated. (xi) N.A. (xii) October and November every year.

2. TREATMENTS :

9 spacings: S₁=8cm.×8cm., S₂=8cm.×15cm., S₃=8cm.×23cm., S₄=8cm.×30cm., S₅=15cm.×15cm., S₆=15cm.×23cm., S₇=15cm.×30cm., S₈=23cm.×23cm., and S₉=23cm.×30cm.

3. DESIGN:

(i) R.B.D. (ii) 9. (iii) 2. (iv) (a) and (b) Bed size=1/2152.3ha. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) No. of flowers. (iv) (a) 1958—contd. (64, 65 N.A.) (b) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

60 (5)

(i) 3946 flowers/ha. (ii) 2019 flowers/ha. (iii) Treatment differences are not significant, (iv) Av. no. of saffron flowers/ha.

Treatment	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉
Av. yield	4304	2152	5381	4304	6457	1076	1076	3228	7533

61 (6)

(i) 10761 flowers/ha. (ii) 3444 flowers/ha. (iii) Treatment differences are significant, (iv) Av. no. of saffron flowers/ha.

Treatment	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉
Av. yield	12914	9685	21522	8608	12914	7533	5381	9685	8608

C.D.=7941 flowers/ha.

62 (12)

(i) 32571 flowers/ha. (ii) 8587 flowers/ha. (iii) Treatment differences are highly significant. (iv) Av. no of saffron flowers/ha.

Treatment	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉
Av. yield	37664	16142	59187	50578	43045	23675	14420	21522	26903

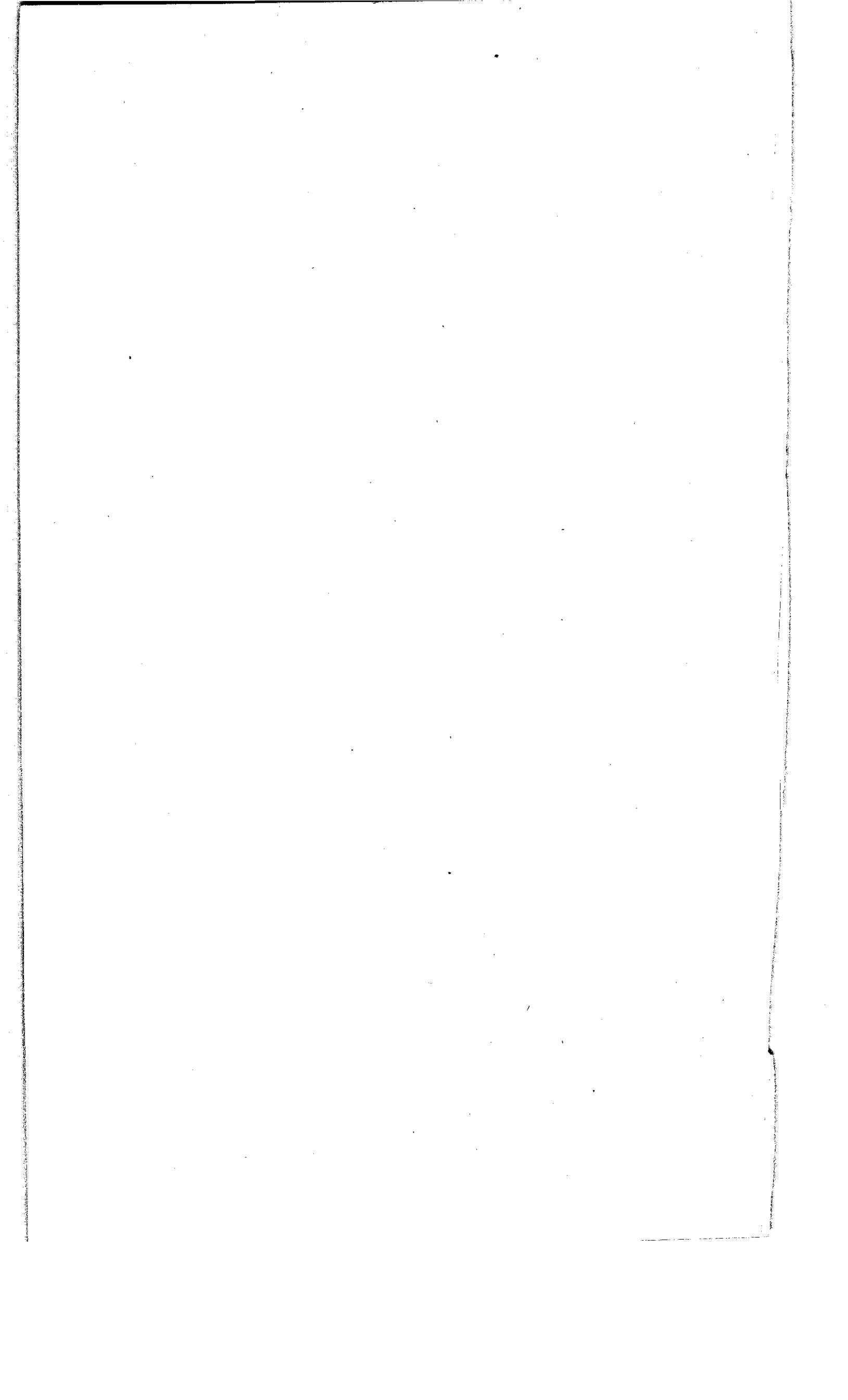
C.D. = 19802 flowers/ha.

63 (14)

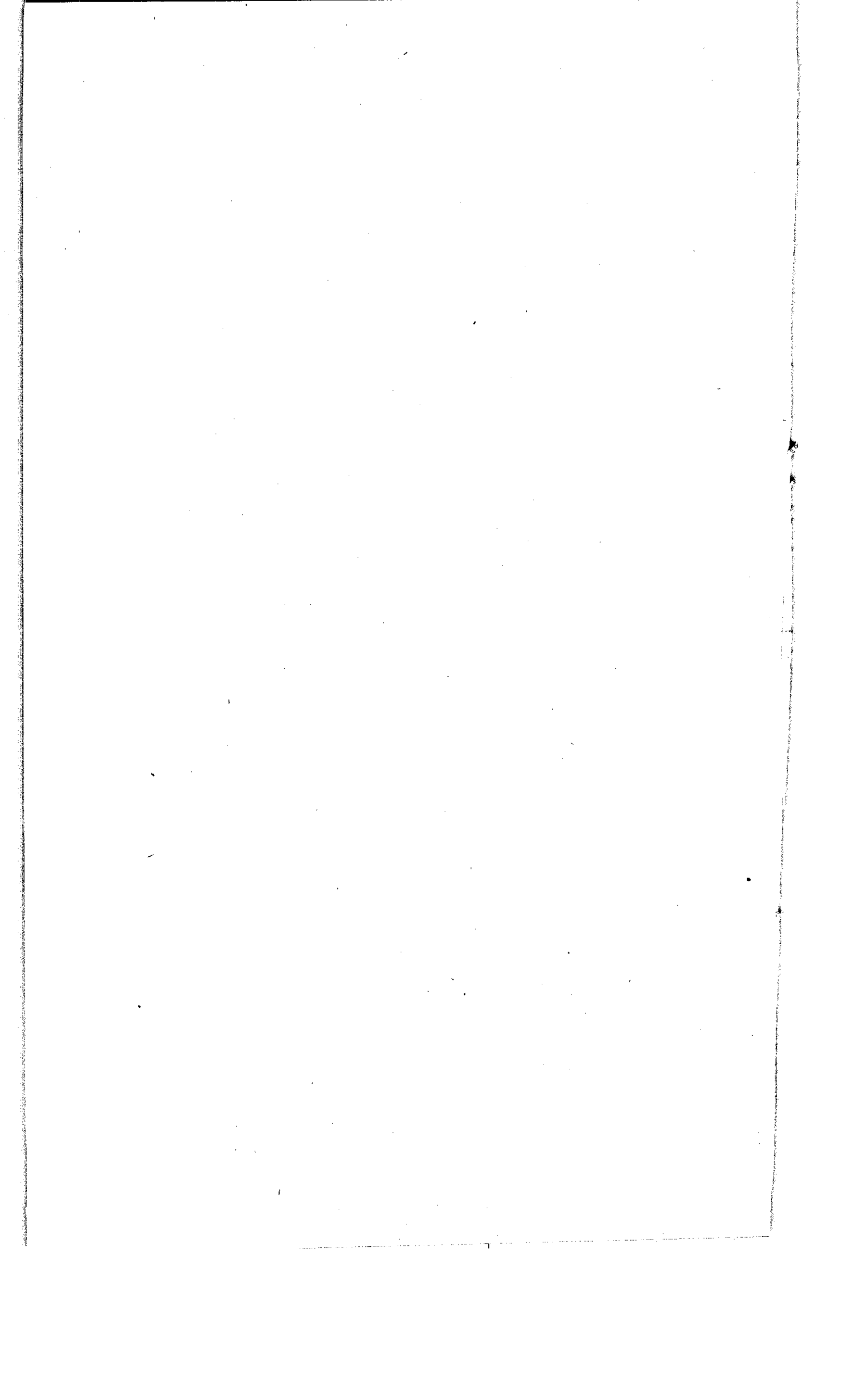
(i) 34795 flowers/ha. (ii) 9039 flowers/ha. (iii) Treatment differences are significant. (iv) Av. no. of saffron flowers/ha.

Treatment	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉
Av. yield	53806	53806	29055	51654	21522	33360	22599	29055	18294

C.D. = 20845 flowers/ha.



PUNJAB



Crop :- Paddy. (Kharif)**Ref :- Pb. 60(128).****Site :- Uppal Farm, Amritsar****Type :- 'M'.****Object :-**To study the effect of different sources of N on the yield of Paddy.**1. BASAL CONDITIONS:**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 10.7.60, (iv) to (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) 7.10.60.

2. TREATMENTS:8 manurial treatments:— T_0 —Control (No manure), T_1 —44.8 Kg/ha. of N as Neem cake, T_2 —44.8 Kg/ha. of N as Cotton cake., T_3 —44.8 Kg/ha. of N as G.N.C., T_4 —44.8 Kg/ha. of N as Bone bluff, T_5 —44.8 Kg/ha. of N as C/A/N, T_6 —44.8 Kg/ha. of N as Compost and T_7 —22.4 Kg/ha. of N as C/A/N.**3. DESIGN :**

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/99 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) N.A. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 1871 Kg/ha. (ii) 127.6 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment.	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7
Av. yield	1415	2409	1834	2165	1837	1963	16603	1683

C.D.—187.7 Kg/ha.

Crop :- Paddy (Kharif)**Ref :- Pb. 62(150),****Site :- Agri. Res. Stn., Gurdaspur.****Type :- 'M'.****Object:—**To study the effect of spraying micronutrients on the yield of Paddy.**1. BASAL CONDITIONS:**(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 18.7.62. (iv) (a) 6 ploughings. (b) to (e) N.A. (v) 67.2 Kg/ha. of N+33.6 Kg/ha. of P_2O_5 +33.7 Kg/ha. of K_2O applied at sowing. (vi) N.A. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 16.10.62.**2. TREATMENTS :**8 applications of micronutrients :— M_0 —Control (no micronutrient applied), M_1 —2.24 Kg/ha. of Borax in 454 litre of water, M_2 —4.48 Kg/ha. of Copper sul.+2.24 Kg/ha. of hydrated lime in 454 litre of water, M_3 —4.48 Kg/ha. Ferrous-Sul.+2.24 Kg/ha. of hydrated lime in 454 litre of water, M_4 —6.72 Kg/ha. of Manganese Sul.+4.48 Kg/ha. of hydrated lime in 454 litre of water M_5 —6.72Kg/ha. of Zinc Sul.+4.48Kg/ha. of hydrated lime in 454 litre of water, M_6 —11.2 Kg/ha. of Magnesium in 454 lt. of water and M_7 —1.12 Kg/ha. of Amm. Molybdate in 454 litre of water.

Micronutrient applied as foliar spray when crop was 1 and 2 months old of water.

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) and (b) N.A. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) As per treatments. (iii) Yield of grain. (iv) (a) N.A. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 1766 Kg/ha. (ii) 223.0 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆	M ₇
Av. yield	1945	1787	1680	1957	1631	1715	1932	1483

Crop :- Paddy. (Kharif)**Ref :- Pb. 62(189), 63(88).****Site : Agri. Res. Stn., Gurdaspur.****Type : 'M'.**

Object :—To study the effect of different levels of silica on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Wheat ; N.A. (c) N.A. (ii) Heavy loam ; loam sand. (iii) 5.7.62; 13.7.63. (iv) (a) 4 ploughings; N.A. (b) to (c) N.A. (v) N.A. (vi) C-27; N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) 15.10.62; 7.10.63.

2. TREATMENTS :

Main-plot treatments:2 manurial treatments : M₁—56 Kg/ha. of N as C/A/N and M₂—56 Kg/ha. of N+28 Kg/ha. of P₂O₅ as Super+28 Kg/ha. of K₂O as Mur. pot.**Sub-plot treatments :**5 levels of silica : S₀=Control (no silica), S₁=224, S₂=448, S₃=672 and S₄=896 Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 2 main-plots/replication, 5 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/123.6 ha; 1/148.3 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-63. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Nil. (vii) Both the error variances are homogeneous. Main-plot treatments×Years interaction is absent while Sub-plot treatments×Years interaction is present.

5. RESULTS :

(i) 2057 Kg/ha. (ii) (a) 744.7 Kg/ha. (based on 7 d.f. made up of Pooled error and Treatments×Years interaction). (b) 413.1 Kg/ha. (based on 8 d.f. made up of Treatments×Years interaction). (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

Pooled results

	S ₀	S ₁	S ₂	S ₃	S ₄	Mean
M ₁	1932	2038	1906	2170	2045	2018
M ₂	1976	2014	2232	2176	2078	2095
Mean	1954	2026	2069	2173	2061	2057

Individual results :

Treatment	M ₁	M ₂	Sig.	S ₀	S ₁	S ₂	S ₃	S ₄	Sig.	G.M.	S.E. / plot	
											Main-plot	Sub-plot
Year												
1962	2591	2634	N.S.	2596	2456	2660	2746	2602	N.S.	2612	481.2	271.2
1963	1446	1557	N.S.	1312	1596	1479	1601	1522	N.S.	1502	1027.0	261.1
Pooled	2018	2095	N.S.	1954	2026	2069	2173	2061	N.S.	2057	744.7	413.1

Crop :- Paddy (Kharif).

Ref :- Pb. 64(200).

Site :- Agri. Res. Stn., Gurdaspur.

Type :- 'M'.

Object :-To find the optimum time of application of C/A/N on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 13.7.64; (iv) (a) to (e) N.A. (v) 22.4 Kg/ha. of P₂O₅+22.4 Kg/ha. of K₂O at planting. (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) 7.10.64.

2. TREATMENTS :

6 times of application of 44.8 Kg/ha. of N as C/A/N : T₀=Control (No nitrogen), T₁=At transplanting, T₂=10 days after transplanting, T₃=20 days after transplanting, T₄=30 days after transplanting, and T₅=40 days after transplanting.

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/123 6 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal (ii) N.A. (iii) Yield of grain. (iv) (a) 1964— contd. (Treatments modified in 65). (b) No. (c) Nil. (v) Nil. (vi) and (vii) N.A.

5. RESULTS :

(i) 1475 Kg/ha. (ii) 152.0 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅
Av. yield	1041	1486	1433	1785	1640	1467

C.D.=229.0 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- Pb. 65(70).

Site :- Agri. Res. Stn., Gurdaspur.

Type :- 'M'.

Object :-To study the effect of N on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Sugarcane. (c) N.A. (ii) Sandy loam. (iii) 15.7.65. (iv) (a) to (e) N.A. (v) 50 Kg/ha. of P₂O₅+50 Kg/ha. of K₂O. (vi) Ghana. (vii) Irrigated. (viii) and (ix) N.A. (x) 11.10.65.

2. TREATMENTS:

7 manurial treatments: T_0 =Control, T_1 =100 Kg/ha. of N at sowing, T_2 =100 Kg/ha. of N after 10 days of sowing, T_3 =100 Kg/ha. of N after 20 days of sowing, T_4 =100 Kg/ha. of N after 30 days of sowing, T_5 =100 Kg/ha of N after 40 days of sowing and T_6 = T_3 + T_5

3. DESIGN:

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 4. (iv) (a) 18'90m.×2'74m. (b) 18'44m.×2'74m. (v) 22 cm. at the ends. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1964-contd (Treatments modified. in 65) (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 831 Kg/ha, (ii) 64.1 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6
Av. yield	650	771	948	1031	843	706	865

C.D.=95.2 Kg/ha.

Crop :- Paddy.(Kharif)

Ref :- .Pb. 65(69)

Site :-Agri. Res. Stn., Gurdaspur

Type :- 'M'.

Object:—To study the effect of spraying the micronutrients on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Sugarcane. (c) N.A. (ii) Sandy loam. (iii) 14.7.65. (iv) (a) N.A. (b) Kera. (c) to (e) N.A. (v) 125 Kg/ha. of N+62.5 Kg/ha. of P_2O_5 +62.5 Kg/ha. of K_2O . (vi) Ghana. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 micronutrient treatments: T_0 =Control. T_1 =4.5 Kg/ha. of N, P and K each+4.5 Kg/ha. of Lime, T_2 =2.2Kg/ha. of Borax+4.5 Kg/ha. of Lime, T_3 =4.5 Kg/ha. of Fe+4.5Kg/ha. of Lime, T_4 =6.7 Kg/ha. of Zn+4.5 Kg/ha. of Lime, T_5 =6.7 Kg/ha. of Mn+4.5 Kg/ha. of Lime, T_6 =11.2 Kg/ha. of Mg+4.5 Kg/ha. of Lime. and T_7 =1.1 Kg/ha. of Molybdenum+2.2 Kg/ha of Lime.

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) 18'90m.×2'74m. (b) 18'44 m.×2'13 m. (v) 28cm.×30cm. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1965-only. (b) No, (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 923 Kg/ha. (ii) 70.9 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7
Av. yield	933	978	894	939	914	904	906	912

Crop :- Paddy (Kharif).

Ref :- .Pb. 62(4), 63(2), 64(1).

Site :- Reg. Rice Res. Stn., Kapurthala

Type :- 'M'.

Object:—To study the effect of different sources of N on the yield of Paddy.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) Seed sown 5 weeks earlier to trans planting and trans planting done on last week of July. (iv) (a) Ploughings, 2puddings. (b) Transplanting. (c) 18 Kg/ha. (d) 23 cm. × 23 cm. (e) 1. (v) Nil. (vi) Jhona—349. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 28.11.62; 1.10.63; 29.10.64

2. TREATMENTS:

7 sources of N at 22.4 Kg/ha. -S₀=(No manure), S₁=F.Y.M., S₂=C/A/N, S₃=G.M. (Dhaincha) S₄=A/S, S₅=Rice husk and S₆=Urea.

In Expt. No 62 (4) treatment S₆ has not been tried.

3. DESIGN:

(i) R.B.D. (ii) (a) 6 for '62' and 7 for others. (b) N.A. (iii) 6;4 for 63 and 64 (iv) 1/1977 ha; 1/247 ha; 1/741 ha. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—64 (b) No. (c) Nil.(v) and. (vi) Nil. (vii) Error variances are heterogeneous and Treatments × Years interaction is absent for 63 and 64, therefore results of individual years are given below.

5. RESULTS:

62 (4)

(i) 1515 Kg/ha. (ii) 1000 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	S ₀	S ₁	S ₂	S ₃	S ₄	S ₅
Av. yield	1483	1813	1714	757	1674	1647

63 (2)

(i) 1811 Kg/ha. (ii) 622.7 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	S ₀	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆
Av. yield	1186	2199	2002	1754	1952	1829	1754

64 (1)

(i) 1319 Kg/ha. (ii) 378.1 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	S ₀	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆
Av. yield	779	1557	1542	1460	1371	1320	1201

Crop :- Paddy (Kharif)

Ref :- Pb. 63(8), 64(4)

Site :- Reg. Rice Res. Stn., Kapurthala

Type :- 'M'.

Object:—To study the effect of G.M., N and P, O₂ on the yield of Paddy.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) End of July, 63; 27.7.64. (a) 2ploughings, 2 puddings. (b) Transplanting. (c) 18 Kg/ha. (d) 23 cm. × 23cm. (e) 1. (v) N.A. (vi) Jhona—349. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 4.11.63; 27.10.64.

2. TREATMENTS :

4 manurial treatments. : T_0 = Control (no manure), T_1 = 28.0 Kg/ha. of N as A/S, T_2 = 28 Kg/ha. of N as Dhaincha + 28 Kg/ha. of P_2O_5 as Super, and T_3 = 28 Kg/ha. of N as Dhaincha.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 6. (iv) 1/123.6 ha.; 1/741 ha. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal (ii) N.A. (iii) Yield of grain. (iv) (a) 1953—Contd. (b) No. (c) Results of combined analysis are presented under 5 Results. (v) and (vi) N.A. (vii) Error variances are heterogeneous and Treatments \times Years interaction is present.

5. RESULTS :

Pooled results:

(i) 1874 Kg/ha. (ii) 624.4 Kg/ha. (based on 3 d.f. made up of Treatments \times Years interaction) (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T_0	T_1	T_2	T_3
Av. yield	1389	2181	1949	1976

Individual results :

Treatment	T_0	T_1	T_2	T_3	Sig.	G.M.	S.E./plot
Year 1963	1689	2264	1837	1936	**	1932	195.2
1964	1090	2098	2061	2016	**	1816	385.2
Pooled	1389	2181	1949	1976	N.S.	1874	624.4

Crop :- Paddy (Kharif)

Ref :- Pb. 62(170)

Site :- Govt. Agri. College; Ludhiana.

Type :- 'M'.

Object:—To study the effect of fertilizers on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) sandy loam. (iii) 18.7.62. (iv) (a) 4-5 ploughings. (b) to (e) N.A. (v) Nil. (vi) China-4. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 16.10.62.

2. TREATMENTS :

All combinations of (1) (2), and (3).

(1) 2 levels of N as C/A/N: N_0 = 0 and N_1 = 44.8 Kg/ha.

(2) 2 levels of P_2O_5 as Super: P_0 = 0 and P_1 = 22.4 Kg/ha.

(3) 2 levels of K_2O as Mur. pot: K_0 = 0 K_1 = 22.4 Kg/ha.

P_2O_5 and K_2O was applied on 17.7.62 while N on 8.8.62 and 24.9.62.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/791 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Av. yield of grain and straw. (iv) (a) 1962-only (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 2450 Kg/ha. (ii) 340.0 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield fo grain in Kg/ha.

	N ₀	N ₁	P ₀	P ₁	Mean
K ₀	1719	3081	2369	2431	2400
K ₁	1796	3204	2363	2636	2500
Mean	1758	3142	2366	2534	2450
P ₀	1690	3042			
P ₁	1825	3242			

C.D. for N marginal means=250.0 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- Pb. 62(207)

Site :- Govt. Agri. College, Ludhiana

Type :- 'M'.

Object :-To study the effect of different combinations of N, P and K on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 20.7.62. (iv) (a) 5 to 6 ploughings. (b) Transplanting. (c) and (d) N.A. (e) 1. (v) and (vi) N.A. (vii) Irrigated. (viii) 3 weedings. (ix) N.A. (x) 29.10.62.

2. TREATMENTS :

12 manurial treatments: T₀=Control (no manure), T₁=44.8 Kg/ha. of N, T₂=T₁+22.4 Kg/ha. of P₂O₅, T₃=T₁+44.8 Kg/ha. of P₂O₅, T₄=T₁+67.2 Kg/ha. of P₂O₅, T₅=T₁+89.6 Kg/ha. of P₂O₅, T₆=T₁+22.4 Kg/ha. of K₂O, T₇=T₁+44.8 Kg/ha. of K₂O as Mur. Pot., T₈=T₁+67.2 Kg/ha. of K₂O, T₉=T₂+22.4 Kg/ha. of K₂O, T₁₀=T₂+44.8 Kg/ha. of K₂O and T₁₁=T₄+67.2 Kg/ha. of K₂O.

N applied as C/A/N, P₂O₅ as Super and K₂O as Mur.Pot.

3. DESIGN :

(i) R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/791 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain and straw. (iv) (a) and (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 3463 Kg/ha. (ii) 695.9 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈
Av. yield	1690	2979	3689	3776	3936	4527	3153	3537	3266
	T ₉	T ₁₀	T ₁₁						
	3212	3543	4244						

C.D.=1001.8 Kg/ha.

Crop :- Paddy (Kharif)

Ref :- Pb. 62(209).

Site :- Govt. Agri. College. Ludhiana

Type :- 'M'.

Object :- To study the effect of micronutrients on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 19.7.62. (iv) (a) 5 ploughings. (b) to (e) N.A. (v) Nil. (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) 19.10.62.

2. TREATMENTS :

9 manurial and trace-elements : T_0 = Control (No manure), T_1 = 44.8 Kg/ha. of N + 22.4 Kg/ha. of P_2O_5 + 22.4 Kg/ha. of K_2O , T_2 = T_1 + Copper sul. 0.4% + Lime 0.2%, T_3 = T_1 + Manganese sul. 0.6% + Lime 0.4%, T_4 = T_1 + Zinc sul. 0.6% + Lime 0.4%, T_5 = T_1 + Ferrous sul. 0.4% + Lime 0.2%, T_6 = T_1 + Amm. molybdate 0.1%, T_7 = T_1 + Borax 0.2% and T_8 = T_1 + All micronutrients as lime and lime 0.1%. P_2O_5 and K_2O applied on 17.7.62 while N applied on 10.8.62 and 24.9.62.

3. DESIGN :

(i) R.B.D. (ii) (a) 9. (b) N.A. (iii) 5. (iv) (a) N.A. (b) 1/494 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain and straw. (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 2670 Kg/ha. (ii) 321.8 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8
Av. yield	2002	2263	2833	2496	2823	2858	3158	2554	2997

C.D. = 414.8 Kg/ha.

Crop :- Paddy. (Kharif).

Ref :- Pb. 60(M.A.E.)

Site :- M.A.E. Centre, Nasirpur.

Type :- 'M'.

Object :- To study the effect of different times of N on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 30.5.60/3.8.60. (iv) (a) 6 ploughings with cultivation. (b) Transplanting. (c) 18.4 Kg/ha. (d) 23cm. x 23cm. (v) 22.4 Kg/ha. of P_2O_5 as Super drilled on 7.7.60. (vi) Jhona-349 (95 days duration) (vii) Irrigated. (viii) One weeding. (ix) N.A. (x) 28.10.60.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 2 levels of 22.4 Kg/ha. of N: S_1 = C/A/N and S_2 = A/S.

(2) 7 times of application of N: — T_1 = Full dose before planting, T_2 = Full dose at planting, T_3 = Full dose at tillering, T_4 = $\frac{1}{2}$ before planting + $\frac{1}{2}$ at tillering, T_5 = $\frac{1}{2}$ at planting + $\frac{1}{2}$ at tillering, T_6 = $\frac{1}{2}$ before planting + $\frac{1}{2}$ at tillering + $\frac{1}{2}$ at flowering and T_7 = $\frac{1}{2}$ at planting + $\frac{1}{2}$ at tillering + $\frac{1}{2}$ at flowering.

3. DESIGN:

- (i) R.B.D. (ii) (a) 15. (b) N.A. (iii) 3. (iv) (a) 17'41m. × 2'90m. (b) 16'64m. × 2'44m. (v) 38cm. × 23cm. (vi) Yes.

4. GENERAL:

- (i) Normal. (ii) Nil. (iii) Yield of grain and straw. (iv) (a) and (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

- (i) 2830 Kg/ha. (ii) 356.9 Kg/ha. (iii) Main effect of S and control vs. others are highly significant (iv) Av. yield of grain in Kg/ha.

Control=2204 Kg/ha.

	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	Mean
S ₁	2802	3120	3325	2989	3139	3400	2840	3088
S ₂	2652	2599	2690	2690	2784	2746	2485	2663
Mean	2727	2858	3007	2839	2961	3073	2662	2875

C.D. for S marginal means=225.6 Kg/ha.

C.D. for control vs. others=436.8 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- Pb. 62(M.A.E.)

Site :- M.A.E. Centre; Nasirpur.

Type :- 'M'.

Object:—To study the effect of methods of application of N on Paddy.

1. BASAL CONDITIONS:

- (i) (a) to (c) N.A. (ii) N.A. (iii) 1st week of July, 62. (iv) to (ix) N.A. (x) 2nd week of Sept., 62.,

2. TREATMENTS:

All combinations of (1) and (2)+Control.

(1) 3 levels of N: N₁=33.6, N₂=50.4 and N₃=67.2 Kg/ha.

(2) 4 methods of application: M₁=Broadcasted just before last puddling and incorporated in the soil (sub surface application), M₂=Broadcasted at planting, M₃=Broadcasted half at planting and half about a month after planting and M₄=Application in the form of pellets about three weeks after planting.

3. DESIGN

- (i) Fact. in R.B.D. (ii) (a) 13. (b) N.A. (iii) N.A. (iv) 1/185.25 ha. (v) Nil. (vi) Yes.

4. GENERAL

- (i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only (b) No (c) Nil. (v) and (vi) N.A. (vii) Since the no. of replication is not available, hence critical difference is not calculated.

5. RESULTS:

- (i) 1479 Kg/ha. (ii) 277.7 Kg/ha. (iii) Main effect of M is highly significant and Control vs. others is significant. (iv) Av. yield of grain in Kg/ha.

Control=1177 Kg/ha.

	N ₁	N ₂	N ₃	Mean
M ₁	1163	1408	1142	1238
M ₂	1209	1524	1327	1353
M ₃	1355	1570	1971	1632
M ₄	1809	1719	1857	1795
Mean	1384	1555	1574	1504

Crop :- Paddy. (Rabi)

Ref :- Pb. 64, 65(M.A.E.)

Site :- M.A.E. Centre; Nasirpur.

Type :- 'M'.

Object:—To determine the effect of micronutrient application and to study the relative merits of two methods of application.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Indus alluvium. (iii) to (x) N.A.

2. TREATMENTS :

Same as in expt. conducted at Khudwani (J. & K.) for the year 63 and 65 and presented on page no. 344.

3 DESIGN :

(i) R.B.D. (ii) (a) 15. (b) N.A. (iii) N.A. (iv) (a) and (b) N.A. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1964-66 (b) No. (c) Nil. (v) Nil. (vi) N.A. (vii) Nil.

5. RESULTS :

64 (M.A.E.)

(i) 2695 Kg/ha. (ii) and (iii) N.A. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀
Av. yield	1700	2750	2850	2790	2760	2840	2710	2790	2800	2770	2740
Treatment	T ₁₁	T ₁₂	T ₁₃	T ₁₄							
Av. yield	2740	2820	2660	2710							

65 (M.A.E.)

(i) 3346 Kg/ha. (ii) and (iii) N.A. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀
Av. yield	2393	3312	4119	3374	3256	3362	3549	3200	3339	3418	3343
	T ₁₁	T ₁₂	T ₁₃	T ₁₄							
	3393	3505	3156	3424							

Crop :- Paddy (Kharif).
District :- Patiala, Hoshiarpur
and Ferozepur.

Ref :- Pb. 60(S.F.T.) for Patiala and
61(S.F.T.) for Hoshiarpur and Ferozepur
Type :- 'M'.

Object :-Type A : To study the response of different levels of N, P and K applied individually and in combination .

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure)

N=22.4Kg/ha. of N.

P=22.4Kg/ha. of P_2O_5 .

K=22.4Kg/ha. of K_2O .

NP=22.4Kg/ha. of N+22.4Kg/ha. of P_2O_5 .

NK=22.4Kg/ha. of N+22.4Kg/ha. of K_2O .

PK=22.4 Kg/ha. of P_2O_5 +22.4 Kg/ha. of K_2O .

NPK=22.4Kg/ha. of N+22.4Kg/ha. of P_2O_5 +22.4Kg/ha. of K_2O .

3. DESIGN :

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle/thana is changed once in two years within the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on Kharif cereal, 8 on a Rabi cereal, 8 on Cash crop, 4 on an Oilseed crop and 3 on a leguminous crop. Half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. The three trials on legumes are of type C. Residual effects of phosphate application are studied on Type C trials in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98.8ha. (b) 1/197.7 ha. (iv) Yes

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain (iv) to (vii) N.A.

5. RESULTS :

Av. response in Kg/ha.

District	No. of trials	Control yield in Kg/ha.	N	P	K	S.E.	NP	NK	PK	NPK	S.E.
60 (S.F.T.)											
Patiala	5	1990	310	240	230	44.0	50	10	-10	10	53.0
61(S.F.T.)											
Hoshiarpur	4	1160	290	50	0	37.0	0	0	0	-10	32.0
Ferozepur	10	1670	460	40	250	49.0	130	70	-140	130	64.0

Crop :- Paddy (Kharif).
District :- Hoshiarpur
and Ferozepur.

Ref :- Pb. 60(S.F.T.) for Ferozepur and
61(S.F.T.) for Hoshiarpur and Ferozepur
Type :- 'M'.

Object :-Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Tarai and sub-mountain for Hoshiarpur and Alluvial for Ferozepur. (iii) to (x) N.A.

2. TREATMENTS:

7 manurial treatments :

O=Control (no manure)

N₁=22.4 Kg/ha. of N as A/SN₂=44.8 Kg/ha. of N as A/SN₁'=22.4 Kg/ha. of N as UreaN₂'=44.8 Kg/ha. of N as UreaN₁''=22.4 Kg/ha. of N as A/S/NN₂''=44.8 Kg/ha. of N as A/S/N

3. DESIGN :

Same as in type A conducted on Paddy crop on page. No. 417.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain (iv) to (vii) N.A.

5. RESULTS :

Av. response in Kg/ha.

60 (S.F.T.)

District	No. of trials	Control yield in Kg/ha.	N ₁	N ₂	N ₁ '	N ₂ '	N ₁ ''	N ₂ ''	S.E.
Ferozepur	4	1790	60	130	70	140	50	100	14.0

61 (S.F.T.)

District	No. of trials	Control yield in Kg/ha.	N ₁	N ₂	N ₁ '	N ₂ '	N ₁ ''	N ₂ ''	S.E.
Hoshiarpur	7	1100	270	510	200	370	260	510	59.0
Ferozepur	11	1700	480	720	210	540	220	580	112.0

Crop:-Paddy (Kharif)**Ref : Pb. 62(S.F.T.) for Hoshiarpur****District:- Hoshiarpur****Type :- 'M'.**Object :— Type A₁ : To study the response curves of important cereal, cash, and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS:

8 manurial treatments.

O=Control (no manure)

N₁=35 Kg/ha. of NN₂=70 Kg/ha. of NP₁=35 Kg/ha. of P₂O₅N₁P₁=35 Kg/ha. of N+35 Kg/ha. of P₂O₅N₂P₁=70 Kg/ha. of N+35 Kg/ha. of P₂O₅N₂P₂=70 Kg/ha. of N+ 70 Kg/ha. of P₂O₅N₂P₂K₁=70 Kg/ha. of N+70 Kg/ha. of P₂O₅+35 Kg/ha. of K₂ON applied as A/S, P₂O₅ as Super and K₂O as Mur. pot.

3. DESIGN:

(i) and (ii) A selected district is divided into four agriculturally homogeneous zones based on climate, soil cropping pattern etc. In each zone one block is selected at random. A block normally consists of a group of 50-100 villages. In each block 36 experiments are conducted in a year of which 11 are of type A₁, 11 of type A₂, 11 of type A₃ and 3 are of type C. The eleven experiments under type A₁, A₂ and A₃ are distributed as 3 on a Kharif cereal, 3 on Rabi cereal, 3 on Cash crop and 2 on Oil seed. All the three type-C experiments are conducted on a legume crop. For the purpose of conducting the A₁, A₂ and A₃ experiments 11 villages are randomly selected in each block and in each village 3 experiments one each of type A₁, A₂ and A₃ are laid out. For conducting these experiments the three villages are randomly selected in each block. (iii) (a) 1/100 ha. (b) 1/200 ha. (iv) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (iv) to (vii) N.A.

5. RESULTS:

62 (S.F.T.)

Hoshiarpur

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₁ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	437	1012	84	526	1000	1114	1124	100.0

Control yield=1395 Kg/ha., No. of trials=5

Crop :- Potato (Kharif)

Ref :- Pb. 62 to 65(S.F.T.) for Ferozepur
62 to 65 (S.F.T.) for Gurdaspur and
63(S.F.T.) for Hoshiarpur.

District:-Ferozepur, Gurdaspur and Hoshiarpur

Type :- 'M'.

Object:—To study the response curves of important cereal cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS : and 3. DESIGN :

Some as in type A₁ conducted on Paddy crop under unirrigated conditions and presented above.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) 1962 to 66 for Ferozepur, 1962 to 66 for Gurdaspur and 63 for Hoshiarpur. (v) to (vii) N.A.

5. RESULTS:

62 (S.F.T)

Ferozepur

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S. E.
Av. response of grain in Kg/ha.	234	481	230	344	593	760	841	76.1

Control yield=1564 Kg/ha.; No. of trials=8

63 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	183	489	197	787	1045	1343	1208	302.1

Control yield=2475 Kg/ha.; No. of trials=8

64(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	474	1062	207	835	1452	1640	1828	221.4

Control yield=1265 Kg/ha. ; No. of trials=4

65(S.F.T)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	247	447	162	660	772	897	1062	110.4

Gurdaspur

62 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	431	770	142	517	577	898	987	110.1

Control yield=1864 Kg/ha. ; No. of trials=2

63 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.F.
Av. response of grain in Kg/ha.	448	823	145	518	803	733	885	120.4

Control yield=1537 Kg/ha. ; No. of trials=12

64 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	307	674	74	448	727	884	919	97.7

Control yield=1828 Kg/ha. ; No. of trials=12

65 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	193	563	68	380	693	825	907	76.2

Control yield=1664 Kg/ha.; No. of trials=9

Hoshiarpur

63 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	469	553	98	434	780	1008	1037	214.0

Control yield=2065 Kg/ha.; No. of trials=2

Crop:- Paddy (Kharif)

Ref:- Pb. 63(S.F.T) for Hoshiarpur, 62 to 65(S.F.T.)for Ferozepur and 62to65(S.F.T.)for Gurdaspur.

District :-Hoshiarpur, Ferozepur and Gurdaspur.

Type :-'M'.

Object :- Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Irrigated (viii) to (x) N.A.

2. TREATMENTS

8 manurial treatments :

O=Control (no manure)

N₁=35 Kg/ha. of N

P₁=35 Kg/ha. of P₂O₅

P₂=70 Kg/ha. of P₂O₅

N₁P₁=35 Kg/ha. of N+35 Kg/ha. of P₂O₅

N₁P₂=35 Kg/ha. of N+70 Kg/ha. of P₂O₅

N₂P₂=70 Kg/ha. of N+70 Kg/ha. of P₂O₅

N₂P₂K₂=70 Kg/ha. of N+70 Kg/ha. of P₂O₅+70 Kg/ha. of K₂O.

N applied as A/S, P₂O₅ as Super and K₂O as Mur. pot.

3. DESIGN :

Same as in type A₁ conducted under irrigated conditions on Paddy crop on page No. 419.

4. GENERAL

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1963 for Hoshiarpur; 1962 to 66 for Ferozepur and 1962 to 66 for Gurdaspur. (b) and (c) Nil. (v) to (vii) N.A.

5. RESULTS:

Hoshiarpur

63 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	686	74	-14	667	588	1141	1200	120.4

Control yield=1616 Kg/ha.; No. of trials=2

Ferozepur

62 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	305	176	313	574	604	774	885	67.3

Control yield=1800 Kg/ha.; No. of trials=9

63 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	647	231	361	729	993	1288	1361	149.9

Control yield=2198 Kg/ha.; No. of trials=8

64 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	606	237	434	994	1278	1910	2148	92.9

Control yield=1199 Kg/ha.; No. of trials=3

65 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	292	460	575	542	535	522	892	190.0

Control yield=2322 Kg/ha., No. of trials=8

Gurdaspur

62 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	425	165	208	576	642	818	861	81.3

Control yield=1690 Kg/ha., No. of trials=9

63 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	410	72	135	541	575	975	962	60.5

Control yield=1760 Kg/ha., No. of trials=13

64 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	325	135	211	541	511	717	768	96.6

Control yield=1615 Kg/ha., No. of trials=11

65 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	385	73	195	835	693	991	1031	143.9

Control yield=1556 Kg/ha., No. of trials=8

Crop :- Paddy (Kharif).**Ref :- Pb. 62(S.F.T.) for Hoshiarpur****District :- Hoshiarpur.****Type :- 'M'.**

Object:—Type A₂: To study the response curves of cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Un-irrigated. (viii) to (x) N.A.

2. TREATMENTS

Same as in type A₂ conducted on Paddy crop under irrigated conditions on page No. 421.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) 1962—only (b) to (c) Nil. (v) to (vii) N.A.

5. RESULTS ;

Hoshiarpur

62 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	471	—5	53	451	629	912	1010	109.2

Control yield=1422 Kg/ha.; No. of trials=5

Crop :- Paddy (*Kharif*)Ref:- Ph. 62 to 65(S.F.T.) for Ferozepur and
62 to 65(S.F.T.) for Gurdaspur.

District :- Ferozepur and Gurdaspur.

Type :- 'M'

Object:—Type A₂ : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

Same as in type A₂ conducted on Paddy crop under un-irrigated condition on page No. 424.

3. DESIGN :

Same as in type A₁ conducted on Paddy crop under irrigated condition on page No. 419.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 62(S.F.T.) to 66(S.F.T.), for Ferozepur, 62(S.F.T.) to 66(S.F.T.) for Gurdaspur. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Ferozepur

62 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	392	37	193	390	555	551	585	95.3

Control yield=1959Kg/ha.; No. of trials=8

63 (S.F.T)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₁	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	435	397	534	749	614	810	1006	232.3

Control yield =2549Kg/ha.; No. of trials=7

64 (S.F.T)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	303	118	237	711	1357	1647	1719	111.0

Control yield=1449Kg/ha.; No. of trials=3

65 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	305	305	350	520	587	730	742	141.2

Control yield=2037 Kg/ha.; No. of trials=8

Gurdaspur

62 (S. F. T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	373	24	143	474	484	859	618	79.1

Control yield=1728 Kg/ha.; No. of trials=9

63 (S. F. T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S. E.
Av. response of grain in Kg/ha.	322	-75	26	413	357	648	490	56.9

Control yield=1733 Kg/ha., No. of trials=8

64 (S. F. T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S. E.
Av. response of grain in Kg/ha.	374	77	144	444	516	857	682	35.0

Control yield = 1460 Kg/ha., No. of trials=12

65 (S. F. T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S. E.
Av. response of grain in Kg/ha.	390	20	80	440	600	780	660	110.6

Control yield=1460 Kg/ha., No. of trials=2

Crop : Paddy (Kharif)**Ref :- Ph. 62(S.F.T),****District :- Hoshiarpur.****Type :- 'M'.**

Object :—Type A₃ : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure).

N₁=35 Kg/ha. of NK₁=35 Kg/ha. of K₂OK₂=70 Kg/ha. of K₂ON₁K₁=35 Kg/ha. of N+35 Kg/ha of K₂ON₁K₂=35 Kg/ha. of N+70 Kg/ha. of K₂ON₂K₂=70 Kg/ha. of N+70 Kg/ha. of K₂ON₁P₁K₁=35 Kg/ha. of N+35 Kg/ha. of P₂O₅+35 Kg/ha. of K₂ON applied as A/S, P₂O₅ as Super and K₂O as Mur. Pot.**3. DESIGN :**Same as in type A₁ conducted on Paddy crop under irrigated condition on page No. 419.**4. GENERAL :**

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) and (c) Nil. (v) to (vii) N.A.

5. RESULTS :

62(S.F.T.)

Hoshiarpur

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	524	-22	48	541	521	1137	652	55.5

Control yield=1395 Kg/ha., No. of trials=3

Crop :- Paddy (Kharif)**Ref :- Pb. 64(5).****Site :- Reg. Rice Res. Stn., Kungurthala****Type :- 'MV'.****Object**—To study the effect of N on different varieties of Paddy.**1. BASAL CONDITIONS :**

(i) (a) to (c) N.A. (ii) Clay loam, (iii) 1st week of July. (iv) (a) 2 ploughings and 2 puddings, (b) Transplanting. (c) 18 Kg/ha. (d) 23cm. x 23cm. (e) 1. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 weedings. (x) N.A. (ix) 10.10.64.

2. TREATMENTS :**Main-plot treatments :**2 varieties : V_1 —Jhana-349 and V_2 —Basmati-370.**Sub-plot treatments :**5 levels of N as A/S: $N_0=0$, $N_1=22.4$, $N_2=44.8$, $N_3=67.2$ and $N_4=89.7$ Kg/ha.**3. DESIGN :**

(i) Split-plot (ii) (a) 2 main-plots/replication, 5 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) and (b) 1/593 ha. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv)(a) 1964—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 2931Kg/ha. (ii) (a) 960.7Kg/ha. (b) 521.9Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	N_0	N_1	N_2	N_3	N_4	Mean
V_1	1957	2894	3392	3864	4151	3256
V_2	2016	2431	2817	2847	2918	2606
Mean	1986	2662	3104	3366	3535	2931

C.D. for N marginal means=538.5Kg/ha.

Crop :- Paddy (Kharif)**Ref :- Pb. 63(89).****Site :- Agri Res. Stn., Gurdaspur.****Type :- 'C'.****Object**—To study the effect of puddling on the yield of Paddy.**1. BASAL CONDITIONS:**

(i) (a) to (c) N.A. (ii) Loamy sand, (iii) 13.7.63. (iv) (a) As per treatments. (b) to (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) 7.10.63.

2. TREATMENTS :2 cultural practices : T_0 —No puddling and T_1 —2 ploughings and planting in water.

3. DESIGN:

(i) R. B. D. (ii) (a) 2 (b) N.A. (iii) 10. (iv) (a) N.A. (b) 1/59.3 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) N.A. (b) No. (c) Nil. (v) and (vi) N.A. (vii) Nil.

5. RESULTS:

(i) 1912Kg/ha. (ii) 174.5Kg/ha. (iii) Treatment difference is highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁
Av. yield	1550	2273

C.D.=176.6Kg/ha.

Crop :- Paddy (Kharif)

Ref :- Pb. 62(6),

Site :- Reg. Rice Res. Stn., Kapurthala.

Type :- 'C'.

Object :- To study the effect of different depths of transplanting on the yield of Paddy.

1. BASAL CONDITIONS

(i) (a) to (c) N.A. (ii) Clay Loam. (iii) 24.7.62 (iv) (a) Ploughings and puddlings (b) Transplanting (c) 18 Kg/ha. (d) 23cm. x 23cm. (e) 1. (v) N.A. (vi) Jhana-349. (vii) Irrigated. (viii) Weeding. (ix) N.A. (x) 2nd week of Nov., 62

2. TREATMENTS:

4 depths of transplanting :- D₁=1.3, D₂=3.8, D₃=6.4 and D₄=8.9 cm.

3. DESIGN:

(i) R.B.D. (ii) (a) 4 (b) N.A. (iii) 6. (iv) (a) 8 (b) N.A. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 1770 Kg/ha. (ii) 387.9 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	D ₁	D ₂	D ₃	D ₄
Av. yield	1774	1618	1774	1914

Crop :- Paddy (Kharif)

Ref :- Pb. 62(7).63(5)

Site :- Reg. Rice. Res. Stn., Kapurthala

Type :- 'C'.

Object :- To study the effect of raking on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) Seeds planted 5 weeks earlier transplanting on 24.7.62, 1st week of July. (iv) (a) 2 ploughings, 2 puddlings (b) Trans planting. (c) 18 Kg/ha. (d) 23cm. x 23cm. (e) 1. (v) N.A. (vi) Jhona-349. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 2nd week of Nov., 1st week of Oct.

2. TREATMENTS

T₀ = Control (No raking), T₁ = Raking after 20 days of transplanting, T₂ = Raking after 40 days of transplanting, and T₃ = Raking after 20 days and again after 40 days of transplanting.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 6, 4. (iv) (a) and (b) 1/988 ha. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-63. (b) No. (c) Nil. (v) and (vi) N.A. (vii) Error variances are heterogeneous and Treatments x Years interaction is absent, therefore individual years results are presented under 5. Results.

5. RESULTS :

62(7)

(i) 2595 Kg/ha. (ii) 1561.7 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₂	T ₁	T ₂	T ₃
Av. yield	2422	2155	2965	2837

63(5)

(i) 657 Kg/ha. (ii) 102.8 Kg/ha. (iii) Treatment differences are highly significant (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃
Av. yield	514	682	603	830

C.D. = 164.4 Kg/ha.

Crop :- Paddy (*Kharif*).

Ref :- Pb. 62(8), 63(6)

Site :- Reg. Rice. Stn., Kapurthala.

Type :- 'C'.

Object :- To study the effect of earthing up on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) N.A./24.7.62 ; 1st week of July. (iv) (a) 2 ploughings and puddlings (b) Transplanting. (c) 18Kg/ha. (d) 23cm. x 23cm. (e) 1. (v) N.A. ; Nil. (vi) Jhona-349. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 2nd week of Nov. ; 1st week of Oct.

2. TREATMENTS :

7 earthing up treatments : T₀ = Control (no earthing up), T₁ = 15 days after transplanting, T₂ = 30 days after transplanting, T₃ = 45 days after transplanting, T₄ = 15 days after transplanting and again 30 days after transplanting, T₅ = 15 days and again 45 days after transplanting and T₆ = 30 days and again 45 days after transplanting.

3. DESIGN:

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 4. (iv) (a) and (b) 1/988 ha. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Satisfactory. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-63 (b) No. (v) N.A. (vi) Nil. (vii) Error variances are heterogeneous and Treatments \times Years interaction is present.

5. RESULTS:

Pooled results

(i) 2522 Kg/ha. (ii) 530.4Kg/ha. (based on 6 d. f. made up of Treatments \times Years interaction). (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield.	2335	2384	2570	2397	2570	2730	2669

Individual results

Year	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	Sig.	G.M.	S.E./plot
1962	2372	2347	2496	2422	2817	3015	3089	N.S.	2651	405.2
1963	2298	2422	2644	2372	2323	2446	2249	N.S.	2393	187.8
Pooled	2335	2384	2570	2397	2570	2730	2669	N.S.	2522	530.4

Crop :- Paddy (Kharif).

Ref :- Pb. 62(5).

Site :- Reg. Rice. Res. Stn., Kapurthala.

Type :- 'CV'.

Object :- To study the effect of different dates of transplanting on the yield of different varieties of Paddy.

1. BASAL CONDITIONS:

(i) (a) to (c) NA (ii) Clay loam (iii) As per treatments (iv) (a) 2 ploughings, 2 puddlings (b) Transplanting (c) 18 Kg/ha. (d) 23cm. \times 23cm. (e) 1. (v) N.A. (vi) As per treatments (vii) Irrigated (viii) 2 weedings (ix) N.A. (x) 30.9.62 to 28.10.62

2. TREATMENTS:

Main-plot treatments :-

8 dates of transplanting :- D₁=10.5.62, D₂=25.5.62, D₃=10.6.62, D₄=25.6.62, D₅=10.7.62, D₆=25.7.62, D₇=10.8.62 and D₈=25.8.62.

Sub-plot treatments :- 4 varieties: V₁=Jhona-349, V₂=Basmati-370, V₃=Jhona-20 and V₄=Hybrid-27

3. DESIGN:

(i) Split-plot (ii) (a) 8 main-plots/replication, 4 sub-plots/main-plot. (b) N.A. (iii) 4 (iv) (a) and (b) N.A. (v) Nil (vi) Yes.

4. GENERAL:

(i) Normal (ii) N.A. (iii) Yield of grain (iv) (a) 1962 to 1969 (Treatments modified every year) (b) No (c) Nil (v) to (vii) N.A.

5. RESULTS:

(i) 1814 kg/ha. (ii) (a) 628.6 Kg/ha. (b) 593.4 Kg/ha. (iii) All the effects are significant (iv) Av. yield of grain in Kg/ha.

	D ₁	D ₂	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	Mean
V ₁	1483	1364	949	2372	2906	2254	1127	652	1638
V ₂	2431	2609	2076	3143	2372	830	593	297	1794
V ₃	1899	2906	4092	2965	2965	1779	1127	534	2284
V ₄	652	534	2016	3558	2728	1305	949	593	1542
Mean	1616	1853	2283	3010	2743	1542	949	519	1814

C.D. for D marginal means=462.2 Kg/ha.

C.D. for V marginal means=281.2 Kg/ha.

C.D. for D means at the same level of N=829.2 Kg/ha.

C.D. for V means at the same level of D=793.1 Kg/ha.

Crop :- Paddy(Kharif)

Ref. :- Pb. 63(3).

Site :- Reg. Rice. Res. Stn., Kapurthala

Type :- 'CV'.

Object :- To study the effect of different dates of transplanting on the yield of different varieties of Paddy.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) (a) Clay loam. (b) N.A. (iii) As per treatments. (iv) (a) 2 ploughings and 2 puddlings. (b) Transplanting. (c) 18 Kg/ha. (d) 23 cm. x 23 cm. (e) 1 (v) N.A. (vi) As per treatments (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 30.9.63 to 28.10.63.

2. TREATMENTS:

Main-plot treatments :-

7 dates of transplanting :- D₁=10.5.63, D₂=25.5.63, D₃=10.6.63, D₄=25.6.63, D₅=10.7.63, D₆=25.7.63, and D₇=10.8.63.

Sub-plot treatments :-

4 varieties :- V₁=Jhona-20 V₂=Basmati-370, V₃=Hybrid-27, and V₄=Jhora-349.

3. DESIGN:

(i) Split-plot. (ii) (a) 7 main-plots/replication, 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) N.A. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962 to 64 (Treatments modified for each year). (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 852 Kg/ha. (ii) (a) 854.0 Kg/ha. (b) 332.1 Kg/ha. (iii) Main effect of V and interaction V x D are highly significant. (iv) Av. yield of grain in Kg/ha.

	D ₁	D ₂	D ₃	D ₄	D ₅	D ₆	D ₇	Mean
V ₁	617	925	830	1838	1186	830	593	974
V ₂	676	712	652	795	771	795	332	676
V ₃	890	297	557	890	1518	771	356	754
V ₄	1566	439	297	1518	1684	771	747	1003
Mean	937	593	584	1260	1290	792	507	852

C.D. for V marginal means=177.3 Kg/ha.

C.D. for D means at the same level of V=716.8 Kg/ha.

C.D. for V means at the same level of D=469.4 Kg/ha.

Crop :- Paddy.(Kharif)**Ref :- Pb. 64(2.)****Site :- Reg. Rice. Res. Stn., Kapurthala****Type :- 'CV'.****Object :-**To study the effect of different dates of transplanting on the yield of different varieties of Paddy.**1. BASAL CONDITIONS:**

(i) (a) to (c) N.A. (ii) Clay loam. (iii) As per treatments. (iv) (a) 2 ploughings and 2 puddlings. (b) Transplanting. (c) 18 Kg/ha. (d) 23 cm. x 23 cm. (e) 1. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 30th Sept. to last week of Oct.

2. TREATMENTS:**Main-plot treatments :-**6 transplanting dates :- $D_1=25.5.64$, $D_2=10.6.64$, $D_3=25.6.64$, $D_4=10.7.64$, $D_5=25.7.64$ and $D_6=10.8.64$.**Sub-plot treatments :-**4 varieties: $V_1=Jhona-349$, $V_2=JKW-277$, $V_3=Jhona-20$ and $V_4=Basmati-370$.**3. DESIGN :**

(i) Split-plot. (ii) (a) 6 main-plots/replication, 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) N.A. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-64 (Treatments are modified every year). (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 1616 Kg/ha. (ii) (a) 474.4 Kg/ha. (b) 400.3 Kg/ha. (iii) All the effects are highly significant. (iv) Av. yield of grain in Kg/ha.

	D_1	D_2	D_3	D_4	D_5	D_6	Mean
V_1	1631	2194	2076	2520	1631	1483	1923
V_2	1186	1668	1668	1631	1260	778	1365
V_3	2298	1631	2298	1631	1371	1038	1711
V_4	1223	1186	1779	2372	1334	890	1464
Mean	1585	1670	1955	2039	1399	1047	1616

C.D. for D marginal means=357.4 Kg/ha.

C.D. for V marginal means=233.0 Kg/ha.

C.D. for D means at the same level of V=607.1 Kg/ha.

C.D. for V means at the same level of D=567.2 Kg/ha.

Crop :- Paddy (Kharif).**Ref :- Pb. 64(6).****Site :- Reg. Rice. Res. Stn., Kapurthala****Type :- 'CV'.****Object :-**To study the effect of different dates of transplanting, varieties & spacings on the yield of Paddy.**1. BASAL CONDITIONS:**

(i) (a) to (c) N.A. (ii) Clay loam. (iii) As per treatments. (iv) (a) N.A. (b) Transplanting. (c) N.A. (d) As per treatments. (e) N.A. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) and (ix) N.A. (x) 4.10.64 for 5.11.64.

2. TREATMENTS:**Main-plot treatments :—**3 dates of transplanting :— $D_1=20.6.64$, $D_2=5.7.64$ and $D_3=20.7.64$.**Sub-plot treatments :—**

All combinations of (1) and (2)

3 varieties :— $V_1=Jhona-349$, $V_2=Jhona-20$, and $V_3=Basmati-370$.3 spacings :— $S_1=15\text{ cm.} \times 15\text{ cm.}$, $S_2=23\text{ cm.} \times 15\text{ cm.}$, and $S_3=23\text{ cm.} \times 23\text{ cm.}$ **3. DESIGN:**

(i) Split-plot. (ii) (a) 3 main-plots/replication; 9 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) N.A. (v) Nil. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1963—only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 2624 Kg/ha. (ii) (a) 1178.7 Kg/ha. (b) 563.5 Kg/ha. (iii) Main effect of S alone is significant. (iv) Av. yield of grain in Kg/ha.

	S_1	S_2	S_3	D_1	D_2	D_3	Mean
V_1	2706	2743	2468	2891	2728	2291	2639
V_2	2891	2854	2550	3076	2810	2394	2765
V_3	2691	2468	2246	3025	2224	2165	2468
Mean	2762	2688	2421	3002	2590	2286	2624
D_1	2995	3254	2758				
D_2	2646	2617	2506				
D_3	2639	2202	2016				

C.D. for S marginal means=2656 Kg/ha.

Crop :- Paddy (Kharif).**Site:- Agri. Res. Stn., Gurdaspur.****Ref :- Pb. 62(190).****Type :- 'CM'.****Object:—**To study the effect of deep cultivation and fertilizer placement on the yield of Paddy.**1. BASAL CONDITIONS :**

(i) (a) N.A. (b) Maize (fodder). (c) N.A. (ii) Heavy loam. (iii) 29.7.62. (iv) (a) 5 ploughings (b) to (e) N.A. (v) N.A. (vi) Jhona-349. (vii) Irrigated. (viii) 4 weedings. (ix) N.A. (x) 29.10.62.

2. TREATMENTS:**Main-plot treatments :—**3 deep cultivations :— $D_1=15\text{ cm. deep}$, $D_2=30\text{ cm. deep}$ and $D_3=46\text{ cm. deep}$.**Sub-plot treatments :—**5 fertilizer placements :— $P_0=$ Control (no fertilizer), $P_1=$ Surface application of 56 Kg/ha. of N as C/A/N+28 kg/ha. of P_2O_5 as Super, $P_2=$ Surface application of F.Y.M.+28 Kg/ha. of K_2O as Mur. pot., $P_3=$ Deep application of 56 Kg/ha. of N as C/A/N+28 Kg/ha. of P_2O_5 as Super, $P_4=$ Deep application of F.Y.M.+28 Kg/ha. of K_2O as Mur. pot.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication, 5 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1.37 m. x 3.05 m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) No. (b) and (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 1378 Kg/ha., (ii) (a) 235.6 Kg/ha., (b) 189.4 Kg/ha., (iii) Main effect of P. alone is highly significant, (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	P ₂	P ₃	P ₄	Mean
D ₁	1316	1435	1477	1615	1477	1464
D ₂	1106	1417	1417	1477	1208	1325
D ₃	1190	1656	1208	1310	1357	1344
Mean	1204	1503	1367	1467	1347	1378

C.D. for P marginal means=156.9 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- Pb. 62(191)

Site :- Agri. Res. Stn., Gurdaspur.

Type :- 'CM'.

Object :- To find out the manurial requirements of Paddy.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Heavy loam. (iii) 10.7.62. (iv) (a) 5 ploughings. (b) to (c) N.A. (v) 56 Kg/ha. of N+28 Kg/ha. of P₂O₅. (vi) Jhona-349. (vii) Irrigated. (viii) and (ix) N.A. (x) 23.10.62.

2. TREATMENTS :

Main-plot treatments :-

All combinations of (1) and (2)

(1) 2 cultural treatments :- T₀=Untreated seed and T₁=Seed treated with Agrosan G. N.

(2) 2 types of seeds :- H₁=Healthy and H₂=Diseased.

Sub-plot treatments :-

4 levels of fertilizer : S₁=Control, S₂=56 Kg/ha. of K₂O as Mur. pot. at transplanting, S₃=KMnO₄ 5% spray, and S₄=56 Kg/ha. of K₂O as Mur. pot. at disease appearance.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication, 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/198 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 2489 Kg/ha. (ii) (a) 444.2 Kg/ha. (b) 193.7 Kg/ha. (iii) Main effect of H alone is significant. (iv) Av. yield of grain in Kg/ha.

	S ₁	S ₂	S ₃	S ₄	K ₀	K ₁	Mean
H ₁	2586	2546	2700	2666	2653	2614	2624
H ₂	2419	2331	2352	2310	2136	2571	2353
Mean	2502	2439	2526	2488	2386	2592	2489
K ₀	2433	2312	2383	2414			
K ₁	2572	2566	2669	2563			

C.D. for N marginal means = 251.2 Kg/ha.

Crop :- Paddy (Kharif).

Ref :- Pb. 64(7).

Site :- Reg. Rice. Res. Stn., Kapurthala.

Type :- 'CM'.

Object ;—To study the effect of different levels of N and different spacings on the yield of Paddy.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) Last week of July, 64. (iv) (a) 2 ploughings and 2 puddlings. (b) Transplanting. (c) 18 Kg/ha. (d) As per treatments. (e) 1. (v) N.A. (vi) Hybrid-27. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 23.1v.64.

2. TREATMENTS :

Main-plot treatments :—

4 levels of N as A/S :— N₀=0, N₁=44.8, N₂=67.2 and N₃=89.6 Kg/ha.

Sub-plot treatments :—

3 spacings :— S₁=15 cm. × 15 cm., S₂=23 cm. × 15 cm. and S₃=23 cm. × 23 cm.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication. 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) and (b) 1/494 ha. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal (ii) N.A. (iii) Yield of grain. (iv) (a) 1964-only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) N.A.

5. RESULTS :

(i) 2020 Kg/ha. (ii) (a) 691.9 Kg/ha. (b) 365.7 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	S ₁	S ₂	S ₃	Mean
N ₀	1557	1492	1344	1464
N ₁	2239	2135	2026	2133
N ₂	2334	2165	2224	2241
N ₃	2184	2234	2313	2244
Mean	2079	2006	1977	2020

Crop :- Wheat. (Rabi)**Ref :- Pb. 60(129).****Site :- Bassi. Jana. (Hoshiarpur)****Type :- 'M'.**

Object :-To study the effect of N, P and K applied individually and in combination on the yield of Wheat crop.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) Fallow. (c) Nil. (ii) Sandy. (iii) N.A. (iv) C-561. (v) (a) N.A. (b) Kera. (c) to (e) N.A. (vi) 19.11.60. (vii) Irrigated. (viii) N.A. (ix) N.A. (x) 20.4.61.

2. TREATMENTS :

All combinations of (1), (2) and (3).

(1) 2 levels of N as C/A/N :- $N_0=0$ and $N_1=44.8$ Kg/ha.

(2) 2 levels of P_2O_5 as Super :- $P_0=0$ and $P_1=22.4$ Kg/ha.

(3) 2 levels of K_2O as Mur. Pot. :- $K_0=0$ and $K_1=22.4$ Kg/ha.

All fertilizers drilled below the seed.

3. DESIGN:

(i) Fact. in R. B. D.; 8; 4. (ii) - (iii) (a) N.A. (b) 1/198 ha. (iv) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-only. (b) No. (c) Nil. (v) Bage Khurd and Phullanwal. (vi) and (vii) Nil.

5. RESULTS:

(i) 2291 Kg/ha. (ii) 581.8 Kg/ha. (iii) Main effects of N and P are highly significant (iv) Av. yield of grain in Kg/ha.

	P_0	P_1	K_0	K_1	Mean
N_0	1156	1758	1179	1735	1457
N_1	2446	3802	3069	3179	3124
Mean	1801	2780	2124	2458	2291
K_0	1646	2602			
K_1	1956	2958			

C.D. for N or P marginal means = 427.7 Kg/ha.

Crop :- Wheat. (Rabi)**Ref :- Pb. 60(96).****Site :- Govt. Agri. Res. Stn., Gurdaspur****Type :- 'M'.**

Object :-To study the residual effect of N and P_2O_5 on the yield of Wheat crop.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) Maize. (c) As per treatments. (ii) Sandy loam. (iii) 29.11.60. (iv) and (v) N.A. (vi) C-273. (vii) Irrigated. (viii) and (ix) N.A. (x) 2.5.61.

2. TREATMENTS :

All combinations of (1) and (2) :-

(1) 3 levels of N as C/A/N :— $N_0=0$, $N_1=67.2$ and $N_2=134.4$ Kg/ha.

(2) 3 levels of P_2O_5 as Super :— $P_0=0$, $P_1=33.6$, $P_2=67.2$ Kg/ha.

Only residual effects are studied, No fertilizer is given to Wheat.

3. DESIGN:

(i) Fact. in R. B. D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) 1/198 ha. (b) 1/207 ha. (v) N.A. (vi) Yes.

4. GENERAL

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 1996 Kg/ha. (ii) 211.0 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	N_0	N_1	N_2	Mean
P_0	1755	1964	2189	1969
P_1	1648	1980	2655	2094
P_2	1632	1920	2227	1927
Mean	1678	1955	3257	1996

C.D. for N marginal means=178.1 Kg/ha.

Crop :- Wheat (Rabi)

Ref :- Pb. 60(24), 61(93).

Site :- Govt. Agri. Stn., Gurdaspur

Type :- 'M'.

Object: --To study the effect of different sources of N on the yield of Wheat Crop.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) Paddy--Jowar (fodder). (c) N.A. (ii) Sandy loam. (iii) 15.11.60; 28.11.61. (iv) (a) and (b) N.A. (c) N.A.; 85 Kg/ha. (d) and (e) N.A. (v) N.A. (vi) C-273; C-286. (vii) Irrigated. (viii) and (ix) N.A. (x) 27.4.61; 27.4.62.

2. TREATMENTS:

10 sources of N at 45 Kg/ha. : S_0 =Control (no manure), S_1 =A/S, S_2 =A/S/N, S_3 =A/C, S_4 =A/N, S_5 =Urea, S_6 =D/N, S_7 =C/A/N, S_8 =Ammo.Phos. and S_9 =Liquid Ammonia.

3. DESIGN:

(i) R. B. D. (ii) (a) 10. (b) N.A. (iii) 4 (iv) (a) N.A. (b) 1/178 ha ; 1/148 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960--61. (b) N.A. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Nil. (vii) Error variances are heterogeneous and Treatments x Years interaction is present.

5. RESULTS:

Pooled results :-

(i) 1285 kg/ha. (ii) 265.3 Kg/ha. (based on 9 d.f. made up of Treatments x years Interaction). (iii) Treatment difference ceases highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	S ₀	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉
Av. yield	624	1368	1386	1422	1054	1179	1626	1483	1623	1086

C. D. = 299.9 Kg/ha.

Individual results

Treatment Year	S ₀	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉	Sig.	G.M.	S.E./Plot
1960	928	1846	1742	1111	1555	1514	2025	1866	2245	1535	**	1712	88.6
1961	319	390	1030	1034	552	845	1227	1101	1001	638	**	864	196.5
Pooled	624	1368	1386	1422	1054	1179	1626	1483	1623	1086	**	1285	265.3

Crop :- Wheat (*Rabi*).

Ref:-Pb. 60(122), 61(94), 63(211), 64(206).

Site :- Agri. Res. Stn., Gurdaspur

Type :- 'M'.

Object :- To study the effect of N, P and K on the yield of Wheat crop.

1. BASAL CONDITIONS :

(i) (a) N.A. for 60; Wheat -Fallow—Wheat for others. (b) Nil. (ii) Sandy loam. (iii) 10.11.60; 10.11.61; 17.11.63; 21.11.64. (iv) (a) and (b) N.A. (c) 85 Kg/ha. (d) and (e) N.A. (v) N.A. (vi) C-285; C-286; C-273; C-273. (vii) Unirrigated. (viii) and (ix) N.A. (x) 24.4.62, 1. 5.62; 25.4.64; 21.4.65.

2. TREATMENTS

7 manurial treatments:-M₀=Control (no fertilizer), M₁=33.6 Kg/ha. of N+33.6 Kg/ha. of P₂O₅, M₂=44.8 Kg/ha. of N+33.6 Kg/ha. of P₂O₅, M₃=67.2 Kg/ha. of N+33.6 Kg/ha. of P₂O₅, M₄=M₁+22.4 Kg/ha. of K₂O, M₅=M₂+22.4 Kg/ha. of K₂O and M₆=M₃+22.4 Kg/ha. of K₂O as Mur. pot. N applied as C/A/N, P₂O₅ as Super and K₂O as Mur. pot.

3. DESIGN :

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 3 for 63; 4 for others. (iv) (a) 1/198 ha. for 61; N.A. for others (b) 1/207 ha. for 60, 1/198 ha. for 61, 64; N.A. for 63 (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-64 (1962 N.A.) (b) No. (c) Results of combined analysis are presented under 5. Results, (v) and (vi) Nil. (vii) Error variances are heterogeneous and Treatments × Years interaction is present.

5. RESULTS :

Pooled results

(i) 1321 Kg/ha. (ii) 366.3 Kg/ha. (based on 18 d. f. made up of Treatments × Years interaction). (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆
Av. yield	767	1336	1394	1541	1321	1388	1502

Individual results

C.D. = 281.0 Kg/ha.

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆	Sig.	G.M.	S.E./plot
Years 1960	843	1584	1679	1724	1533	1648	1822	**	1548	131.7
1961	687	870	840	756	741	771	677	N.S.	7632	302.5
1963	637	1211	1318	1451	1252	1314	1438	**	1232	262.6
1964	870	1646	1720	2210	1740	1799	2056	**	1720	205.6
Pooled	767	1336	1394	1541	1321	1388	1502	**	1321	366.3

Crop :- Wheat (Rabi).

Ref :- Pb. 61(85).

Site :- Govt. Agri. Stn., Gurdaspur.

Type :- 'M'.

Object :-To study the effect of different times of application of C/A/N on the yield of Wheat crop.

1. BASAL CONDITIONS

(i) (a) to (c) N.A. (ii) Sandy Loam. (iii) 28.11.61. (iv) (a) N.A. (b) Kera. (c) 92Kg/ha. (d) and (e) N.A. (v) N.A. (vi) C-281. (vii) Irrigated. (viii) and (ix) N.A. (x) 25.4.62.

2. TREATMENTS :

4 times and methods of application of C/A/N:— T_1 —At sowing by drilling, T_2 —At sowing by broadcast-
ing, T_3 —One month after sowing and T_4 — $\frac{1}{2}$ one month after sowing + $\frac{1}{2}$ at sowing by drilling.

3. DESIGN:

(i) R B.D. (ii) (a) 4. (b) N A. (iii) 6. (iv) (a) N.A. (b) 1/99ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961-only. (b) No. (c) Nil. (v) N A. (vi) and (vii) Nil.

5. RESULTS :

(i) 2727Kg/ha. (ii) 457.1Kg/ha. (iii) Treatment differences are significant. (iv) Av. yield of grain in.
Kg/ha.

Treatment	T_1	T_2	T_3	T_4
Av. yield	3209	2551	2379	2752

C.D.—562.7Kg/ha.

Crop :- Wheat (Rabi).

Ref :- Pb. 60(110).

Site :- Agri. Res. Stn., Gurdaspur

Type :- 'M'.

Object :-To study the effect of N, P and K. applied individually and in combination on the yield of
Wheat.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Fallow. (c) N.A. (if) Loamy (iii) 9.12.60. (iv) (a) to (e) N.A. (v) N.A. (vi) C-286
(vii) Irrigated. (viii) and (ix) N.A. (x) 25.4.61.

2. TREATMENTS:

All combinations of (1), (2) and (3).

(1) 3 levels of N as C/A/N :—No control (no manure). $N_1=44.8$ and $N_2=89.6$ Kg/ha.

(2) 3 levels of P_2O_5 as Super :— P_0 =Control (no manure), $P_1=44.8$ and $P_2=89.6$ Kg/ha.

(3) 2 levels of K_2O as Mur. pot. : $K_1=22.4$ and $K_2=44.8$ Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 18. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/299ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 2601Kg/ha. (ii) 301.7Kg/ha. (iii) Main effects of N and P are highly significant and that of K is significant while interaction P×K is significant. (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	P ₂	K ₁	K ₂	Mean
N ₀	1886	2167	2557	2158	2249	2203
N ₁	2553	2795	2777	2572	2845	2708
N ₂	2762	2932	2984	2840	2946	2893
Mean	2400	2631	2773	2523	2680	2601
K ₁	2294	2679	2596			
K ₂	2506	2583	2950			

C.D. for N or P marginal means=175.9Kg/ha.

C.D. for K marginal means=142.1Kg/ha.

C.D. for the body of P×K table=246.8Kg/ha.

Crop :- Wheat (Rabi).

Ref :- Pb. 61(61).

Site :- Reg. Wheat Res. Sub-Stn., Gurdaspur.

Type :- 'M'.

Object :- To study the effect of N, P and K, applied individually and in combination on the yield of Wheat.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 2.12.61. (iv) (a) 6-8 ploughings, 6-8 plankings. (b) Behind the plough. (c) to (e) N.A. (v) N.A. (vi) C-273. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 30.4.62.

2. TREATMENTS:

All combinations of (1), (2) and (3)

(1) 3 levels of N, as C/A/N :- N₀=0, N₁=28 and N₂=56Kg/ha,

(2) 3 levels of P₂O₅ as Super :- P₀=0, P₁=28 and P₂=56Kg/ha,

(3) 3 levels of K₂O as Mur. Pot. :- K₀=0, K₁=28 and K₂=56Kg/ha.

All fertilizers applied before sowing.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 27. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/494ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961-64 (Design modified in 62) (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS

(i) 887 Kg/ha. (ii) 361.9Kg/ha. (iii) Main effects of N and P, are significant. (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
N ₀	547	583	546	509	583	586	559
N ₁	872	914	1112	827	988	1038	966
N ₂	872	1236	1302	1070	1137	1203	1137
Mean	764	911	987	817	903	942	887
K ₀	736	843	872				
K ₁	719	932	1058				
K ₂	838	959	1030				

C.D. for N or P marginal means = 170.0 Kg/ha.

Crop :- Wheat (Rabi).
Site :- Govt. Agri. Stn.; Gurdaspur.

Ref :- Pb. 62(146).
Type :- 'M'.

Object:—To study the effect of fertilizers on the yield of Wheat.

1. BASAL CONDITIONS

(i) (a) N.A. (b) Fallow. (c) N.A. (ii) Sandy loam. (iii) 6.12.62. (iv) (a) 5 ploughings and 3 subgas. (b) to (e) N.A. (v) 33.6Kg/ha. of P₂O₅. (vi) C-286. (vii) Unirrigated. (viii) 2 ploughings and 2 weedings. (ix) N.A. (x) 20.4.63.

2. TREATMENTS :

All Combinations of (1) and (2)+one control (no manure).

(1) 3 levels of N as C/A/N : N₁=33.6, N₂=44.8 and N₃=67.2 Kg/ha.

(2) 2 levels of K₂O as Mur. Pot :—K₀=0, and K₁=22.4Kg/ha.

Fertilizers were applied before sowing.

3 DESIGN :

(i) Fact. in R.B.D. (ii) (a) 7. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/198ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain & straw. (iv) (a) 1962-only (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 1089Kg/ha. (ii) 83.0Kg/ha. (iii) Main effect of N and extra Vs. others are highly significant. (iv) Av. yield of grain in Kg/ha.

Control = 455Kg/ha.

	N ₁	N ₂	N ₃	Mean
K ₀	1003	1161	1386	1183
K ₁	1147	1144	1324	1205
Mean	1075	1152	1355	1194

C.D. for N marginal means = 80.1Kg/ha.

C.D. for extra vs. others = 322.6Kg/ha.

Crop :- Wheat. (Rabi.)**Ref :- Pb. 62(148).****Site :- Govt. Agri. Stn., Gurdaspur.****Type :- 'M'.****Object:—**To study the effect of sprayings of micronutrients on the yield of Wheat.**1. BASAL CONDITIONS :**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 6.12.62. (iv) (a) 5 ploughings. (b) to (e) N.A.
 (v) 67.2 Kg/ha. of N+33.6 Kg/ha. of P_2O_5 +33.6 Kg/ha. of K_2O at the time of sowing. (vi) C-286
 (vii) Irrigated. (viii) 2 ploughings and 2 weedings. (ix) N.A. (x) 20.4.63.

2. TREATMENTS :

8 micronutrients:

(i) T_0 =Control, T_1 =2.24Kg/ha. of Borax in 454.6 litre, of water, T_2 =4.48Kg/ha. Copper Sul. + 2.24Kg/ha. hydrated lime in 454.6 litre of water, T_3 =4.48 Kg/ha. of Ferrous Sul. 2.24Kg/ha. of hydrated lime in 454.6 litre of water, T_4 =6.72 Kg/ha. $MnSO_4$ +4.48 Kg/ha. hydrated lime in 454.6 litre of water, T_5 =6.72 Kg/ha. of $ZnSO_4$ +4.48 Kg/ha. of hydrated lime in 454.6 litre of water, T_6 =11.2 Kg/ha. of magnesium in 454.6 litre of water and T_7 =1.12 Kg/ha. of Amm. molybdate in 456.6 litre of water.

3. DESIGN :

(i) R. B. D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/99 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Good. (ii) As per treatments. (iii) Yield of grain and straw. (iv) (a) 1962-only. (b) No.
 (c) Nil. (v) to (viii) N.A.

5. RESULTS :

(i) 1471 Kg/ha. (ii) 159.4 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7
Av. yield	1604	1467	1467	1465	1453	1444	1382	1484

Crop :- Wheat (Rabi.)**Ref :- Pb. 62(192).****Site : Agri. Res. Stn., Gurdaspur.****Type :- 'M'.****Object:—**To study the comparative manuring value of different cakes, F. Y. M. and doses of C/A/N.**1. BASAL CONDITIONS :**

(i) (a) N.A. (b) Fallow. (c) N.A. (ii) Sandy loam. (iii) 5.12.62. (iv) (a) 5 ploughings. (b) to (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) 3 weedings. (ix) N.A. (x) 23.4.63.

2. TREATMENTS :

9 types of fertilizers:— T_0 =Control (No manure), T_1 =Neem cake, T_2 =G. N. C., T_3 =Cotton seeds, T_4 =F.Y.M. T_5 =22.4 kg/ha. of N as C/A/N, T_6 =Bone fluff, T_7 =44.8 kg/ha. of as C/A/N, and T_8 =Blood meal.

3. DESIGN :

(i) R. B. D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/148 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain and straw. (iv) (a) 1962-only. (b) No. (c) Nil.
 (v) to (vii) Nil.

5. RESULTS :

(i) 818 Kg/ha. (ii) 108.5 Kg/ha. (iii) Treatment differences are significant, (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈
Av. yield	660	893	854	806	669	882	865	927	802

C.D. = 158.5 Kg/ha.

Crop :- Wheat (Rabi).

Ref :- Pb. 62(89),

Site :- Reg. Wheat Res. Stn., Gurdaspur.

Type :- 'M'.

Object :- To study the effect of placement of N as C/A/N on the yield of Wheat.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 31 10.62. (iv) (a) 6-8 ploughings, 6-8 plankings and (b) Behind the plough. (c) to (e) N.A. (v) N.A. (vi) C-286. (vii) Unirrigated. (viii) 2 weedings. (ix) & (x) N.A.

2. TREATMENTS :

Main-plot treatments :-

4 levels of N as C/A/N :- N₀=0, N₁=22.4, N₂=44.8 and N₃=66.2 Kg/ha.

Sub-plot treatments :-

3 methods of placement of C/A/N :- M₁=Kera, M₂=Para and M₃=Broadcasting.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication., 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/198 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-64 (Treatments are modified in 63) (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 1597 Kg/ha. (ii) (a) 250.5 Kg/ha., (b) 139.5 g/ha. (iii) Only interaction M×N is highly significant. (iv) Av. yield of grain in Kg/ha.

	M ₁	M ₂	M ₃	Mean
N ₀	1404	1413	1315	1377
N ₁	1626	1631	1809	1689
N ₂	1690	1646	1749	1695
N ₃	1557	1685	1636	1626
Mean	1569	1594	1627	1597

C.D. for N means at the same level of M=284.6 Kg/ha.

C.D. for M means at the same level of N=203.6 Kg/ha.

Crop :- Wheat. (Rabi)

Ref :- Pb. 63(111), 64(100).

Site :- Reg. Wheat Res. Stn., Gurdaspur

Type :- 'M'.

Object :- To study the effect of different placement methods of fertilizer under rain fed conditions for Wheat.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 1st week of Nov. (iv) (a) 6 to 8 ploughings, 6 to 8 plankings. (b) Behind the plough. (c) to (e) N.A. (v) N.A. (vi) C-286. (vii) Un-irrigated. (viii) 2 weedings. (ix) and (x) N.A.

2. TREATMENTS:

Main-plot treatments :-

4 manurial treatments :- $M_1 = 44.8$ Kg/ha. of N as C/A/N, $M_2 = M_1 + 44.8$ Kg/ha. of P as Super, $M_3 = M_1 + 44.8$ Kg/ha. of K as Mur. pot, and $M_4 = M_2 + 44.8$ Kg/ha. of K as mur. pot.

Sub-plot treatments :-

3 methods of application :- $A_1 = \text{Kera}$, $A_2 = \text{Pora}$ and $A_3 = \text{Broadcasting}$.

3. DESIGN:

(i) Split-plot. (ii) (a) 4 main-plots/replication, 3 sub-plots/main-plot. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/247 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962 — 64 (Treatments modified in 63). (b) No, (c) Nil. (v) and (vi) Nil. (vii) Both the error variances are heterogenous, therefore individual years results are given under 5. Results.

5. RESULTS:

63 (111)

(i) 1208 Kg/ha. (ii) (a) 156.5 Kg/ha. (b) 135.4 Kg/ha. (iii) Main effect of M is significant. (iv) Av. yield of grain in Kg/ha.

	A ₁	A ₂	A ₃	Mean
M ₁	1112	1013	988	1038
M ₂	1408	1310	1334	1351
M ₃	1137	1038	1063	1079
M ₄	1408	1408	1285	1367
Mean	1266	1192	1168	1208

C.D. for M marginal means = 111.2 Kg/ha.

64 (100)

(i) 2742 Kg/ha. (ii) (a) 532.2 Kg/ha. (b) 323.2 Kg/ha. (iii) None of the effect is significant. (iv) Av. yield of grain in Kg/ha.

	A ₁	A ₂	A ₃	Mean
M ₁	2711	2597	2614	2641
M ₂	2661	2829	2760	2750
M ₃	2686	2933	2839	2819
M ₄	2792	2795	2688	2758
Mean	2713	2788	2725	2742

Crop :- Wheat (*Rabi*)

Ref :- Pb. 62(91), 63(107), 64(99).

Site :- Reg. Wheat Res. Stn., Gurdaspur

Type :- 'M'.

Object :—To study the effect of N and P on the yield of Wheat,

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) Last week of October. (iv) (a) 6 — 8 ploughings and 6 8 plankings. (b) Behind the plough. (c) to (e) N.A. (v) N.A. (vi) C-286 for 62 and 64, C-303 for 63. (vii) Un-irrigated. (viii) 2 weedings. (ix) and (x) N.A.

2. TREATMENTS :

Main-plot treatments :—

3 levels of N :— $N_0=0$, $N_1=33.6$ and $N_2=67.2$ Kg/ha.

Sub-plot treatments :—

3 levels of P_2O_5 :— $P_0=0$, $P_1=33.6$ and $P_2=67.2$ Kg/ha.

3 DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication, 3 sub-plots/main-plot. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/198ha. for 62. ; 1/247ha. for others. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962 — 64. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) and (vi) N.A. (vii) Both the error variances are homogeneous and Treatments \times Years interaction is absent.

5. RESULTS:

Pooled results

(i) 1574 Kg/ha. (ii) (a) 214.0 Kg/ha. (based on 30 d.f. made up of pooled error and Treatments \times Years Interaction) (b) 144.5 Kg/ha. (based on 90 d.f. made up of pooled error and Treatments \times Years Interaction). (iii) Main effect of P alone is significant. (iv) Av. yield of grain in Kg/ha.

	P_0	P_1	P_2	Mean
N_0	1092	1217	1278	1196
N_1	1478	1658	1847	1661
N_2	1620	1973	2002	1865
Mean	1397	1616	1704	1574

C.D. for P marginal means = 55.3 Kg/ha.

Individual results :

Treatment	N_0	N_1	N_2	Sig.	P_0	P_1	P_2	Sig.	G.M.	S.E./plot	
										Main-plot	Sub-plot
Year 1962	1127	1414	1584	**	1048	1473	1604	*	1375	256.2	153.7
1963	692	1244	1442	**	1063	1170	1145	N.S.	1126	126.4	148.3
1964	1768	2325	2569	**	2080	2206	2377	*	2221	236.2	130.7
Pooled	1196	1661	1865	N.S.	1397	1616	1704	*	1574	214.0	144.5

Crop :- Wheat (Rabi).

Ref :- Pb. 62(92), 63(104) 64(105).

Site :- Reg. Wheat Res. Stn., Gurdaspur.

Type :- 'M'

Object :—To study the effect of N, P and K applied individually and in combination on the yield of Wheat.

1. BASAL CONDITIONS

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 21.11 62; N.A. for 63 and 64. (iv) (a) 6—8 ploughings and 6—8 ploughings. (b) Behind the plough. (c) to (e) N.A. (v) N.A. (vi) C-273-for 62 and 63; N.A. (vii) Irrigated. (viii) 2 weedings. (ix) and (x) N.A.

2. TREATMENTS :

Main-plot treatments :

3 levels of N : $N_0=0$, $N_1=28$ and $N_2=56$ Kg/ha.

Sub-plot treatments:—

All combinations of (1) and (2)

(i) 3 levels of $P_2O_5=P_0=0$, $P_1=28$ and $P_2=56$ Kg/ha.

(2) 3 levels of $K_2O=K_0=0$, $K_1=28$ and $K_2=56$ Kg/ha.

Fertilizers were applied before sowing.

3. DESIGN :

(i) Split-plot. (ii) 3 main-plots/replication, 9 sub-plots/main-plot. (b) N.A. (iii) 4. (vi) (a) N.A. (b) N.A. 1/370 ha.; 1/494 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil.; N.A. for 62 & 64. (iii) Yield of grain. (iv) (a) 1961 — 64 (Design modified in 62) (b) No. (c) Nil. (v) N.A. (vi) Nil. (vii) As both the error variances are heterogeneous, the results of individual years are given under 5. Results.

5. RESULTS :

62(92)
(i) 2024Kg/ha. (ii) (a) 535.5Kg/ha. (b) 173.3Kg/ha. (iii) Main effects of N and P are significant. (iv) Av. yield of grain in Kg/ha.

	P_0	P_1	P_2	K_0	K_1	K_2	Mean
N_0	1543	1748	1866	1717	1715	1725	1719
N_1	2079	2114	2145	2129	2167	2043	2113
N_2	2024	2377	2325	2247	2331	2148	2242
Mean	1882	2080	2112	2031	2071	1972	2024
K_0	1876	2060	2157				
K_1	1919	2110	2184				
K_2	1851	2070	1995				

C.D. for N marginal means=308.8Kg/ha.

C.D. for P marginal means=81.4Kg/ha.

63 (104)

(i) 2266Kg/ha. (ii) (a) 198.8Kg/ha. (b) 303.3Kg/ha. (iii) Main effects of N and P are significant. (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
N ₀	1915	2076	2237	1915	2150	1263	2076
N ₁	2026	2495	2294	2199	2384	2236	2273
N ₂	2125	2545	2674	2348	2537	2456	2448
Mean	2202	2372	2403	2154	2358	2286	2266
K ₀	1940	2261	2261				
K ₁	2038	2520	2513				
K ₂	2088	2335	2435				

C.D. for N marginal means=114.8Kg/ha.

C.D for P marginal means=142.7Kgha.

64 (105)

(i) 2551Kg/ha. (ii) (a) 248.5 Kg/ha. (b) 813.0Kg/ha. (iii) Main effect of N alone is significant. (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
N ₀	1945	2234	2193	2135	2056	2181	2124
N ₁	2330	2580	2734	2473	2577	2594	2548
N ₂	2700	3172	3074	3006	3029	2911	2982
Mean	2325	2662	2667	2538	2554	2562	2551
K ₀	2435	2553	2646				
K ₁	2231	2735	2696				
K ₂	2309	2718	2659				

C.D. for N marginal means=143.1Kg/ha.

Crop :- Wheat. (Rabi)

Ref :- Pb. 63(105), 64(97).

Site :- Reg. Wheat. Res. Stn., Gurdaspur.

Type : 'M'.

Object: —To study the effect of different times of application of N on the yield of Wheat crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) Last week of Nov. (iv) (a) 6 to 8 ploughings. (b) Behind the plough. (c) to (e) N.A. (v) N.A. (vi) C-273. (vii) Irrigated (viii) 2 weedings. (ix) & (x) N.A

2. TREATMENTS :

6 times of application of 67.2 kg/ha. of N :—T₁=1/2 at sowing+1/2 at flowering, T₂=1/3 at sowing+1/3 at first irrigation, T₃=Full at sowing, T₄=1/2 at first irrigation+1/2 at flowering, T₅=1/2 at first irrigation+1/2 at sowing and T₆=Full at first irrigation.

3. DESIGN :

(i) R, B. D. (ii) (a) 6. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/247 ha. (v) N.A. (vi) Yes.

4 GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1963 64. (b) No. (c) Nil. (v) and (vi) Nil, (vii) As the error variances are heterogeneous and Treatments \times Years interaction is absent, the results of individual years are given under 5. Results.

5. RESULTS :

63 (105)

(i) 2611 Kg/ha. (ii) 178.7 Kg/ha. (iii) Treatment differences are significant. (iv) Av. yield of grain in kg/ha.

Treatment	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	2817	2693	2619	2545	2520	2471

C.D.=212.4 Kg/ha.

64 (97)

(i) 3361 Kg/ha. (ii) 97.7 Kg/ha. (iii) Treatment differences are significant. (iv) Av. yield of grain in Kgs/ha.

Treatment	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	3511	3420	3252	3462	3269	3854

C.D.=116.2 Kg/ha.

Crop :- Wheat (Rabi)**Ref :-Pb. 63(112).****Site :- Reg. Wheat Res. Stn., Gurdaspur.****Type :- 'M'.**

Object :-To study the effect of G.M., when G.M. was planted on different dates, on the yield of Wheat.

1. BASAL CONDITIONS

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 24.11.63. (iv) (a) 6-8 ploughings, 6-8 plankings. (b) Behind the plough. (c) to (e) N.A. (v) N.A. (vi) C-303. (vii) Irrigated. (viii) 2 weedings. (ix) and (x) N.A.

2. TREATMENTS:

Main-plot treatments :

3 dates of sowing of G.M. as Dhaincha—D₁=6th June, D₂=19th June and D₃=3rd July, 63.

Sub-plot treatments :

4 doses of manurial treatments :—M₀=0 (No G.M.), M₁=G.M., M₂=G.M+50.4Kg/ha. of P₂O₅ to G.M. and M₃=G.M+50.4Kg/ha. of P₂O₅ to Wheat.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication, 4 Sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/247ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1963 to 64. (Treatments modified in 64). (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 1972Kg/ha. (ii) (a) 158.8Kg/ha. (b) 303.8Kg/ha. (iii) Main effect of M alone is significant. (iv) Av. yield of grain Kg/ha.

	M ₀	M ₁	M ₂	M ₃	Mean
D ₁	1586	2061	2254	2254	2039
D ₂	1705	1987	2051	2254	2002
D ₃	1764	1883	1883	1876	1972
Mean	1685	1977	2066	2160	1972

C.D. for M marginal means=255.0Kg/ha.

Crop :- Wheat. (Rabi)

Ref :- Pb. 64(104).

Site :- Reg. Wheat Res. Stn., Gurdaspur

Type :- 'M'.

Object :-To study the effect of G.M. and P on the yield of Wheat.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (i) Sandy loam. (iii) N.A. (iv) (a) 6-8 ploughings and 6-8 plankings. (b) Behind the plough. (c) to (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) 2 weedings. (ix) and (x) N.A.

2. TREATMENTS

Main-plot treatments:

4 dates of burrying Dhaincha as G.M. : D₀=0 (Fallow), D₁=30 days, D₂=40 days and D₃=50 days.

Sub-plot treatments:

4 levels of P₂O₅: P₀=0, P₁=22.4, P₂=44.8 and P₃=67.2Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (b) 4 main-plots/replication, 4 sub-plots/main plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/247ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1963-64. (Treatments modified in 64). (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 2297Kg/ha. (ii) (a) 228.6Kg/ha. (b) 142.6Kg/ha. (iii) Main effects of D and P are significant. (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	P ₂	P ₃	Mean
D ₀	1431	1396	1520	1782	1532
D ₁	2291	2419	2464	2604	2444
D ₂	2315	2582	2607	2516	2505
D ₃	2624	2713	2807	2686	2708
Mean	2165	2278	2350	2397	2297

C.D. for D marginal means=182.8Kg/ha.

C.D. for P marginal means=102.3Kg/ha.

Crop :- Wheat, (Rabi)**Ref :- Pb. 65(163).****Site :- Agri. Res. Stn., Gurdaspur.****Type :- 'M'.**

Object :—To study the effect of application of different sources of Nitrogen and different times of its application on the yield of Wheat crop.

1. BASAL CONDITIONS :

(i) (a) Fallow-Wheat. (b) Fallow. (c) Nil. (ii) Sandy loam. (iii) 20th Nov., 65. (iv) (a) 3-4 ploughings. (b) Kera. (c) 85Kg/ha. (d) 20 cm. (e) — (v) 40Kg/ha. of N+25Kg/ha. of P_2O_5 . (vi) C-273. (vii) Irrigated. (viii) One hoeing. (ix) 59.3cm. (x) 2nd week of April, 66.

2. TREATMENTS

Main-plot treatments :

3 sources of N :— S_1 =Urea., S_2 =A/S and S_3 =C/A/N.

Full dose of N=60Kg/ha.

Sub-plot treatments :

6 times of application :— T_1 =Full dose at sowing, T_2 =Full dose at 1st irrigation, T_3 = $\frac{1}{2}$ at sowing+ $\frac{1}{2}$ at 1st irrigation, T_4 = $\frac{1}{2}$ at sowing+ $\frac{1}{2}$ at flowering, T_5 = $\frac{1}{2}$ at 1st irrigation+ $\frac{1}{2}$ at flowering and T_6 = $\frac{1}{2}$ at sowing+ $\frac{1}{2}$ at flowering+ $\frac{1}{2}$ at 1st irrigation.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication., 6 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/250ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Good. (ii) Nil. (iii) Yield of grain. (iv) (a) 1965-only. (b) No. (c) Nil. (v) Ludiana. (vi) and (vii) Nil.

5. RESULTS :

(i) 2025Kg/ha. (ii) (a) N.A. (b) 242.2Kg/ha. (iii) Main effect of T and interaction $S \times T$ are highly significant. (iv) Av. yield of grain in Kg/ha.

	S_1	S_2	S_3	Mean
T_1	2150	2500	2250	2300
T_2	2050	2350	2350	2250
T_3	2100	1900	2100	2033
T_4	1800	1600	2150	1850
T_5	1850	1950	1550	1783
T_6	2100	1700	2000	1933
Mean	2008	2000	2067	2025

C.D. for T marginal means=220.3Kg/ha.

C.D. for T means at the same level of S=345.3Kg/ha.

Crop :- Wheat (Rabi)**Ref 'Pb.' 60(59).****Site :- Govt. Agri. Stn., Gurdaspur.****Type 'M.'**

Object :—To study the effect of various micro-nutrients on the yield of Wheat.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) N.A. (iii) 8/9.11.60. (iv) (a) to (e) N.A. (v) 67.3Kg/ha. of N as C/A/N+33.6Kg/ha. of P_2O_5 as Super+30.3Kg/ha. of K_2O as Mur. pot. (vi) C-273. (vii) Irrigated. (viii) and (ix) N.A. (x) 30.4.61.

2. TREATMENTS:

All Combinations of (1), (2), (3), (4) and (5).

- (1) 2 levels of Borax : - A_0 =Control and A_1 =Borax 0.2%
 (2) 2 levels of $CuSO_4$: - B_0 =Control and B_1 = $CuSO_4$ 0.4%
 (3) 2 levels of $FeSO_4$: - C_0 =Control and C_1 = $FeSO_4$ 0.4%
 (4) 2 levels of $MnSO_4$: - D_0 =Control and D_1 = $MnSO_4$ 0.6%
 (5) 2 levels of $ZnSO_4$: - E_0 =Control and E_1 = $ZnSO_4$ 0.6%

3. DESIGN:

(i) 2⁵ fact. Confd. (ii) (a) 4 blocks/ replication, 8 plots/block. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/296.4ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 1398 Kg/ha. (ii) 303.7 Kg/ha. (iii) Interaction D×E is significant. (iv) Mean and differential responses in Kg/ha.

	Mean Response	Differential Response									
		A		B		C		D		E	
		-	+	-	+	-	+	-	+	-	+
A	-13.89	-	-	0.00	-27.78	-90.76	62.98	-6.48	-21.30	-13.89	-13.9
B	-17.60	31.49	3.71	-	-	20.38	14.82	23.16	12.04	-8.33	43.53
C	10.19	-66.68	87.06	12.97	7.41	-	-	21.30	-0.92	-25.00	45.38
D	77.80	85.21	70.39	83.36	72.24	88.91	66.69	-	-	-50.93	206.53
E	33.34	33.34	33.34	7.41	59.27	-1.85	68.53	-95.39	162.07	-	-

C.D. for differential response=151.1Kg/ha.

Crop :- Wheat(Rabi).

Ref :- Pb. 60(97).

Site :- Govt. Agri. Stn., Jullundur.

Type :- 'M'.

Object :- To study the effect of different sources of N on the yield of Wheat.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 24.11.60. (iv) (a) and (b) N.A. (c) 79.6Kg/ha. (d) and (e) N.A. (v) N.A. (vi) C-273. (vii) Irrigated. (viii) and (ix) N.A. (x) April, 61.

2. TREATMENTS:

8 manurial treatments:

T_0 =Control. T_1 =44.8Kg/ha. of N as Neem Cake., T_2 =44.8Kg/ha. of N as G. Nut.

$T_3=44.8$ Kg/ha. of N as Cotton seed, $T_4=22.4$ Kg/ha. of N as C/A/N, $T_5=44.8$ Kg/ha. of N as F.Y.M.,
 $T_6=44.8$ Kg/ha. of N as Bone meal and $T_7=44.8$ Kg/ha. of N as C/A/N.

3. DESIGN:

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/98.9ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) Nil. (vi) and (vii) N.A.

5. RESULTS:

(i) 1308 Kg/ha. (ii) 239.0 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment:	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7
Av. yield :	969	1537	932	1080	1772	776	988	2409

Crop :- Wheat (Rabi).

Ref :- 60(98).

Site :- Govt. Agri. Stn., Jullundur

Type :- 'M'.

Object :-To study the effect of different levels of N on the yield of Wheat.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) Maize. (c) N.A. (ii) Sandy loam. (iii) 21.11.60. (iv) (a) and (b) N.A. (c) 85Kg/ha. (d) and (e) N.A. (v) Nil. (vi) C-286. (vii) Irrigated. (viii) and (ix) N.A. (x) 21.4.61.

2. TREATMENTS:

6 levels of N as C/A/N :- N_0 =Control (no manure), $N_1=56$, $N_2=112$, $N_3=186$, $N_4=224$ and $N_5=336$ Kg/ha.

3. DESIGN:

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/266.5 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 2910Kg/ha. (ii) 462.0Kg/ha. (iii) Treatment differences are highly significant, (iv) Av. yield of grain in Kg/ha.

Treatment	N_0	N_1	N_2	N_3	N_4	N_5
Av. yield.	2150	2543	3284	3299	3610	2572

C.D.=696.2 Kg/ha.

Crop :- Wheat (Rabi).

Ref :- 60(99), 62(19).

Site :- Govt. Agri. Stn., Jullundur.

Type :- 'M'.

Object :- To study the residual effect of different levels of N applied to Maize on the yield of Wheat.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Maize. (c) As per treatments. (ii) Sandy loam. (iii) 21.11.60; 3.12.62. (iv) (a) and (b) N.A. (c) 85Kg/ha.; N.A. (d) and (e) N.A. (v) Nil. (vi) C-273. (vii) Irrigated. (viii) N.A.; 4 hoeings. (ix) N.A. (x) May, 61; N.A.

2. TREATMENTS :

6 levels of N as C/A/N : - $N_0=0$, $N_1=56$, $N_2=112$, $N_3=168$, $N_4=224$ and $N_5=336$ Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/296.5 ha.; 1/259.5 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-62. (Experiment for 61 N.A.) (b) No. (c) Results of combined analysis are presented under 5. Results. (v) and (vi) Nil. (vii) Error variances are homogeneous and Treatments \times Years interaction is present.

5. RESULTS :

Pooled results

(i) 2083Kg/ha. (ii) 792.4Kg/ha (based on 5d.f. made up of Treatments \times Years interaction). (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	N_0	N_1	N_2	N_3	N_4	N_5
Av. yield.	1529	1560	1942	2726	2113	2740

Individual results

Treatment	N_0	N_1	N_2	N_3	N_4	N_5	Sig.	G.M.	S.E./plot
Year 1960	2150	2402	3121	3892	3017	3128		2952	572.3
1962	909	699	763	1561	1210	2152	**	1216	492.2
Pooled	1529	1550	1942	2726	2113	2640	N.S.	2083	792.4

Crop :- Wheat (Rabi).

Ref :- .Pb. 60(100), 61(100), 62(17).

Site :- Agri. Res. Stn., Jullundur

Type :- 'M'.

Object :- To study the residual effect of N, P and K, on Wheat, applied to Maize.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Maize. (c) As per treatments. (ii) Sandy loam. (iii) 21.11.60; 17.11.61; 3.12.62. (iv) (a) to (c) N.A. (v) N.A. (vi) C-273. (vii) Irrigated. (viii) and (ix) N.A. (x) 2.5.61.; 25.4.62; N.A.

2. TREATMENTS :

7 manurial treatments :- $T_0=0$, $T_1=112$ Kg/ha. of N as C/A/N, $T_2=224$ Kg/ha. of N as C/A/N, $T_3=T_1+112$ Kg/ha. of P_2O_5 as super, $T_4=T_3+112$ Kg/ha. of K_2O as Mur. Pot., $T_5=T_2+112$ Kg/ha. of P_2O_5

as Super and $T_6 = T_5 + 112 \text{Kg/ha. of } K_2O \text{ as Mur. Pot.}$

3. DESIGN :

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/247ha.; 1/208ha.; 1/207.6ha. (v) N.A. (vi) Yes.

4 GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960 to 62. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) and (vi) N.A. (vii) Error variances are heterogeneous and Treatments \times Years interaction is present.

5. RESULTS :

Pooled results :

(i) 1921Kg/ha. (ii) 509.3Kg/ha. (based on 12d.f. made up of Treatments \times Years. interaction) (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield.	1458	1685	2108	1735	2005	2058	2195

Individual results :

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	Sig.	G.M.	S.E./plot
Year 1960	2181	2823	2959	2656	3101	2502	3262	**	2783	348.4
1961	1564	2130	2541	1882	2188	2729	2162	**	2171	187.0
1962	629	701	823	667	726	943	1162	N.S.	807	271.3
Pooled	1458	1885	2108	1735	2005	2058	2195	N.S.	1921	509.3

Crop :- Wheat. (Rabi)

Ref :- Pb. 61(10).

Site :- Govt. Agri. Stn., Jullundur.

Type :- 'M'.

Object :- To study the best dose of Nitrogen on the yield of Wheat in the presence and absence of F.Y.M. application.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) N.A. (iii) 17.11.61. (iv) (a) to (e) N.A. (v) Two experiments were conducted. and F.Y.M was applied. to one experiment (vi) C-273. (vii) Irrigated (viii) 4 hoeings, 4 waterings. (ix) N.A. (x) 24/25.4.62.

2. TREATMENTS :

6 levels of N as C/A/N: $-N_0=0, N_1=56, N_2=112, N_3=168, N_4=224$ and $N_5=336 \text{Kg/ha.}$

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) and (b) 158.5m. \times 2.44m. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961-only. (b) No. (c) Nil. (v) No. (vi) Nil. (vii) Two separate experiments, with and without F.Y.M. were conducted.

5. RESULTS:

(With the application of F.Y.M.)

(i) 1905Kg/ha. (ii) 319.1Kg/ha. (iii) Treatment differences are highly significant. (vi) Av. yield of grain in Kg/ha.

Treatment :	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅
Av. yield. :	2412	2403	1557	1616	2153	1292

C.D. = 481.0 Kg/ha.

(Without the application of F.Y.M.)

(i) 1774Kg/ha. (ii) 322.1Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅
Av. yield.	1880	2039	1483	1652	2185	1403

C.D. = 500.3 Kg/ha.

Crop :- Wheat. (Rabi)

Ref :- Pb.61(11).

Site :- Govt. Agri. Stn., Jullundur.

Type :- M^o.

Object :- To study the effect of various micronutrients on the yield of Wheat.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) N.A. (iii) 24.11.61. (iv) (a) to (e) N.A. (v) 91Kg/ha. of C/A/N+57Kg/ha. of P₂O₅+19 Kg/ha. of K₂O on 24.11.61 and 50Kg/ha. of C/A/N applied on 7.2.62. (vi) C-273. (vii) Irrigated. (viii) and (ix) N.A. (v) 30.4.62.

2. TREATMENTS:

8 micro nutrient treatments: T₀=Control. T₁=Borax 2%, T₂=Copper 4%, T₃=Iron 4%. T₄=Manganese 6%, T₅=Zinc 6%, T₆=Magnesium 10% and T₇=Molybdate 1%.

Micronutrients sprayed on 30.1.62 and on 21.2.62.

3. DESIGN:

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) and (b) 1/123.6ha. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) N.A. (b) No. (c) Nil. (v) No. (vi) and (vii) Nil.

5. RESULTS:

(i) 1618 Kg/ha. (ii) 303.7 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈
Av. yield.	1597	1799	1709	1667	1611	1456	1625	1477

Crop :- Wheat (Rabi)**Ref :- Pb 61,(102),****Site :- Govt. Agri. Stn. Jullundur****Type :- 'M'.****Objec:—To study the residual effect of N, applied to Maize, on Wheat.****1. BASAL CONDITIONS :**

(i) (a) N.A. (b) Maize. (c) As per treatments. (ii) Sandy loam. (iii) 17.11.61. (iv) (a) and (b) N.A. (c) 85Kg/ha. (d) and (e) N.A. (vi) C- 23. (vii) Irrigated. (viii) and (ix) N A. (x) 24.25.4.62.

2 TREATMENTS :

All combinations of (1) and (2)

(1) 2 manurial treatments :— F_0 =No. F.Y.M. and F_1 =F.Y.M. applied.(2) 6 levels of N as C/A/N :— $N_0=0$, $N_1=56$, $N_2=112$, $N_3=168$, $N_4=224$ and $N_5=336$ Kg/ha. 56Kg/ha. of N applied at the time of sowing and rest as side dressing.**3. DESIGN :**

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/259.5 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) N.A. (b) No. (c) N.A. (v) to (vii) Nil.

5. RESULTS :

(i) 1840Kg/ha. (ii) 311.9Kg/ha. (iii) Main effect of N alone is highly significant. (vi) Av. yield of grain in Kg/ha.

	N_0	N_1	N_2	N_3	N_4	N_5	Mean
F_0	1403	1483	1652	2039	2185	1880	1774
F_1	1292	1557	1616	2403	2153	2412	1906
Mean	1348	1520	1634	2221	2169	2146	1840

C.D. for N marginal means=317.5Kg/ha.

Crop :- Wheat (Rabi).**Ref :- Pb.62(18).****Site :- Govt. Agri. Stn., Jullundur.****Type :- 'M'.****Object:—To study the residual effect on Wheat, of N applied to the previous Hybrid Maize.****1. BASAL CONDITIONS :**

(i) (a) No. (b) Hybrid-Maize. (c) As per treatments. (ii) (a) and (b) N.A. (iii) 3.12.62. (iv) (a) to (e) N A. (v) 24.7 Q/ha. of F.Y.M. (vi) C-273. (vii) Irrigated. (viii) 4 waterings. (ix) and (x) N.A.

2 TREATMENTS :6 doses of N as C/A/N :— $N_0=0$, $N_1=56$, $N_2=112$, $N_3=168$, $N_4=224$. and $N_5=336$ Kg/ha. of N. Manures applied to the previous crop Maize.

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/259.5 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Satisfactory. (ii) N.A. (iii) Yield of grain. (iv) (a) and (b) N.A. (c) Nil. (v) Nil. (vi) N.A. (vii) Nil.

5. RESULTS :

(i) 1111 Kg/ha. (ii) 310.0 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅
Av. yield.	737	742	742	1238	1151	2058

C.D. = 151.75; 11

Crop. - Wheat (Rabi).

Ref :- Pb. 62(20).

Site :- Govt. Agri. Stn., Jullundur.

Type :- 'M'.

Object :- To see the effect on the yield of Wheat sown after Guara green manure.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) Guara. (c) N.A. (ii) to (vi) N.A. (vii) Irrigated, (viii) to (x) N.A.

2. TREATMENTS:

6 G.M. treatments :- To=Control (No manure), T₁=Guara buried as G.M., T₂=Guara Stems etc. removed and cut at the time of crop, T₃=Guara grown and matured for the seed, T₄=No Guara sown but stems etc. cut from T₁ above and buried and T₅=Guara green manured with P₂O₅ at 56Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 6, (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/247ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 1341 Kg/ha. (ii) 375.6 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅
Av. yield	1273	1325	1384	1354	1210	1499

Crop :- Wheat (Rabi).

Ref :- Pb. 60(105).

Site : Kiana. Patiala. (c. f.)

Type : 'M'.

Object :- To study the effect of N, P and K applied individually and in combination on the yield of Wheat.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) Wheat (c) N.A. (ii) Sandy loam. (iii) N.A. (iv) C-591. (v) (a) N.A. (b) Kera. (c) to (e) N.A. (vi) 13.11.60. (vii) Irrigated. (viii) and (ix) N.A. (x) 19.4.61.

2. TREATMENTS:

All combinations of (1), (2) and (3)

(1) 2 levels of N as C/A/N :— $N_0=0$, $N_1=44.8$ Kg/ha.

(2) 2 levels of P_2O_5 as Super :— $P_0=0$ and $P_1=22.4$ Kg/ha.

(3) 2 levels of K_2O as Mur. Pot. :— $K_0=0$ and $K_1=22.4$ Kg/ha.

P_2O_5 drilled before seed while N and K broadcasted at sowing.

3. DESIGN:

(i) Fact. in R.B.D. ; 8 ; 4. (ii) — (iii) (a) N.A. (b) 1/297 ha. (iv) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 2041 Kg/ha. (ii) 181.0 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	P_0	P_1	K_0	K_1	Mean
N_0	1426	1476	1523	1379	1451
N_1	2576	2684	2617	2643	2630
Mean	2001	2080	2070	2011	2041
K_0	2030	2110			
K_1	1972	2050			

C.D. for N marginal means = 133.0 Kg/ha.

Crop : Wheat. (Rabi)

Ref : Pb.. 61(150).

Site :- Govt. Agri. College, Ludhiana.

Type : 'M'.

Object:—To study the effect of different levels of N with and without P and K on the yield of Wheat crop.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 25.11.61. (iv) (a) 4 to 5 ploughings. (b) Kera. (c) to (e) N.A. (v) N.A. (vi) C-286. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 20.4.62.

2. TREATMENTS:

Main-plot treatments:—

2 levels of P and K :— T_1 =Without P and K and T_2 =With P and K (doses, N.A.).

Sub-plot treatments:—

6 levels of nitrogen : $N_0=0$, $N_1=45$, $N_2=67$, $N_3=90$, $N_4=112$ and $N_5=134$ Kg/ha.

P and K applied at the time of sowing by drilling and N applied at the time of sowing by broadcasting.

3. DESIGN:

(i) Split-plot. (ii) (a) 2 main-plots/replication ; 6 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/197-69 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1961-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 2185Kg/ha. (ii) (a) 437.7 Kg/ha. (b) 241.5Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅	Mean
T ₁	1030	2195	2421	2486	2504	2489	2188
T ₂	956	2197	2233	2592	2426	2689	2182
Mean	993	2196	2327	2539	2465	2589	2185

C.D. for N marginal means=246.6 Kg/ha.

Crop :- Wheat. (Rabi)

Ref :- Pb. 62(154),

Site :- Govt. Agri. College, Ludhiana.

Type :- 'M'.

Object :- To study the effect of micronutrients as spray on the yield of Wheat.

1. BASAL CONDITIONS

(i) (a) to (c) N A. (ii) Sandy loam. (iii) 25.11.62. (iv) (a) 5-6 ploughings. (b) to (e) N.A. (v) 67.2 Kg/ha. of N+33.6Kg/ha. of P₂O₅+33.6Kg/ha. of K₂O at sowing. (vi) C-273. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 3.5. 63.

2. TREATMENTS :

7 micronutrient treatments+one control :- T₀=Control, T₁=Borax. 2.29Kg/ha. in 1122.9 Litre of water per ha. T₂=4.5Kg/ha. of Copper. Sul.+2.2Kg/ha. of hydrated lime in 1122.9 litre of water., T₃=4.5Kg/ha. of Ferrous Sul.+2.2 Kg/ha. of hydrated lime in 1122.9 litre of water, T₄=6.7 Kg/ha. of Manganese. Sul.+4.5 Kg/ha of hydrated lime in 1122.9 litre of water, T₅=6/7 Kg/ha. of Zinc. Sul.+4.5 Kg/ha. of hydrated lime in 1122.9 litre of water, T₆=11.2 Kg/ha. of Magnesium. in 1122.9 litre of Water and T₇=1.1 Kg/ha. of Amm. molybdate in 1122.9 litre of water.

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/195 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) As per treatments. (iii) Yield of grain and straw. (iv) (a) 1962-only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 2779Kg/ha. (ii) 80.34Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇
Av. yield.	2674	2762	2728	2860	2771	2893	2753	2791

Crop :- Wheat. (Rabi)

Ref :- Pb. 63(17).

Site :- Govt. Agri. College, Ludhiana

Type :- 'M'.

Object :- To study the effect of different doses of K on the yield of Wheat.

1. BASAL CONDITIONS

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 16.11.63. (iv) (a) 2 to 3 ploughings. (b) N.A. (c) 91Kg/ha. (d) and (e) N.A. (v) N.A. (vi) C-273. (vii) Irrigated. (viii) and (ix) N.A. (x) April, 64.

2. TREATMENTS :

5 levels of K₂O as Mur. Pot. :- K₀=0, K₁=28, K₂=56, K₃=84, K₄=112Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 6. (iv) and (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) N.A. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil

5. RESULTS:

(i) 238.4Kg/ha. (ii) 211.5Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	K ₀	K ₁	K ₂	K ₃	K ₄
Av. yield.	2320	2232	2416	2570	2374

Crop :- Wheat. (Rabi).

Ref :- Pb. 63(18).

Site :- Govt. Agri. College, Ludhiana.

Type :- 'M'.

Object :- To study the effect of different levels of P on the yield of Wheat crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 16.11.63. (iv) (a) 2 ploughings. (b) N.A. (c) 91Kg/ha. (d) and (e) N.A. (v) N.A. (vi) C-273. (vii) Irrigated. (viii) and (ix) N.A. (x) April, 64.

2. TREATMENTS:

5 levels of P₂O₅ as Super :- P₀=0, P₁=28, P₂=56, P₃=84 and P₄=112Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 6. (iv) (a) and (b) N.A. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1963-only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 2027Kg/ha. (ii) 305.2Kg/ha. (iii) Treatment differences are significant. (iv) Av. yield of grain in Kg/ha.

Treatment	P ₀	P ₁	P ₂	P ₃	P ₄
Av. yield.	1688	2079	1969	2194	2203

C.D.—367.5Kg/ha.

Crop :- Wheat. (Rabi).

Ref :- Pb. 64(280).

Site :- Punjab. Agri. University; Ludhiana.

Type :- 'M'.

Object :- To find out the requirements of N, P and K in various combinations of the doses on the yield of Wheat.

1. BASAL CONDITIONS :

(i) (a) Maize-Wheat (b) Maize. (c) N.A. (ii) Loamy sand. (iii) Up to 20th Nov., 64. (vi) (a) 3-4 ploughings. (b) Kera. (c) 80 Kg/ha. (d) 20cm. (e) — (v) N.A. (vi) C—306. (vii) Irrigated. (viii) 2 hoeings. (ix) 11.0cm. (x) 2nd week of April, 65.

2. TREATMENTS :

Main-plot treatments :

4 levels of N :- N₀=0, N₁=44.8, N₂=89.7 and N₃=134.5 Kg/ha.

Sub-plot treatments :

All combinations of (1) and (2)

(1) 2 levels of P₂O₅ :- P₀=0 and P₁=67.3 Kg/ha.

(2) 2 levels of K₂O :- K₀=0 and K₁=44.8 Kg/ha.

The required doses of fertilizers were applied at the time of sowing by the method of broadcasting.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication, 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/326.2ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Good. (ii) Nil. (iii) Yield of grain. (iv) (a) 1964 only. (b) No. (c) Nil. (v) No. (vi) and (vii) Nil.

5. RESULTS :

(i) 4368 Kg/ha. (ii) (a) 720.3 Kg/ha. (b) N.A. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	N ₃	K ₀	K ₁	Mean
P ₀	3354	4172	4619	4370	4135	4123	4129
P ₁	3747	4711	5064	4906	4522	4692	4607
Mean	3550	4441	4842	4638	4328	4408	4368
K ₀	3596	4375	4758	4582			
K ₁	3505	4508	4926	4693			

C.D. for N marginal means = 575.9 Kg/ha.

Crop :- Wheat. (Rabi)

Ref :- Pb. 65(161).

Site :- Punjab. Agri. University, Ludhiana.

Type :- 'M'.

Object :- To find out the effect of spartin on the yield of Wheat crop.

1. BASAL CONDITIONS :

(i) (a) Maize—Wheat. (b) Maize. (c) 375 Kg/ha. of Super + 125 Kg/ha. of K₂O + 1020 Kg/ha. of A/S. (iii) 25.11.61. (iv) (a) 3 ploughings. (b) Kera. (c) 90 Kg/ha. (d) 23cm. (e) — (v) Nil. (vi) C—306. (vii) Irrigated. (viii) One hoeing. (ix) 91cm. (x) 2nd April, 66.

2. TREATMENTS :

All combinations of (1) and (2).

(1) 3 levels of Spartin :—S₀=0, S₁=100 and S₂=200 Kg/ha.

(2) 2 levels of Nitrogen :—N₀=0 and N₁=60 Kg/ha.

3. DESIGN :

(i) Fact, in R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/500 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Good. (ii) N.A. (iii) Yield of grain. (iv) (a) 1965—only (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 3281 Kg/ha. (ii) 328.5 Kg/ha. (iii) Main effect of S is significant while that of N is highly significant. (iv) Av. yield of grain in Kg/ha.

	S ₀	S ₁	S ₂	Mean
N ₀	3180	2640	3420	3080
N ₁	3425	3380	3640	3481
Mean	3303	3010	3530	3281

C.D. for S marginal means = 350.0 Kg/ha.

C.D. for N marginal means = 285.8 Kg/ha.

Crop :- Wheat (*Rabi*)

Ref : Pb. 65(162).

Site :- Punjab. Agri. University Ludhiana.

Type :- 'M'.

Object :- To study the effect of different times of application of Nitrogen on the yield of Wheat crop.

1. BASAL CONDITIONS :

(i) (a) Fallow—Wheat. (b) Fallow. (c) Nil, (ii) Loamy sand. (iii) Up to 20 Nov., 65. (iv) (a) 3-4 ploughing. (b) Kera. (c) 85 Kg/ha. (d) 20cm. (e) — (v) 40 Kg/ha. of N+25 Kg/ha. of P_2O_5 . (vi) S-306. (vii) Irrigated. (viii) One hoeing. (ix) 11.0cm. (x) Second week of April, 66.

2. TREATMENTS :

Main-plot treatments :

3 sources of Nitrogen :- S_1 —C/A/N, S_2 —A/S and S_3 —Urea.

Sub-plot treatments :

6 times of application— T_1 —Full at sowing, T_2 —Full at 1st irrigation, T_3 —1/2 at sowing+1/2 at first irrigation, T_4 —1/2 at sowing+1/2 at flowering, T_5 —1/2 at 1st irrigation+1/2 at flowering, and T_6 —1/3 at sowing+1/3 1st irrigation+1/3 at flowering.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication, 6 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) 1/250ha. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Good. (ii) Nil, (iii) Germination counts, yield of grain. (iv) (a) and (b) No. (c) Nil. (v) No. (vi) and (vii) Nil.

5. RESULTS :

(i) 3132Kg/ha. (ii) (a) 302.9 Kg/ha. (b) 251.5 Kg/ha. (iii) Main effect of S alone is significant. (vi) Av. yield of grain in Kg/ha.

	T_1	T_2	T_3	T_4	T_5	T_6	Mean
S_1	2994	3162	2926	2969	3124	3162	3056
S_2	3304	3434	3372	3410	3143	3317	3330
S_3	2783	3162	3044	2746	3143	3186	3011
Mean	3027	3253	3114	3042	3137	3222	3132

C.D. for S marginal means=214.0Kg/ha.

Crop :- Wheat (*Rabi*).

Ref :- Pb. 60(101)

Site :- Sadhar. Ludhiana. (c.f.)

Type :- 'M'.

Object :- To study the effect of organic manures on the yield of Wheat crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Fine sand. (iii) N.A. (iv) C-273. (v) (a) and (b) N.A. (c) 80Kg/ha. (d) and (e) N.A. (vi) 20.11.60. (vii) Irrigated. (viii) and (ix) N.A. (x) 20.4.61.

2. TREATMENTS:

8 manurial treatments: T_0 —Control (no manure). T_1 —44.8Kg/ha of N as Neem Cake, T_2 —44.8Kg/ha. of N as G.N.C., T_3 —44.8Kg/ha. of N as Cotton seed cake, T_4 —45.8Kg/ha. of N as Bone meal, T_5 —22.4 Kg/ha. of N as, F.Y.M. T_6 —22.4 Kg/ha of N as C/A/N, and T_7 —44.8Kg/ha. of N as C/A/N.

3. DESIGN:

(i) R.B.D. : 8 ; 3. (ii) 8. (iii) (a) N.A. (b) 1/99 ha. (iv) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) No. (b) and (c) N.A. (v) to (vii) Nil.

5. RESULTS :

(i) 2448Kg/ha. (ii) 153.0 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7
Av, yield	1934	2659	2586	2428	2369	1726	2866	3018

C.D.—267.9 Kg/ha.

Crop :- Wheat (Rabi).

Ref :- Pb.60(103),60(102),60(131),60(130).

**Site :- Jawadhi, Ghungrabi, Khurd,
phullancib and Ludhiana**

Type :- 'M'.

Object :- To study the effect of N, P and K on the yield of Wheat crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) N.A. (iv) C-273 for 60(103) and 60(102); C-518 for 60(131) and Mixed variety for 60(130). (v) 3-4 ploughings. (b) Kera. (c) to (e) N.A. (vi) 28.10.60; 9.11.60; 15.11.60; 19.11.60. (vii) Irrigated. (viii) and (ix) N.A. (x) 3rd week of April.

2. TREATMENTS :

All combinations of (1), (2) and (3)

- (1) 2 levels of N as C/A/N :— N_0 —0 and N_1 —44.8Kg/ha.
 (2) 2 levels of P as Super :— P_0 —0 and P_1 —22.4Kg/ha.
 (3) 2 levels of K as Mur. Pot. :— K_0 —0 and K_1 —22.4Kg/ha.

All fertilizers drilled below the seed.

3. DESIGN :

(i) Fact. in R.B.D. ; 8 ; 4. (ii) — (iii) (a) N.A. (b) 1/74 ha. for 60(102) and 149.4 ha. for others. (iv) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) and (b) No. (c) Nil. (v) No. (vi) Nil. (vii) Error variances are heterogeneous and Treatments \times Places interaction is present

5. RESULTS:

Pooled results :

(i) 1883Kg/ha. (ii) 729.5 Kg/ha. (based on 21 d.f. made up of Treatments \times Places interaction). (iv) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	K ₀	K ₁	Mean
N ₀	1352	1473	1399	1426	1413
N ₁	2226	2472	2343	2364	2354
Mean	1794	1972	1871	1895	1883
K ₀	1790	1953			
K ₁	1798	1992			

C.D. for N marginal means = 270.9 Kg/ha.

Treatments Years	N ₀	N ₁	Sig.	P ₀	P ₁	Sig.	K ₀	K ₁	Sig.	G.M.	S.E./plot
1960 (103)	1760	2682	**	2184	2258	*	2225	2217	N.S.	2221	92.4
1960 (102)	1475	3276	**	2262	2489	**	2349	2402	N.S.	2375	216.0
1960 (131)	1248	1648	**	1272	1624	**	1420	1476	**	1448	50.3
1960 (130)	1168	1809	**	1458	1521	N.S.	1492	1486	N.S.	1489	126.5
Pooled	1413	2354	**	1794	1972	N.S.	1871	1895	N.S.	1883	270.

Crop :- Wheat (Rabi).

Ref :- Pb. 60(135), 60(149), 60(134).

Site :- Jawadhi, Ghungrali Bagge
Khurd, Ludhiana. (c f.)

Type :- 'M'.

Object :- To study the effect of different mixtures of N, P and K on the yield of Wheat.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) Fellow; N.A.; Fellow. (c) Nil. (ii) Sandy loam; Loamy sand; Sandy loam. (iii) N.A.; Nil.; N.A. (iv) C-273; C-273; C-518. (v) 5 to 6 ploughings; 3-4 ploughings. (b) Kera. (c) to (e) N.A. (vi) 5.11.60; 10.11.60; 16.11.60. (vii) Irrigated. (viii) 2 hoeings and 2 weedings; 2 weedings; 2 hoeings and 2 weedings. (ix) N.A. (x) 20.4.61; 22.4.61; 19.4.61.

2. TREATMENTS:

45Kg/ha. of N from each mixture

T₀ = Control T₁ = Mixture of N, P and K in the ratio 10:5:5, T₂ = Mixture of N, P and K in the ratio 12:5:5 and T₃ = Mixture of N, P and K in the ratio 14:5:5.

3. DESIGN:

(i) R.B.D.; 4:4. (ii) — (iii) (a) N.A. (b) 1/49.4 ha. (iv) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) and (b) No. (v) and (vi) Nil. (vii) Error variances are homogeneous and Treatments × Places interaction is present.

5. RESULTS:

Pooled results

(i) 2462 Kg/ha. (ii) 453.5 Kg/ha. (based on 6 d.f. made up of Treatments × Places interaction). (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃
Av. yield.	1900	2474	2746	2727

C.D. = 453.0 Kg/ha.

Individual Results

Treatment	T ₀	T ₁	T ₂	T ₃	Sig.	G.M.	S.E./plot
1960(135)	2199	2684	3099	3101	**	2771	132.0
1960(149)	2194	3243	3441	3431	**	3077	194.9
1960(134)	1307	1496	1699	1649	**	1538	102.4
Pooled	1900	2474	2746	2727	**	2462	453.5

Crop :- Wheat

Ref :- Pb. 60(M.A.E).

Site :- M. A. E. Centre, Nasirpur.

Type :- 'M'.

Object Type VI :- To study the effect of different times of application of N on the yield of block.

1. BASAL CONDITIONS

(i) (a) to (c) N.A. (ii) Alluvial. (iii) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

All combinations of (1), (2) and (3) + a control plot in each Block.

2 levels of N : N₁=22.4 and N₂=44.8 Kg/ha.(2) 3 sources of N : S₁=A/N, S₂=A/S/N and S₃=Urea.(3) 3 times of application : T₁=At sowing, T₂=At first irrigation and T₃=½ at sowing + ½ at first irrigation.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 7 plots/block, 3 blocks/replication. (b) N.A. (iii) 4. (vi) (a) and (b) N.A. (v) to (vii) Nil. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-only. (b) N.A. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) N.A. (ii) N.A. (iii) Main effect of N alone is significant. (iv) Av. yield of grain in Kg/ha.

Control=3071 Kg/ha.

Treatment	T ₁	T ₂	T ₃	S ₁	S ₂	S ₃
Av. yield	3237	3080	3246	3034	3275	3265

Treatment	N ₁	N ₂
Av. yield	3053	3486

C.D.=316Kg/ha.

Crop :- Wheat.

Ref. :- Pb. 60, 61, 62, 63, 64(M.A.E.)

Site :- M.A.E. Centre, Nasirpur.

Type :- 'M'.

Object Type II :- To study the effect of different levels of N, P and K on the yield of Wheat.

1. BASAL CONDITIONS :

- (i) (a) Maize-Wheat-Cotton-Serji, for 60; N.A. for others. (b) Maize for 60; N.A. for others. (c) N.A.
(ii) Sandy loam; Alluvial; N.A.: Indian alluvium for 63 and 64. (iii) 26.10.60; 30.10.61; N.A.; N.A., 12.11.64.
(iv) (a) 6 ploughings; 3 ploughings; N.A. for others. (b) Pora method for 60 and 61; N.A. for others. (c)
80Kg/ha; 76.5Kg/ha.; N.A. for others. (d) 23cm between rows; N.A. for others. (v) Nil. (vi) Irrigated.
(viii) One hoeing for 60 and 61; N.A. for others. (ix) N.A. (x) 18.4.61; 1st week of April; N.A.; 19.6.64;
N.A.

2. TREATMENTS :

All combinations of (1),(2),(3) and (4)

- (1) 3 levels of F.Y.M. : $F_0=0$, $F_1=5600$ and $F_2=11200$ Kg/ha.
(2) 3 levels of N as C/A/N: $N_0=0$, $N_1=22.4$ and $N_2=44.8$ Kg/ha.
(3) 3 levels of P_2O_5 as Super ; $P_0=0$, $P_1=22.4$ and $P_2=44.8$ Kg/ha.
(4) 3 levels of K_2O as Mur. Pot. : $K_0=0$, $K_1=22.4$ and $K_2=44.8$ Kg/ha.

3. DESIGN :

- (i) 3⁴ Fact. confd. (ii) (a) 9 plots/block, 9 blocks/replication. (b) N.A. (iii) 1. (iv) (a) 10.08m. × 50.04m ;
1/197.6 ha.; N.A. for others. (b) 8.86m. × 45.8m.; 1/247ha.; N.A. for others. (v) 61cm. × 26cm.; N.A. for
others. (vi) Yes.

4. GENERAL:

- (i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960-64. (b) Yea. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

60(M.A.E.)

- (i) 1434Kg/ha. (ii) 275.8 Kg/ha. (iii) Main effect of N is highly significant and that of F is significant. (iv)
Av. yield of grain in Kg/ha.

	N_0	N_1	N_2	P_0	P_1	P_2	K_0	K_1	K_2	Mean
F_0	854	1228	1836	1268	1339	1311	1336	1330	1252	1306
F_1	848	1330	2178	1453	1504	1399	1345	1483	1528	1452
F_2	931	1636	2066	1584	1537	1491	1492	1428	1712	1544
Mean	878	1398	2027	1435	1467	1400	1391	1414	1497	1434
K_0	913	1333	1927	1388	1502	1283				
K_1	861	1376	2005	1421	1458	1363				
K_2	859	1485	2148	1496	1441	1554				
P_0	879	1391	2035							
P_1	956	1363	2082							
P_2	799	1439	1963							

C.D. for N or F marginal means=151.7 Kg/ha.

Phase I

(i) 1469Kg/ha. (ii) 341.2Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	904	1282	1845	1226	1420	1386	1402	1365	1265	1344
F ₁	987	1568	1983	1365	1540	1634	1512	1522	1505	1513
F ₂	1079	1688	1881	1605	1522	1520	1531	1540	1576	1549
Mean	990	1513	1903	1399	1494	1513	1482	1476	1449	1469
K ₀	1061	1476	1918	1540	1549	1357				
K ₁	913	1614	1900	1374	1347	1707				
K ₂	996	1450	1891	1284	1586	1476				
P ₀	1014	1439	1744							
P ₁	978	1512	1992							
P ₂	978	1588	1973							

C.D. for N marginal means=187.7Kg/ha,

Phase II (Direct effect)

(i) 1377Kg/ha. (ii) 193.7Kg/ha. (iii) Main effect of N is highly significant. Main effect of P,K and interaction N×P, N×F are significant (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	839	1337	1872	1310	1485	1252	1383	1476	1188	1349
F ₁	904	1439	1780	1393	1411	1318	1420	1383	1391	1374
F ₂	968	1577	1679	1291	1485	1448	1347	1512	1365	1408
Mean	904	1451	1777	1331	1460	1339	1383	1457	1291	1377
K ₀	895	1494	1760	1310	1531	1307				
K ₁	931	1522	1918	1439	1512	1420				
K ₂	886	1336	1652	1244	1337	1291				
P ₀	1005	1365	1623							
P ₁	904	1596	1880							
P ₂	802	1391	1827							

C.D. for N, P or K marginal means=106.5Kg/ha.

C.D. for the body of N×P or N×F table=184.5 Kg/ha.

Phase III (Residual effect)

(i) 923 Kg/ha. (ii) 209.4 Kg/ha (iii) Main effect of N alone is significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	775	766	978	738	913	869	885	895	740	840
F ₁	885	968	987	959	1014	868	821	1051	969	947
F ₂	913	941	1088	987	996	960	1024	987	932	981
Mean	858	892	1018	895	974	899	910	978	880	923
K ₀	793	867	1070	904	978	848				
K ₁	867	978	1089	913	1070	951				
K ₂	914	831	895	868	874	898				
P ₀	812	867	1006							
P ₁	876	950	1096							
P ₂	886	859	952							

C.D for N marginal means=115.2 Kg/ha.

62(M.A.E.)

Cumulative Phase

(i) 1837 Kg/ha. (ii) 286.8 Kg/ha. (iii) Main effect of N is highly significant and that of P is significant. (vii) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	1137	1713	2330	1824	1764	1592	1702	1605	1873	1727
F ₁	1246	1980	2272	1932	1914	1653	1793	1847	1858	1833
F ₂	1297	2036	2521	1942	1988	1924	2008	1945	1901	1951
Mean	1227	1910	2374	1899	1889	1723	1834	1799	1877	1837
K ₀	1165	1943	2395	1907	1922	1674				
K ₁	1190	1862	2346	1912	1748	1737				
K ₂	1326	1924	2382	1878	1996	1757				
P ₀	1232	2035	2429							
P ₁	1309	1864	2493							
P ₂	1139	1828	2201							

C.D. for N or P marginal means=157.7 Kg/ha.

Residual Phase

(i) 1681 Kg/ha. (ii) 284.2 Kg/ha. (iii) Main effect of N alone is highly significant. (vi) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	1123	1617	2177	1592	1702	1624	1579	1703	1635	1639
F ₁	1164	1892	1928	1754	1569	1661	1513	1715	1756	1661
F ₂	1222	1833	2174	1734	1783	1711	1711	1758	1760	1743
Mean	1170	1781	2093	1693	1685	1665	1601	1725	1771	1681
K ₀	1111	1791	1901	1660	1521	1623				
K ₁	1186	1773	2216	1758	1763	1655				
K ₂	1212	1778	2161	1662	1771	1717				
P ₀	1124	1903	2053							
P ₁	1230	1690	2135							
P ₂	1155	1749	2092							

C.D. for N marginal means=156.3 Kg/ha.

Direct Phase

(i) 1362 Kg/ha. (ii) 354.4 Kg/ha. (iii) Main effect of N alone is highly significant. (vi) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	1223	1177	1633	1399	1469	1164	1262	1352	1419	1344
F ₁	1208	1386	1515	1478	1463	1168	1409	1456	1244	1370
F ₂	1201	1400	1517	1412	1313	1393	1487	1212	1420	1373
Mean	1211	1321	1555	1430	1415	1242	1386	1340	1361	1362
K ₀	1222	1437	1500	1386	1482	1291				
K ₁	1200	1277	1543	1480	1285	1254				
K ₂	1211	1250	1623	1424	1478	1181				
P ₀	1192	1497	1600							
P ₁	1265	1225	1755							
P ₂	1175	1241	1310							

C.D. for N marginal means=194.9 Kg/ha.

63(M.A.E.)

Direct effect

(i) 2388 Kg/ha. (ii) 391.0 Kg/ha. (iii) Main effects of N and P are highly significant. Main effect of F and interaction F × N are significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	1571	2560	2512	2072	2100	2470	2072	2306	2265	2214
F ₁	2182	2498	2889	2333	2422	2814	2498	2724	2347	2523
F ₂	1674	2649	2958	2341	2381	2560	2567	2347	2368	2427
Mean	1809	2569	2786	2249	2301	2615	2379	2459	2327	2388
K ₀	1798	2532	2807	2402	2306	2429				
K ₁	1825	2704	2848	2333	2313	2731				
K ₂	1805	2471	2704	2011	2285	2684				
P ₀	1702	2402	2642							
P ₁	1743	2443	2718							
P ₂	1983	2862	2999							

C.D. for N or P or F marginal means = 215.0 Kg/ha.

C.D. for the body of N × F table = 372.4 Kg/ha.

Cumulative Effect

(i) 2546 Kg/ha. (ii) 454.6 Kg/ha. (iii) Main effects of F and N are highly significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	1592	2512	2965	2251	2340	2477	2285	2306	2477	2356
F ₁	1894	2505	2978	2580	2370	2422	2594	2525	2258	2459
F ₂	2190	2841	3438	2676	2889	2903	3068	2615	2786	2823
Mean	1892	2619	3127	2503	2534	2601	2649	2482	2507	2546
K ₀	1873	2779	3294	2622	2628	2697				
K ₁	1812	2553	3081	2402	2573	2471				
K ₂	1990	2526	3006	2484	2402	2635				
P ₀	1922	2567	3020							
P ₁	1928	2484	3191							
P ₂	1825	2807	3171							

C.D. for N or F marginal means = 250.0 Kg/ha.

Residual effect

- (i) 2257 Kg/ha. (ii) 540.6 Kg/ha. (iii) Main effect of N is highly significant and that of P is significant.
 (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	2107	2066	2649	2114	2601	2107	2368	2381	2072	2274
F ₁	1736	2313	2429	2099	2251	2127	2175	2319	1983	2159
F ₂	1853	2189	2972	2265	2477	2271	2436	2258	2319	2338
Mean	1899	2189	2683	2159	2443	2168	2326	2319	2125	2257
K ₀	1812	2381	2786	2374	2326	2278				
K ₁	2100	2168	2690	2107	2779	2072				
K ₂	1784	2018	2574	1997	2223	2155				
P ₀	1715	2072	2690							
P ₁	2258	2478	2594							
P ₂	1722	2017	2765							

C.D. for N or P marginal means = 297.3 Kg/ha.

64(M.A.E.)

Cumulative Phase

- (i) 2214 Kg/ha. (ii) 465.3 Kg/ha. (iii) Main effect of N alone is significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	1663	2020	2529	1952	2185	2075	2117	2158	1938	2071
F ₁	1608	2240	2983	2282	2240	2309	2254	2309	2268	2277
F ₂	1635	2570	2680	2253	2460	2172	2405	2199	2281	2295
Mean	1635	2277	2731	2162	2295	2185	2259	2222	2162	2214
K ₀	1567	2309	2901	2103	2488	2185				
K ₁	1690	2213	2763	2282	2240	2144				
K ₂	1649	2309	2529	2102	2158	2226				
P ₀	1539	2296	2722							
P ₁	1649	2447	2790							
P ₂	1718	2158	2680							

C.D. for N marginal means = 255.9 Kg/ha.

Residual effect

(i) 1689 Kg/ha. (ii) 381.4 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	1677	1635	1553	1539	1842	1484	1553	1883	1429	1622
F ₁	1525	1677	1855	1732	1704	1622	1732	1704	1622	1686
F ₂	1635	1704	1938	1649	1814	1814	1608	1883	1787	1759
Mean	1612	1672	1782	1640	1787	1640	1631	1823	1613	1689
K ₀	1402	1786	1704	1553	1690	1649				
K ₁	1758	1649	2061	1924	2020	1525				
K ₂	1677	1580	1581	1443	1650	1745				
P ₀	1594	1608	1718							
P ₁	1718	1745	1897							
P ₂	1525	1663	1731							

Direct Phase

(i) 2060 Kg/ha. (ii) 415.8 Kg/ha. (iii) Main effect of N is highly significant and that of F is significant. (vi) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mea
F ₀	1580	1993	2062	1635	2061	1938	1883	1993	1759	1878
F ₁	1622	2185	2556	2172	2062	2130	2130	2282	1952	2121
F ₂	1652	2364	2529	2144	2106	2295	2240	1993	2312	2182
Mean	1618	2181	2382	1984	2076	2121	2084	2089	2008	2060
K ₀	1525	2295	2433	1952	2226	2075				
K ₁	1622	2158	2488	2075	2158	2034				
K ₂	1708	2089	2226	1924	1844	2554				
P ₀	1594	2034	2323							
P ₁	1693	2199	2336							
P ₂	1567	2309	2487							

C.D. for N or F marginal means = 228.7 Kg/ha.

Crop :- Wheat (Rabi).

Ref :- Pb. 60, 61(M.A.E.)

Site : M.A.E. Centre, Nasirpur

Type :- 'M'.

Object :- Type IX: To study the relative efficacy of different types of phosphates along with different methods of application on the yield of Wheat.

1. BASAL CONDITIONS:

(i) (a) Nil. (b) Fallow. (c) Nil. (ii) Sandy loam. (iii) 4.11.60; 8.11.61. (iv) (a) 4-5 ploughings. (b) Kera method. (c) 80 Kg/ha. (d) 23cm. between rows. (e)-(v) Nil. (vi) C-273. (vii) Irrigated. (viii) one hoeing. (ix) N.A. (x) 15.4.61; 1st week of April, 62.

2. TREATMENTS:

All combinations of (1), (2), (3) and (4)+extra treatments in each block.

(1) 3 types of phosphates : P_1 =Super, P_2 =ODDA (20-20-0) and P_3 =PEC (16-14-0)

(2) 3 levels of fertilizers : L_1 =12 Kg/ha. of N+10.5 Kg/ha. of P_2O_5 , L_2 =2 L_1 and L_3 =2 L_2

(3) 3 methods of application of fertilizers : M_1 =broadcasted before sowing, M_2 =placement 6.3cm. below seed and M_3 =Band placement.

(4) 2 levels of F.Y.M : F_0 =0 and F_1 =5604 Kg/ha.

Extra. treatments : N_0 =0, N_1 =12, N_2 =24 and N_3 =48Kg/ha. of N.

3. DESIGN :

(i) $(3^3 \times 2) + 4$, confd. (ii) (a) 13 plots/block; 6 blocks/replication (3 blocks received F_0 treatment and other 3 blocks received F_1 treatment.) (b) N.A. (iii) 1. (iv) (a) 3.28m. \times 7.64m. (b) 2.82m. \times 7.18m. (v) 23cm. \times 23cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960-61. (b) No. (c) Nil. (v) and (vi) N.A. (vii) Only marginal means and S.E.'s are available and are presented under 5. Results.

5. RESULTS :

60(M.A.E.)

(i) 3497Kg/ha. (ii) 464.8 Kg/ha. (iii) Main effect of M alone is significant. (iv) Av. yield of grain in Kg/ha. (Marginal means)

P_1	P_2	P_3	L_1	L_2	L_3	M_1	M_2	M_3
3459	3426	3463	3491	3550	3307	3693,	3126,	3579
		F_0		F_1				
		3456		3443				
Extra Treatment		N_0	N_1	N_2	N_3			
Av. yield.		3528	3547	3864	3477			

61(M.A.E.)

(i) 2315 Kg/ha. (ii) 367.1 Kg/ha. (iii) Interaction (F \times L) alone is highly significant. (vi) Av. yield of grain in Kg/ha. (Marginal means)

P_1	P_2	P_3	L_1	L_2	L_3	M_1	M_2	M_3
2324	2342	2407	2384	2375	2315	2444,	2361,	2269
		F_0		F_1				
		2401		2315				
Extra treatment		N_0	N_1	N_2	N_3			
Av. yield.		2278	2043	2209	2347			

Crop :- Wheat.

Ref :- Pb. 62 to 65(M.A.E.)

Site :- M.A.E. Centre, Nasirpur.

Type :- 'M'.

Object Type V (a):—To study the effect of different methods of placement of Nitrogenous manures on the yield of Wheat.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Alluvial. (iii) and (iv) N.A. (v) 33.6Kg/ha. of P_2O_5 as Super. (vi) N.A. (vii) Irrigated (viii) to (x) N.A.

2. TREATMENTS :

All combinations of (1) and (2)+one control (without nitrogen)

(1) 3 methods of placement : M_1 =Broadcasted at sowing, M_2 =Drilled 7cm. below the Seed and M_3 =side band placement at about 5 to 8 cm. on either side.

(2) 3 levels of nitrogen in the form of A/S : N_1 =33.6, N_2 =50.4 and N_3 =67.2 Kg/ha. of N.

3. DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/247 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-66. (b) N.A. (c) Nil. (v) Nil. (vi) N.A. (vii) Nil.

5. RESULTS :

62(M.A.E.)

(i) 2499 Kg/ha. (ii) N.A. (iii) Main effect of N alone is significant. (iv) Av. yield of grain in Kg/ha.

Control=1630.

Treatment	M_1	M_2	M_3	N_1	N_2	N_3
Av. yield	2896	2682	2787	2565	2835	2965

C.D.=267Kg/ha.

63(M.A.E.)

(i) 2271 Kg/ha. (ii) N.A. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

Control=1968Kg/ha.

Treatment	M_1	M_2	M_3	N_1	N_2	N_3
Av. yield	2366	2314	2438	2360	2516	2242

64(M.A.E.)

(i) 2502 Kg/ha. (ii) N.A. (iii) Main effects of M and N are significant. (iv) Av. yield of grain in Kg/ha.

Control=1873Kg/ha.

Treatment	M_1	M_2	M_3	N_1	N_2	N_3
Av. yield	2715	2601	2819	2497	2778	2861

C.D.=178Kg/ha.

65(M.A.E.)

(i) 2791Kg/ha. (ii) N.A. (iii) Main effects of M and N are significant. (iv) Av. yield of grain in Kg/ha.

Control=1656Kg/ha.

Treatment	M_1	M_2	M_3	N_1	N_2	N_3
Av. yield	3104	3083	3322	2874	3239	3395

C.D.=193Kg/ha.

Crop :- Wheat.

Ref :- Pb. 62 to 65(M.A.E.)

Site :- M.A.E. Centre, Nasirpur.

Type :- 'M'.

Object :—Type X: To compare the effect of green manure raised and ploughed both in-situ on succeeding cereal crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Alluvial. (iii) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

All combinations of (1), (2) and (3)+Extra treatment (T) in each block.

(1) 3 green manuring treatments: G_0 =No green manure, G_1 =Green manure crop raised and ploughed back in-situ before cereal crop sown in-site. and G_2 = G_1 +35Kg/ha. of P_2O_5 applied to G.M. crop.(2) 3 levels of Nitrogen : $N_0=0$, $N_1=17.5$ and $N_2=35$ Kg/ha. of N as A/S.(3) 3 levels of Phosphate : $P_0=0$, $P_1=35$ and $P_2=70$ Kg/ha. of P_2O_5 as Super.

(T) Extra treatment : N, P, K nutrients through artificial fertilizers equivalent to those obtained from G.M.

3. DESIGN :

(i) 3rd confd. (ii) (a) 10 plots/block, 3 blocks/replication. (b) N.A. (iii) 2. (iv) (a) 1/100 ha. (b) 1/125 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-66. (65 N.A.) (b) N.A. (c) Nil. (v) Nil. (vi) N.A. (vii) Nil.

5. RESULTS:

62(M.A.E.)

(i) 2295 Kg/ha. (ii) 217.5 Kg/ha. (iii) Main effect of G, N and Extra vs. others are highly significant. Main effect of P is significant. (iv) Av. yield of grain in Kg/ha.

T=1861 Kg/ha.

	G_0	G_1	G_2	N_0	N_1	N_2	Mean
P_0	2249	2640	2520	2145	2517	2747	2470
P_1	1932	2319	2487	2018	2220	2500	2246
P_2	1873	2364	2706	2109	2250	2578	2314
Mean	2018	2441	2696	2091	2331	2608	2343
N_0	1647	2335	2290				
N_1	1997	2430	2566				
N_2	2410	2558	2857				

C.D. for G or N or P marginal means=148 Kg/ha.

C.D. for Extra Vs. [others] =256 Kg/ha.

63(M.A.E.)

(i) 2043 Kg/ha. (ii) 257.5 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

T=1853 Kg/ha.

	G ₀	G ₁	G ₂	N ₀	N ₁	N ₂	Mean
P ₀	1853	2050	2048	1503	2020	2429	1984
P ₁	2079	2122	2213	1719	2182	2512	2138
P ₂	2275	2038	1894	1647	2038	2522	2069
Mean	2069	2070	2052	1623	2080	2488	2064
N ₀	1729	1585	1554				
N ₁	1997	2174	2069				
N ₂	2481	2450	2532				

C.D. for N marginal means=175 Kg/ha.

64(M.A.E.)

(i) 2630Kg/ha. (ii) 355.7Kg/ha. (iii) Main effects of G, N and Ext. Vs. "others" are highly significant. (iv) Av. yield of grain in Kg/ha.

T=3225 Kg/ha.

	G ₀	G ₁	G ₂	N ₀	N ₁	N ₂	Mean
P ₀	1623	3163	3017	2289	2455	3059	2601
P ₁	1727	2955	2851	2226	2622	2684	2511
P ₂	1956	2997	2790	2102	2768	2872	2581
Mean	1769	3038	2886	2206	2615	2872	2564
N ₀	1187	2892	2539				
N ₁	1893	2872	3080				
N ₂	2227	3352	3038				

C.D. for G or N marginal means=242 Kg/ha.

C.D. for Ext. Vs. others =419Kg/ha.

Crop :- Wheat (Rabi).

Ref :- Pb. 60(147).

Site :- Jawadhi Ludhiana (c.f.)

Type :- 'M'.

Object :- To study the effect of different ratios of N, P and K on the yield of Wheat.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) Nil. (iv) C-273. (v) (a) 4-5 ploughings. (b) Kera. (c) to (e) N.A. (vi) 29.10.60. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 19.4.61

2. TREATMENTS:

4 manurial treatments: T_0 =Control, T_1 =N, P and K mixture in the ratio 10:5:5, T_2 =N, P and K mixture in the ratio 12:5:5 and T_3 =N, P and K mixture in the ratio 14:5:5.
(Actual dose - N.A.)

3. DESIGN:

(i) R.B.D.; 4; 4. (ii) — (iii)(a) N.A. (b) 1/494 ha. (iv) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960—only (b) No. (c) Nil. (v) Phullarwal, Ghungrali and Sadhar. (vi) and (vii) Nil.

5. RESULTS:

(i) 2738 Kg/ha. (ii) 279.9 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T_0	T_1	T_2	T_3
Av. yield	2147	2764	2923	3116

C.D.=447.8 Kg/ha.

Crop :- Wheat (*Rabi*).

Ref :- Pb. 60 and 61 (S.F.T.).

Site :- Sangrur, Patiala, Ludhiana, Hoshiarpur,
Jullundur and Ferozepur

Type :- 'M'.

Object :—Type A : To study the response of N, P and K applied individually and in combination on the yield of Wheat.

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS:

8 manurial treatments:

O=Control (no manure)

N=22.4 Kg/ha. of N

P=22.4 Kg/ha of P_2O_5

K=22.4 Kg/ha of K_2O

NP=22.4 Kg/ha. of N+22.4 Kg/ha. of P_2O_5

NK=22.4 Kg/ha. of N+22.4 Kg/ha. of K_2O

PK=22.4 Kg/ha. of P_2O_5 +22.4 Kg/ha. of K_2O .

NPK=22.4 Kg/ha. of N+22.4 Kg/ha. of P_2O_5 +22.4 Kg/ha. of K_2O .

3. DESIGN:

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle/thana is changed once in two years with in the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on Kharif cereal, 8 on a Rabi cereal, 8 on Cash crop, 4 on an oilseed crop and 3 on a leguminous crop. Half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. Three trials on legumes are of type C. Residual effects of phosphate application are studied on type C trials in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98.8 ha. (b) 1/197.7 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-61. (b) and (c) N.A. (v) to (vii) N.A.
Av. response in Kg/ha.

5. RESULTS:

60 (S.F.T)

District	No. of trials	Control yield in Kg/ha.	N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Sangrur	14	2060	280	180	110	59.0	460	60	60	110	47.0
Patiala	9	2080	590	260	130	55.0	40	40	0	80	60.0
Ludhiana	10	1860	460	200	10	55.0	-20	-60	160	70	40.0
Hoshiarpur	2	1200	1180	440	310	144.0	290	20	-10	-40	61.0
Jullundur	15	1890	450	130	130	33.0	-20	-10	20	-90	28.0
Ferozepur	17	1490	290	90	80	30.0	20	-10	-50	-10	18.0

61 (S.F.T)

District	No of trials	Control yield in Kg/ha.	N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Sangrur	15	1700	460	250	130	61.0	-30	60	-70	120	35.0
Patiala	8	2330	490	250	80	73.0	30	40	50	80	47.0
Ludhiana	19	1850	640	280	100	85.0	-180	0	-60	50	69.0
Hoshiarpur	8	1500	1060	280	250	34.0	70	20	40	-10	20.0
Jullundur	15	1130	640	250	120	53.0	-10	20	60	20	22.0
Ferozepur	19	1470	310	100	130	27.0	-20	-10	-30	-10	20.0

Crop :- Wheat (Rabi).

Ref :- Pb. 60 and 61(S.F.T.)

Site :- Patiala and Hoshiarpur

Type :- 'M'.

Object :- Type A : To study the response of N, P and K applied individually and in combination on the yield of Wheat.

1. BASAL CONDITIONS

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS and 3. DESIGN :

Same as in type A conducted on Wheat crop under irrigated condition on page No. 476.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960 to 61. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Av. response in Kg/ha.

60 (S.F.T.)

District	No. of trials	Control yield in Kg/ha.	N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Patiala	4	1620	470	260	160	101.0	20	-50	-70	-20	42.0
Hoshiarpur	11	830	610	100	100	53.0	80	10	20	40	29.0

61 (S.F.T.)

District.	No. of trials	Control yield in Kg/ha.	N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Patiala	4	1690	540	350	40	37.0	0	0	60	20	22.0
Hoshiarpur	15	850	640	120	40	37.0	0	0	60	20	22.0

Crop :- Wheat (Rabi).

Ref :- Pb. 60 and 61(S.F.T.)

Site :- Patiala and Hoshiarpur

Type :- 'M'.

Object— :- Type B: To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

7 manurial treatments:

O—Control (no manure)

N₁—22.4 Kg/ha. of N as A/S.,

N₂—44.8 Kg/ha. of N as A/S.,

N₁'—22.4Kg/ha. of N as Urea.,

N₂'—44.8 Kg/ha. of N as Urea.,

N₁"—22.4 Kg/ha. of N as C/A/N. and

N₂"—44.8 Kg/ha. of N as C/A/N.

3. DESIGN :

Same as in type A conducted under irrigated condition on Wheat crop on page. No. 476.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960 — 61. (b) and(c) N.A. (v) to (vii) N.A.

5. RESULTS :

60 (S.F.T.)

Av. response in Kg/ha.

District	No. of trials	Control yield in Kg/ha.	N ₁	N ₂	N ₁ '	N ₂ '	N ₁ "	N ₂ "	S.E.	
Patiala	2	1870	270	740	160	570	410	1030	135.0	
Hoshiarpur	7	1000	250	790	310	720	390	1010	60.0	
61 (S.F.T)										
Patiala	4	1770	360	670	290	540	440	800	67.0	
Hoshiarpur	3	640	550	770	370	740	640	800	138.0	

Crop :- Wheat (Rabi).

**Ref :- Pb. 60(S.F.T)for Patiala and Sangrur
and 61(S.F.T)for Sangrur and Hoshiarpur**

Site :- Patiala, Sangrur and Hoshiarpur.

Type :- 'M'.

Object :- Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Alluvial. (iii) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (no manure)

$N_1=22.4$ Kg/ha. of N as A/S.,

$N_2=44.8$ Kg/ha. of N as A/S.,

$N_1'=22.4$ Kg/ha. of N as Urea.,

$N_2'=44.8$ Kg/ha. of N as Urea.,

$N_1''=22.4$ Kg/ha. of N as C/A/N. and

$N_2''=44.8$ Kg/ha. of N as C/A/N.

3. DESIGN :

Same as in type A conducted under irrigated condition on Wheat crop on pageNo. 476.

4. GENERAL :

(i) and (ii) N.A. (iii)Yield of grain. (iv) (a) to (c) N.A. (v) to (vii) N.A.,

5. RESULTS :

Av. response in Kg/ha.

60 (S.F.T.)

District	No of trials	Control yield in Kg/ha.	N_1	N_2	N_1'	N_2'	N_1''	N_2''	S.E.
Patiala	9	2080	610	950	450	1010	760	1130	128.0
Sangrur	16	1910	350	720	340	450	510	780	113.0

61 (S.F.T.)

Hoshiarpur	7	2050	360	400	470	540	280	780	197.0
Sangrur	8	1140	480	1130	320	850	480	1140	45.0

Crop :- Wheat (Rabi).

**Ref :- Pb. 60(S.F.T) for Ferozepur and
61(S.F.T) for Sangrur, Ferozepur and Patiala**

District :- Sangrur, Ferozepur and Patiala.

Type :- 'M'.

Object :-Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O = Control (no manure)

N₁ = 22.4 Kg/ha. of N as A/S,

N₂ = 44.8 Kg/ha. of N as A/S,

N₁' = 22.4 Kg/ha. of N as Urea,

N₂' = 44.8 Kg/ha. of N as Urea,

N₁" = 22.4 Kg/ha. of N as A/S/N and

N₂" = 44.8 Kg/ha. of N as A/S/N

3. DESIGN :

Same as in type A conducted under irrigated condition on Wheat crop on page No. 476.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) to (vii) N.A.

5. RESULTS :

Av. response in Kg/ha.

60 (S.F.T.)

District	No. of trials	Control yield in Kg/ha.	N ₁	N ₂	N ₁ '	N ₂ '	N ₁ "	N ₂ "	S.E.
Ferozepur	15	1490	290	440	270	410	220	430	55.0

61 (S.F.T.)

Sangrur	8	1730	340	470	270	520	580	760	103.0
Ferozepur	12	1320	170	320	160	360	170	330	39.0
Patiala	8	2490	50	950	470	1070	590	1190	105.3

Crop :- Wheat (Rabi).

Ref :- Pb. 62 to 65 (S.F.T.) for Ferozepur, Gurdaspur, Ludhiana, Patiala and Sangrur; 62, 65 (S.F.T.) for Hoshiarpur and 62, 63, and 65 (S.F.T.) for Jullundur.

Distict :- Ferozepur, Gurdaspur, Ludhiana, Patiala, Sangrur, Type 'M' Hoshiarpur and Jullundur.

Object :-Type A1: To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS:

8 manurial treatments :

O = Control (no manure)

N₁ = 35 Kg/ha. of N,

N₂ = 70 Kg/ha.,

P₁ = 35 Kg/ha. of P₂O₅,

N₁P₁ = 35 Kg/ha. of N + 35 Kg/ha. of P₂O₅

$N_2P_1=70\text{Kg/ha. of N}+35\text{ Kg/ha. of }P_2O_5$

$N_2P_2=70\text{ Kg/ha. of N}+70\text{Kg/ha. of }P_2O_5$

$N_2P_2K_1=70\text{Kg/ha. of N}+70\text{Kg/ha. of }P_2O_5+35\text{Kg/ha. of }K_2O$

3. DESIGN :

(i) and (ii) A selected district is divided into four agriculturally homogeneous zones based on climate, soil cropping pattern etc. In each zone one block is selected at random. A block normally consists of a group of 50-100 villages. In each block 36 experiments are conducted in a year of which 11 are of type A_1 , 11 of type A_2 , 11 of type A_3 and 3 are type C. The eleven experiments each under type A_1, A_2 and A_3 are distributed as 3 on a Kharif cereal, 3 on a rabi cereal, 3 on a cash crop and 2 on oilseed. All the three type-C experiments are conducted on legume crop. For the purpose of conducting the A_1, A_2 and A_3 experiments 11 villages are randomly selected in each block and in each village 3 experiments one each of type A_1, A_2 and A_3 are laid out. For conducting these experiments, three villages are randomly selected in each block.

(iii) (a) 1/100ha. (b) 1/200ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962 to 66 for Ferozepur, Gurdaspur, Ludhiana, Patiala and Sangrur. 1962 to 66 for Hoshiarpur. (63,64, N.A.) and 1962 to 65 for Jullundur (64 N.A.) (iv) to (vii) N.A.

5. RESULTS :

Patiala

62(S.F.T)

Treatment	N_1	N_2	P_1	N_1P_1	N_2P_1	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of grain in Kg/ha.	642	820	327	778	931	1188	1153	114.1

Control yield=1799 Kg/ha. ; No. of trials=7

63(S.F.T.)

Treatment	N_1	N_2	P_1	N_1P_1	N_2P_1	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of grain in Kg/ha.	536	625	214	577	1017	1037	1034	181.3

Control yield=2464 Kg/ha. ; No. of trials=7

64(S.F.T.)

Treatment	N_1	N_2	P_1	N_1P_1	N_2P_1	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of grain in Kg/ha.	553	939	102	674	1150	1344	1348	80.5

Control yield=1781 Kg/ha. ; No. of trials=11

65(S.F.T.)

Treatment	N_1	N_2	P_1	N_1P_1	N_2P_1	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of grain in Kg/ha.	503	956	-20	636	1238	1222	1417	159.1

Control yield=1679 Kg/ha. ; No. of trials=8

Hoshiarpur

62(S.F.T.)

Treatment	N_1	N_2	P_1	N_1P_1	N_2P_1	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of grain in Kg/ha.	222	170	-85	227	333	459	511	185.2

Control yield=980Kg/ha.; No. of trials=2

63 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	579	996	45	722	1108	1359	1369	106.0

Control yield=1245 Kg/ha. ; No. of trials=15

Jullundur

62(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	391	580	179	555	778	985	1085	69.5

Control yield=1342 Kg/ha. ; No. of trials=12

63(S.F.T)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	380	664	186	486	674	912	1043	71.1

Control yield=1808 Kg/ha. ; No. of trials=16

65(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	590	1052	318	825	946	1396	1678	117.3

Control yield=1696 Kg/ha. ; No. of trials=10

Ferozepur

62(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.F.
Av. response of grain in Kg/ha.	448	622	213	542	605	904	624	96.5

Control yield=1467 Kg/ha. ; No. trials=9

63(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	376	589	99	582	764	965	1027	53.8

Control yield=1149 Kg/ha. ; No. of trials=10

64 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	458	755	202	682	940	1125	1238	72.8

Control yield=1395 Kg/ha. ; No of trials=7

65(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	210	411	89	368	610	737	856	35.2

Control yield=1779 Kg/ha. No of trials=17

Gurdaapur

62(S.F.T)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	347	673	70	593	799	901	1021	61.4

Control yield=1205 Kg/ha. ; No. of trials=7

63(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	448	662	21	606	782	764	867	122.4

Control yield=1375 Kg/ha. ; No. of trials=8

64(S.E.T)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	441	723	95	648	862	1115	1131	78.7

Control yield=1301 Kg/ha. ; No. of trials=11

65 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	289	417	-9	435	725	930	896	88.9

Control yield=1293 Kg/ha. ; No. of trials=10

Ludhiana.

62(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	603	965	58	745	1008	1326	1097	346.7

Control yield=1819 Kg/ha. ; No. of trials=7

63(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	339	563	207	699	1040	1189	1307	153.3

Control yield=2142Kg/ha. ; No. of trials=11

64(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	683	1083	374	911	1280	1439	1488	86.4

Control yield=1996 Kg/ha. ; No. of trials=14

65 (S F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	454	708	405	843	998	1255	1324	67.7

Control yield=2033 Kg/ha. ; No. of trials=14

Sangrur

62(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	373	798	43	583	847	923	944	109.1

Control yield=1998 Kg/ha. ; No. of trials=16

63(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	275	518	61	512	757	899	1008	51.3

Control yield=1739 Kg/ha. ; No of trials=12

64(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	191	885	65	364	826	691	966	119.1

Control yield =1568 Kg/ha. ; No. trials=10

65(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	444	691	125	370	787	804	894	90.4

Control yield=1663 Kg/ha.; No. of trials=11

Crop :- Wheat(Rabi)**District :- Gurdaspur, Hoshiarpur
Ludhiana and Patiala.****Ref :- 62, 63(S.F.T) for Gurdaspur,
62to 64 (S.F.T) for Hoshiarpur, 62
(S.F.T) for Ludhiana and 63(S.F.T)
for Patiala.****Type :- 'M'**Object Type A₁ :-To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.**1. BASAL CONDITIONS :**

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS and 3. DESIGN : are same as in Type A₁ conducted on Wheat crop under irrigated condition on page No. 480.**4. GENERAL:**

(i) and (ii) N.A. (iii) Yield of Wheat. (vi) (a) 1962 to 66 (64 and 65 N.A.) for Gurdaspur, 1962 to 66. (65 N.A.) for Hoshiarpur, 1962 for Ludhiana and 1963 only for Patiala. (iv) to (vii) N.A.

5. RESULTS:

Gurdaspur

62(S.F.T)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	355	635	102	431	817	929	1031	62.5

Control yield=448 Kg/ha. ; No. of trials=3

63 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	444	743	224	889	1284	1415	1524	94.8

Control yield=872 Kg/ha. ; No. of trials=4

Hoshiarpur

62(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	513	855	113	555	918	1019	1037	89.7

Control yield=1020 Kg/ha. ; No of trials=10

63(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	422	740	88	498	952	890	1141	108.2

Control yield=1078 Kg/ha. ; No. of trials=17

64(S.F.T)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	433	853	105	566	993	1213	1261	60.9

Control yield=1290 Kg/ha. ; No. of trials=18

Ludhiana

62(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	263	505	186	507	639	836	965	110.9

Control yield=1054 Kg/ha. ; No. of trials=3

Patiala

63 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	333	528	56	464	593	672	785	70.6

Control yield.=630 Kg/ha. ; No. of trials=4

Crp :- Wheat (Rabi)

Ref :- Pb. 62, 63(S.F.T.) for Jullundur

District:- Jullundur, Ludhiana, Patiala, 62 to 65(S.F.T) for Ludhiana, Patiala, Sangrur and Hoshiarpur.

Sangrur and 62,65(S.F.T.) for Hoshiarpur.

Type :- 'M'.

Object :-Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (No manure)

N₁=35 Kg/ha. of N,P₁=35 Kg/ha. of P₂O₅,P₂=70 Kg/ha. of P₂O₅,N₁P₁=35 Kg/ha. of N+35 Kg/ha. of P₂O₅,N₁P₂=35 Kg/ha. of N+70 Kg/ha. of P₂O₅,N₂P₂=70 Kg/ha. of N+70 Kg/ha. of P₂O₅ andN₂P₂K₂=70 Kg/ha. of N+70 Kg/ha. of P₂O₅+70Kg/ha. of K₂O,

3. DESIGN :

Same as in type A₁ Conducted under irrigated condition on Wheat crop on page No. 480.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of wheat. (iv) (a) 1962 to 63 for Jullundur, 1962 to 66 for Ludhiana, Patiala, Sangrur and 1962 to 66 for Hoshiarpur (63 and 64 N.A.) (b) and (c) Nil. (v) to (vii) N.A.

5. RESULTS

Jullundur

62 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	408	116	231	482	599	719	812	50.8

Control yield=1344 Kg/ha. No. of trials=12.

63(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	613	159	307	706	807	1044	1110	55.5

Control yield=1519 Kg/ha. No. of trials=16

Ludhiana

62(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	652	295	356	652	894	1178	985	369.2

Control yield=1712 Kg/ha. No. of trials=7.

63(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	582	250	426	807	1013	1153	1374	389.0

Control yield=1889 Kg/ha; No. of trials=7

64(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	771	287	433	880	1226	1592	1717	104.2

Control yield=1719 Kg/ha; No. of trials=16

65(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	559	260	548	665	979	1258	1376	104.4

Control yield=2000 Kg/ha; No. of trials=15

Patiala

62(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	485	95	459	732	936	1015	1174	97.8

Control yield=1623 Kg/ha; No. of trials=7

63(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	499	232	536	741	1095	1047	1371	176.3

Control yield=2357Kg/ha; No. of trials=8

64(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	459	-3	131	504	654	1132	1110	117.7

Control yield=1859 Kg/ha; No. of trials=12

65(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	491	296	270	723	1001	1532	1447	132.6

Control yield=1621 Kg/ha; No. of trials=9

Sangrur

62(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	555	162	321	512	747	786	943	90.4

Control yield=1708 Kg/ha; No. of trials=15

63(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	175	52	137	394	415	727	846	53.0

Control yield=1657Kg/ha. ; No of trials=11

64(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg ha.	387	275	50	934	1116	1340	1442	103.9

Control yield=1473 Kg/ha. ; No of trials=9

65(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	255	77	106	330	460	766	810	48.2

Control yield=1739 Kg/ha. ; No. of trials=11

Hoshiarpur

62(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	589	103	242	634	774	1024	1041	73.8

Control yield=798 Kg/ha; No. of trials=4

65(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S
Av. response of grain in Kg/ha.	495	37	153	611	700	1126	1144	72.8

Control yield=1213 Kg/ha. ; No of trials=15

Crop :- Wheat (Rabi).
District :- Patiala, Hoshiarpur
Gurdaspur and Ludhiana.

Ref :- Pb. 63(S.F.T) for Patiala, 63,64(S.F.T)
for Hoshiarpur 62,63and65(S.F.T)for Gur-
daspur and 62,63(S.F.T) for Ludhina.

Type 'M'.

Object :—Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

Same as in type A₂ conducted on Wheat crop under irrigated condition on page No. 486.

3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Wheat crop on page No. 480.

4. GENERAL

(i) and (ii) N.A. (iii) Yield of wheat. (iv) 1963 for Patiala, 1962 to 66 Hoshiarpur (62, 65 N.A.), (b) 1962 to 66 for Gurdaspur (64 N.A.) and 1962, 63 for Ludhiana. (v) to (vii) N.A.

5. RESULTS :

Patiala

63 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	298	49	143	429	444	605	840	85.7

Control yield=659 Kg/ha. ; No. of trials=4

Hoshiarpur

63 (S.F.T)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	463	137	198	645	708	970	1012	72.5

Control yield=901 Kg/ha. ; No. of trials=17

64 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	615	141	328	748	707	1120	1283	87.6

Control yield=1357 Kg/ha. ; No. of trials=18

Gurdaspur

62 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	318	88	237	496	607	854	716	159.1

Control yield=521 Kg/ha. ; No. of trials=4

63(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	467	160	345	1072	1010	1111	1494	138.5

Control yield=825 Kg/ha. ; No. of trials=4

65(S.F.T)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	270	44	110	391	517	831	824	76.7

Control yield=990 Kg/ha. ; No. of trials=10

Ludhiana

62(S.F.T)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	343	244	674	683	856	1080	1245	101.1

Control yield=1179 Kg/ha. ; No of trials=3

63(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	125	204	349	487	606	810	1041	66.7

Control yield=1001 Kg/ha. ; No of trials=3

Crop :- Wheat (Rabi)

District : Ferozepur, Ludhiana, Patiala, Ludhiana, Patiala and Sangrur; Sangrur, Jullundur, Hoshiarpur and Gurdaspur

Ref. :- Pb 62 to 65(S.F.T.) for Ferozepur, 62,63(S.F.T.) for Jullundur; 62,65(S.F.T) for Hoshiarpur and 62,63 and 65 (S.F.T.) for Gurdaspur.

Type :- 'CM'.

Object :-Type A₂ : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

N₁=35 Kg/ha. of N,K₁=35 Kg/ha. of K₂O,K₂=70 Kg/ha. of K₂O,N₁K₁=35 Kg/ha. of N+35 Kg/ha. of K₂O,N₁K₂=35 Kg/ha. of N+70 Kg/ha. of K₂O,N₂K₂=70 Kg/ha. of N+70 Kg/ha. of K₂O andN₁P₁K₁=35 Kg/ha. of N+35 Kg/ha. of P₂O₅+35 Kg/ha. of K₂O.

3. DESIGN :

Same as in type A₁ Conducted under irrigated condition on Wheat crop on page No. 480.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) 1962 to 65 (S.F.T.) for Ferozepur, Ludhiana, Patiala and Sangrur; 62, 63 (S.F.T.) for Jullundur; 62, 65 (S.F.T) for Hoshiarpur and 62, 63 and 65 (S.F.T.) for Gurdaspur (v) to (vii) N.A.

5. RESULTS :

Ferozepur

62(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	361	44	340	365	503	702	682	110.4

Control yield=1472 Kg/ha. ; No. of trials=5

63 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	573	174	298	695	797	1004	901	63.0

Control yield=1121Kg/ha. ; No. of trials=8

64(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	454	89	182	626	649	871	1180	77.6

Control yield=1301 Kg/ha. ; No. of trials=8

65(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	278	81	184	416	504	630	720	22.0

Control yield=1516 Kg/ha. ; No. of trials=15

Ludhiana

62(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	810	95	69	445	477	924	734	323.1

Control yield=1517 Kg/ha. ; No. of trials=7

63(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	472	49	192	507	608	908	934	278.1

Control yield=1983 Kg/ha. ; No. of trials=7

64(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	686	196	403	681	804	1160	1177	93.6

Control yield=1796 Kg/ha. ; No. of trials=14

65(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	515	213	440	539	693	1008	1094	104.6

Control yield=1888 Kg/ha. ; No. of trials=16

Patiala

62(S.F.T)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	653	51	522	833	883	1030	1123	236.1

Control yield=1651Kg/ha. ; No. of trials=7

63(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	509	-98	212	523	679	820	929	203.0

Control yield=2033Kg/ha. ; No. of trials=8

64(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	501	197	225	577	681	1186	1136	111.9

Control yield=1820 Kg/ha. ; No. of trials=12

65(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	610	90	211	756	831	1074	1262	139.2

Control yield=1688 Kg/ha. ; No. of trials=10

Sangrur

62(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	558	85	132	482	669	915	782	83.6

Control yield=1570 Kg/ha. ; No. of trials=15

63(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	290	57	262	520	598	735	767	63.2

Control yield=1195 Kg/ha. ; No. of trials=11

64(S.F.T)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	381	520	307	787	879	1010	608	224.5

Control yield=1603Kg/ha. ; No. of trials=9

65(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	328	84	74	210	178	536	405	75.5

Control yield=1625 Kg/ha. ; No. of trials=11

Jullundur

62(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₁	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	443	123	232	540	638	794	780	53.7

Control yield=1303 Kg/ha. ; No. of trials=12

5. RESULTS :

63(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	729	258	349	691	774	1107	1088	52.3

Control yield=1484 Kg/ha. ; No. of trials=14

Hoshiarpur

62(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	102	40	-98	578	368	840	483	208.6

Control yield=1061 Kg/ha. ; No. of trials=3

65(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	543	8	106	671	692	1106	1103	90.1

Control yield=1131 Kg/ha. ; No. of trials=13

Gurdaspur

62(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	314	-18	-1	357	426	532	561	54.9

Control yield=1565 Kg/ha. ; No. of trials=6

63(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	410	-4	18	405	434	732	520	44.8

Control yield=1320 Kg/ha. ; No. of trials=7

65(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	346	47	21	337	389	606	683	80.8

Control yield=883 Kg/ha. ; No. of trials=10

Crop :- (Rabi).

**District :- Ferozepur, Patiala
Hoshiarpur, Ludhiana and
Gurdaspur.**

**Ref :-Pb. 62(S.F.T) for Ferozepur and patiala;
62 to 64(S.F.T) for Hoshiarpur, 62,63 (S.F.T) for
Ludhiana and 63,64(S.F.T)forGurdaspur.**

Type :- 'M'.

Object :-Type A₂: To study the response curves of important cereal,cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS

Same as in type A₂ conducted under irrigated condition on Wheat crop on page No. 490.

3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Wheat crop on page No. 480.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of wheat. (iv) (a) 1962 for Ferozepur, Patiala, 1962 to 66 for Hoshiarpur (65 N.A.), 1962 to 63 for Ludhiana and 1963 to 66 for Gurdaspur (65 N.A.). (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Ferozepur

62(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	192	93	256	143	326	385	118	123.0

Control yield=1126 Kg/ha. ; No. of trials=2

Patiala

62(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	224	22	76	244	328	696	541	77.0

Control yield=669 Kg/ha. ; No. of trials=4

Hoshiarpur

62 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	414	60	105	461	453	769	778	63.8

Control yield=729 Kg/ha. ; No. of trials=9

63(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	422	96	142	468	522	903	825	60.3

Control yield=1067 Kg/ha. ; No. of trials=17

64 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	422	63	177	610	626	1019	818	81.5

Control yield=1168 Kg/ha. ; No. of trials=17

Ludhiana

62(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	429	235	400	552	644	802	888	113.4

Control yield=838 Kg/ha. ; No. of trials=3

63(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	408	85	164	467	540	632	830	42.8

Control yield=836 Kg/ha. ; No. of trials=3

Gurdaspur

63(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	535	217	300	672	765	1067	931	128.7

Control yield=937 Kg/ha. ; No. of trials=5

64(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	262	-29	11	314	375	648	585	60.0

Control yield=1164 Kg/ha. ; No. of trials=9

Crop Wheat-(Rabi).

Ref :- Pb. 62(195).

Site :- Agri. Res. Stn.; Gurdaspur

Type :- 'MV'.

Object :- To study the response of different varieties of Wheat to different doses of fertilizer.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Nil. (c) N.A. (ii) Heavy loam. (iii) 13.11.62. (iv) (a) 5-6 ploughings. (b) to (e) N.A. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 4 weedings. (ix) N.A. (x) 18.4.63.

2. TREATMENTS :

Main-plot treatments :-

7 fertilizers : M₀=Control (No manure), M₁=44.8 Kg/ha. of N, M₂=89.6 Kg/ha. of N, M₃=M₁+22.4 Kg/ha. of P₂O₅, M₄=M₂+44.8 Kg/ha. of P₂O₅+22.4 Kg/ha. of K₂O, M₅=M₂+22.4 Kg/ha. of K₂O and M₆=M₂+44.8 Kg/ha. of P₂O₅+44.8 Kg/ha. of K₂O.

Sub-plot treatments :—2 varieties : $V_1=C-286$ and $V_2=C-273$.**3. DESIGN :**

(i) Split-plot. (ii) (a) 7 main-plots/replication; 2 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/197.7 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 1743 Kg/ha. (ii) (a) 219.4 Kg/ha. (b) 109.9 Kg/ha. (iii) Main effect of M alone is highly significant. (iv) Av. yield of grain in Kg/ha,

	M_0	M_1	M_2	M_3	M_4	M_5	M_6	Mean
V_1	519	1661	2034	1532	2397	1774	2466	1769
V_2	499	1557	1942	1641	2392	1715	2273	1717
Mean	509	1609	1988	1586	2394	1744	2370	1743

C.D. for M marginal means=230.5 Kg/ha.

Crop:- Wheat (Rabi)**Ref :- Pb. 61(62).****Site:- Reg. Wheat Res. Stn., Gurdaspur.****Type :- 'MV'.**

Object—To study the effect of different doses of N on different varieties of Wheat crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 29.11.61 (iv) (a) 6-8 ploughings, 6-8 plankings. (b) Behind the plough. (c) to (e) N.A. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 26.4.62.

2. TREATMENTS :

All combinations of (1) and (2) :

(1) 6 levels of N as C/A/N: $N_0=0$, $N_1=22.4$, $N_2=33.6$, $N_3=44.8$, $N_4=56.0$, and $N_5=67.2$ Kg/ha.
(2) 2 varieties : $V_1=C-286$, and $V_2=C-273$.**3. DESIGN :**

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/346 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961 (Design and treatments modified in 62). (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 1316 Kg/ha. (ii) 132.8 Kg/ha. (iii) Main effect of N alone is significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅	Mean
V ₁	964	1297	1327	1474	1431	1339	1305
V ₂	868	1349	1370	1401	1491	1477	1326
Mean	916	1323	1348	1438	1461	1408	1316

C.D. for N marginal means = 109.2 Kg/ha.

Crop :- Wheat (Rabi).

Ref :- Pb. 62(85).

Site :- Reg. Wheat Res. Stn., Gurdaspur.

Type :- 'MV'.

Object :- To study the effect of different doses of N on the different varieties of Wheat crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) N.A. (iv) (a) 6-8 ploughings, 6-8 plankings. (b) Behind the plough. (c) to (e) N.A. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 weedings. (ix) and (x) N.A.

2. TREATMENTS :

Main-plot treatments :-

4 levels of N as C/A/N : N₀=0, N₁=22.4, N₂=44.8 and, N₃=67.2 Kg/ha.

Sub-plot treatments:

3 varieties : V₁=C-273, V₂=C-306 and V₃=C-286.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication, 3 sub-plots/main-plot. (b) N.A. (iii) 6. (iv) and (v) N.A. (vi) Yes.

4 GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961-63. (Treatments modified in 63) (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 1043 Kg/ha. (ii) (a) 424.9 Kg/ha. (b) 143.7 Kg/ha. (iii) Main effect of N alone is significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	N ₃	Mean
V ₁	450	964	1233	1497	1036
V ₂	531	1043	1255	1517	1086
V ₃	556	912	1255	1307	1008
Mean	512	973	1248	1440	1043

C.D. for N marginal means = 301.7 Kg/ha.

Crop :- Wheat (Rabi).**Ref :- Pb. 63(110).****Site :- Reg. Wheat Res. Stn., Gurdaspur.****Type :- 'MV'.****Object :-**To study the effect of different doses of N on different varieties of Wheat.**1. BASAL CONDITIONS :**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 25.11.63. (iv) (a) 6-8 ploughings. (b) Behind the plough. (c) to (e) N.A. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 weedings. (ix) and (x) N.A.

2. TREATMENTS :**Main-plot treatments :**3 varieties: $V_1=303$, $V_2=273$ and $V_3=306$.**Sub-plot treatments :**5 levels of N as C/A/N= $N_0=0$, $N_1=22.4$, $N_2=44.8$, $N_3=67.2$ and $N_4=89.6$ Kg/ha.**3. DESIGN:**

(i) Split-plot. (ii) (a) 3 main-plots/replication, 5 sub-plots/main-plot. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/247 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961-63. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 1868 Kg/ha. (ii) (a) 313.6 Kg/ha. (b) 151.3 Kg/ha. (iii) Main effect of N alone is significant. (iv) Av. yield of grain in Kg/ha.

	N_0	N_1	N_2	N_3	N_4	Mean
V_1	1483	1804	2026	2100	2249	1932
V_2	1384	1458	1853	2076	2273	1809
V_3	1334	1581	2002	2150	2249	1863
Mean	1400	1614	1960	2109	2257	1868

C.D. for N marginal means=101.8 Kg/ha.

Crop :- Wheat. (Rabi).**Ref :- Pb. 64(106).****Site :- Reg. Wheat Res. Stn., Gurdaspur.****Type :- 'MV'.****Object :-**To study the effect of different levels of fertilizers on the yield of different varieties of Wheat.**1. BASAL CONDITIONS :**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) N.A. (iv) (a) 6-8 ploughings and 6-8 plankings. (b) Behind the plough. (c) to (e) N.A. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 weedings. (ix) and (x) N.A.

2. TREATMENTS:

Main-plot treatments :

5 doses of fertilizers: $F_0=0$ (Control), $F_1=67.2$ Kg/ha. of $P_2O_5+44.8$ Kg/ha. of K_2O , $F_2=44.8$ Kg/ha. of $N+67.2$ Kg/ha. of $P_2O_5+44.8$ Kg/ha., of K_2O , $F_3=89.6$ Kg/ha. of $N+67.2$ Kg/ha. of $P_2O_5+44.8$ Kg/ha. of K_2O and $F_4=134.4$ Kg/ha. of $N+89.6$ Kg/ha. of $P_2O_5+44.8$ Kg/ha. of K_2O .

Sub-plot treatments :

6 varieties : V_1 =Lerma-64-A, V_2 =Sonara-63, V_3 =NP-876, V_4 =Sonara-64, V_5 =NP-887 and V_6 =C-306.

3. DESIGN :

(i) Split-plot. (ii) (a) 5 main-plots/replication, 6 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) $1/2 \times 7$ ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) and (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 3140 Kg/ha. (ii) (a) N.A. (b) 482.4 Kg/ha. (iii) Main effect of V alone is significant. (iv) Av. yield of grain in Kg/ha.

	F_0	F_1	F_2	F_3	F_4	Mean
V_1	3558	3499	4369	4156	3709	3858
V_2	2928	3744	3610	3539	3739	3512
V_3	3558	3551	3188	2792	3131	3244
V_4	3361	2874	3072	2871	2612	2958
V_5	2496	2817	2775	2693	2624	2681
V_6	2941	2869	2597	2167	2350	2585
Mean	3140	3226	3269	3036	3027	3140

C.D. for V marginal means=304.3 Kg/ha.

Crop :- Wheat. (Rabi).

Ref :- Pb. 64(203)

Site :-Govt. Agri. Stn., Gurdaspur.

Type :- 'MV'.

Object :- To study the effect of N,P and K on the yield of different varieties of Wheat.

1. BASAL CONDITIONS:

(i) N.A. (ii) Sandy loam. (iii) 17.11. 64. (iv) and (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) and (ix) N.A. (x) 24.4.65.

2. TREATMENTS

Main-plot treatments :

2 varieties : V_1 =C-273, V_2 =C-286.

Sub-plot treatments :

13 doses of fertilizers— F_0 =Control (No manure), $F_1=44.8$ Kg/ha. of N as C/A/N, $F_2=89.6$ Kg/ha. of N

as C/A/N, $F_2=F_1+P_1$, $F_4=F_2+P_1$, $F_6=F_1+P_1$, $F_8=F_2+P_2$, $F_7=F_1+P_1+K_1$, $F_9=F_2+P_1+K_1$, $F_{10}=F_1+P_2+K_1$, $F_{11}=F_2+P_2+K_1$, $F_{12}=F_1+P_2+K_2$ and $F_{13}=F_2+P_2+K_2$. $K_1=22.4$ Kg/ha. of K_2O as Mur. Pot and $K_2=44.8$ Kg/ha. of K_2O Mur. Pot., $P_1=22.4$ Kg/ha. of P_2O_5 as Super, $P_2=44.8$ Kg/ha. of P_2O_5 as Super,

3. DESIGN :

(i) Split-plot. (ii) (a) 2 main-plots/replication, 13 sub-plots/main-plot. (b) N.A. (iii) 2. (iv) (a) N.A. (b) 1/148.3 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1964-only. (b) No. (c) Nil. (v) N.A. (vi) Nil. (vii) N.A.

5. RESULTS :

(i) 2131 Kg/ha. (ii) (a) 286.0 Kg/ha. (b) 205.0 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	F_0	F_1	F_2	F_3	F_4	F_5	F_6	F_7	F_8	F_9	F_{10}	F_{11}	F_{12}	Mean
V_1	1364	1831	2194	1579	2254	2113	2365	2172	2039	2157	2402	2209	2647	2102
V_2	1290	1972	2202	2283	2365	1942	2231	2261	2217	2328	2394	2320	2268	2159
Mean	1327	1902	2198	1931	2309	2027	2298	2216	2128	2242	2398	2264	2458	2131

Crop : Wheat. (Rabi).

Ref :- Pb 65(121).

Site :- Punjab Agri. University. (Ludhiana

Campus) Ludhiana

Type :- 'MV'.

Object :- To study the effect of different levels of N on the yield of tall and dwarf varieties of Wheat.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Fallow. (c) Nil. (ii) Sandy loam. (iii) 16.11.65. (iv) (a) 3 ploughings. (b) By Kera. (c) 90 Kg/ha. (d) 23 cm. row to row. (e) Nil. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) and (ix) N.A. (x) 24.4.66.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 5 levels of N: $N_0=0$, $N_1=45$, $N_2=90$, $N_3=135$ and $N_4=180$ Kg/ha.

(2) 2 varieties: $V_1=C-306$ and $V_2=PV-18$.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 10. (b) N.A. (iii) 4 (iv) (a) N.A. (b) 1/250 ha. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Good. (ii) Nil. (iii) Yield of grain. (iv) (a) 1965— contd. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 4033 Kg/ha. (ii) 258.3 Kg/ha. (iii) Main effects of N, V and interaction $N \times V$ are highly significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	N ₃	N ₄	Mean
V ₁	3118	3693	3380	3193	3380	3353
V ₂	3425	3850	5163	5343	5780	4712
Mean	3272	3772	4272	4268	4580	4033

C.D. for N marginal means=265.0 Kg/ha.

C.D. for V marginal means=167.6Kg/ha.

C.D. for the body of N×V table=374.8 Kg/ha.

Crop :- Wheat (Rabi).

Ref :- Pb. 65(59).

Site :- Cotton Res. Stn., Abohar.

Type :- 'C'.

Object :-To study the effect of deep ploughing and inter culturing on the yield of Wheat crop.

1. BASAL CONDITIONS :

(i) (a) Cotton-Wheat. (b) Cotton. (c) N.A. (ii) Sandy loam. (iii) Nov., 65. (iv) (a) 4-5 ploughings. (b) to (e) N.A. (v) N.A. (vi) C-273. (vii) Irrigated (viii) 2 hoeings, and 2 weedings. (ix) N.A. (x) 1st week of April, 66.

2. TREATMENTS :

Main-plot treatments :

3 ploughings : P₁=Normal ploughing, P₂=22cm. deep ploughing every year after Cotton-Wheat and P₃=22cm. deep ploughing once or two years after Wheat harvesting.

Sub-plot treatments :

3 inter-culturing treatments:—C₁=One inter-culture, C₂=Two inter cultures and C₃=Three inter cultures.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication, 3 sub-plots/main-plot. (b) N.A. (iii) 4 (iv) (a) N A (b) 1/299ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1965-only. (b) No. (c) Nil. (v) Jullundur and Gurdaspur. (vi) and (vii) Nil.

5. RESULTS :

(i) 3425 Kg/ha. (ii) (a) 179.0 Kg/ha. (b) 243.0Kg/ha. (iii) Main effect of 'P' alone is highly significant (iv) Av. yield of grain in Kg/ha.

	C ₁	C ₂	C ₃	Mean
P ₁	3131	3011	2885	3009
P ₂	3795	3736	3699	3743
P ₃	3530	3580	3457	3522
Mean	3485	3442	3347	3425

C.D. for P marginal means=178.8 Kg/ha.

Crop:-Wheat(Rabi).

Ref:-Pb. 65(66).

Site :- Agri. Res. Stn., Gurdaspur.

Type :- 'C'.

Objec :-To study the effect of deep ploughing and inter culturing on the yield of Wheat crop.

1. BASAL CONDITIONS:

(i) (a) Cotton-Wheat. (b) Cotton. (c) N.A. (ii) Heavy loam. (iii) Mid of Nov., 65. (iv) (a) 5-6 ploughings. (b) to (e) N.A. (v) N.A. (vi) C-286. (vii) Irrigated. (viii) 2 hoeings. (ix)—(x) Mid of April, 66.

2. TREATMENTS:

Same as in expt. no. 65(59) and presented on page No. 501.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication ; 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/291 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal (ii) N.A. (iii) Yield of grain. (iv) (a) 1965—contd. (b) No. (c) Nil. (v) Abohar and Jullundur. (vi) and (vii) Nil.

5. RESULTS :

(i) 1039 Kg/ha. (ii) (a) 422.0 Kg/ha. (b) 173.0 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	P ₁	P ₂	P ₃	Mean
C ₁	1138	1172	931	1080
C ₂	1093	960	911	988
C ₃	1088	1010	1049	1049
Mean	1106	1047	964	1039

Crop :-Wheat(Rabi).

Ref:-Pb. 65(33).

site :- Agri. Res. Stn., Jullundur.

Type:-'C'.

Object—To study the effect of deep ploughing and inter culturing on the yield of Wheat crop.

1. BASAL CONDITIONS:

(i) (a) Cotton-Wheat. (b) Cotton. (c) N.A. (ii) Sandy loam. (iii) 3.11.65. (iv) (a) 5 ploughings. (b) to (e) N.A. (v) N.A. (vi) C-273. (vii) Irrigated. (viii) 2 hoeings, 2 weedings. (ix) N.A. (x) Mid of April, 66.

2. TREATMENTS:

Same as in expt. no. 65(59) and presented on page No. 501.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication; 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/161 ha. (v) No. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1965—contd. (b) No. (c) Nil. (v) Above (vi) and (vii) N.A.

5. RESULTS :

(i) 2321 Kg/ha. (ii) (a) 246.0 Kg/ha. (b) 314.0 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	P ₁	P ₂	P ₃	Mean
C ₁	2238	2282	2194	2238
C ₂	2254	2339	2443	2345
C ₃	2318	2475	2351	2381
Mean	2270	2365	2329	2321

Crop :- Wheat. (Rabi).

Site :- Govt. Agri. College, Ludhiana.

Ref :- Pb. 61(110), 62(174).

Type :- 'C'.

Object :- To study the effect of deep cultivation on the yield of Wheat.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam ; Loamy sand. (iii) 27.11. 61; 29. 11. 62. (iv) (a) 5-6 ploughings. (b) to (e) N.A. (v) 44.8 Kg/ha. of N+22.4 Kg/ha. of P₂O₅. (vi) C-273. (vii) Irrigated. (viii) N.A. ; 2 weedings. (ix) N.A. (x) 16.4. 62. ; 4.5.63.

2. TREATMENTS :

3 depths of ploughing : D₁=Shallow ploughing 10cm. to 15cm. deep. , D₂=Deep ploughing 20cm. to 25 cm. deep and D₃=Ripping up to 46cm. deep.

3. DESIGN :

(i) R.B.D. (ii) (a) 3. (b) N.A. (iii) 4. ; 8. (iv) (a) N.A. (b) 1/59ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961 to 62. (b) No. (c) Nil. (v) N.A. (vi) Nil (vii) As the error variances are heterogeneous and Treatments × Years interaction is absent. Hence the results of individual years are given under 5. Results.

5. RESULTS:

61(110)

(i) 1809 Kg/ha. (ii) 228.0 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	D ₁	D ₂	D ₃
Av. yield	1636	1894	1897

62(174)

(i) 1036 Kg/ha. (ii) 92.8 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	D ₁	D ₂	D ₃
Av. yield	934	1025	1150

C D. = 101.3 Kg/ha.

Crop :- Wheat (Rabi).

Ref :- Pb. 61(60).

Site :- Reg. Wheat. Res. Stn., Gurdaspur.

Type :- 'CV'.

Object :- To study the effect of different spacings on the yield of different varieties of Wheat.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 2.12.61. (iv) (a) 6-8 ploughings; 6-8 plankings. (b) Behind the plough. (c) N.A. (d) As per treatments. (e) N.A. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 30.4.62.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 3 varieties :- V₁ = C-303, V₂ = C-273 and V₃ = C-286.

(2) 3 spacings (between rows) :- S₁ = 15, S₂ = 23 and S₃ = 30 cm.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/494ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961—only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 651.0 Kg/ha. (ii) 300.0 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	V ₁	V ₂	V ₃	Mean
S ₁	870	741	677	763
S ₂	662	633	642	646
S ₃	642	558	435	545
Mean	725	644	585	651

Crop :- Wheat. (Rabi).**Ref:- Pb, 61(59).****Site :- Reg. Wheat. Res. Stn., Gurdaspur****Type :- 'CV'.****Object :-**To study the effect of different seed rates on the different varieties of Wheat.**1. BASAL CONDITIONS :**(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 24.11.61. (iv) (a) 6-8 ploughings and 6-8 plankings. (b) Behind the plough. (c) As per treatments. (d) and (e) N.A. (v) G.M. with Dhaincha 22.4 Kg/ha. of N as C/A/N and 17.9 Kg/ha. of P₂O₅ as Super. (vi) As per treatments (vii) Irrigated- (viii) 2 weedings. (ix) N.A. (x) 27.4.62.**2. TREATMENTS :**

All combinations of (1) and (2)

(1) 5 seed rates :- S₁=49.4, S₂=59.3, S₃=69.2, S₄=79.1, S₅=89.0 and S₆=98.8 Kg/ha.(2) 2 varieties :- V₁=273 and V₂=286.**3. DESIGN :**

(i) Fact. in R B.D. (ii) (a) 12. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/563ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal (ii) N.A. (iii) Yield of grain. (iv) (a) 1961-64. (modified for 62 to 64 treatments and Design.) (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 1216 Kg/ha. (ii) 448.8 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	Mean
V ₁	1114	1240	1374	1379	1384	1379	1312
V ₂	1030	954	1196	1018	1305	1223	1121
Mean	1072	1097	1285	1198	1344	1301	1216

Crop :-Wheat (Rabi).**Ref:-Pb. 62(90).****Site :- Reg. Wheat. Res. Stn., Gurdaspur.****Type :- 'CV'.****Object :-**To study the effect of different seed rates on the yield of different varieties of Wheat.**1. BASAL CONDITIONS:**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) N.A. (iv) (a) 6-8 ploughings, 6-8 plankings. (b) Behind the plough. (c) As per treatments. (d) and (e) N.A. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 2 weedings. (ix) and (x) N.A.

2. TREATMENTS :**Main-plot treatments :**3 varieties :- V₁=C-306, V₂=C-273 and V₃=C 286.**Sub-plot treatments :**4 seed rates :- S₁=49.4, S₂=74.1, S₃=98.8 and S₄=123.6 Kg/ha.**3. DESIGN.**

(i) Split-plot. (ii) (a) 3 main-plots/replication; 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/136ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961-64 (Treatments modified every year). (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 1474 Kg/ha. (ii) (a) 118.0 Kg/ha. (b) 164.6 Kg/ha. (iii) Main effect of V alone is significant. (iv) Av. yield of grain in Kg/ha.

	V ₁	V ₂	V ₃	Mean
S ₁	1616	1371	1154	1380
S ₂	1646	1441	1208	1432
S ₃	1693	1522	1359	1526
S ₄	1773	1507	1386	1557
Mean	1685	1460	1277	1474

C.D. for V marginal means=102.0 Kg/ha.

Crop :- Wheat. (Babi).

Ref :- Pb. 63(108).

Site :- Reg. Wheat. Res. Stn., Gurdaspur.

Type :- 'CV'.

Object :- To study the effect of different seed rates on the yield of different varieties of Wheat.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) N.A. (iv) (a) 6-8 ploughings, and 6-8 plankings. (b) Behind the plough. (c) As per treatments. (d) and (e) N.A. (v) 44.8 Kg/ha. of N+28 Kg/ha. of P₂O₅. (vi) As per treatments. (vii) Irrigated. (viii) 2 weedings. (ix) and (x) N.A.

2. TREATMENTS :

Main-plot treatments :

3 varieties : V₁=C-303, V₂=C-273 and V₃=C-306.

Sub-plot treatments :

4 seed-rates : S₁=49.4, S₂=74.1, S₃=98.8 and S₄=123.6 Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication; 3 sub-plots/main-plot. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/247 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961 to 64 (Treatments modified every year). (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 2166 Kg/ha. (ii) (a) 222.8 Kg/ha. (b) 151.3 Kg/ha. (iii) Main effect of S alone is significant. (iv) Av. yield of grain in Kg/ha.

	V ₁	V ₂	V ₃	Mean
S ₁	2076	1829	2150	2018
S ₂	2175	2051	2199	2142
S ₃	2397	2100	2298	2265
S ₄	2199	2298	2224	2240
Mean	2212	2069	2218	2166

C.D. for S marginal means=101.7 Kg/ha.

Crop :- Wheat. (Rabi).

Ref :- Pb. 64(102).

Site :- Reg. Wheat. Res. Stn., Gurdaspur.

Type :- 'CV'.

Object : To study the effect of different seed rates on different varieties of Wheat.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) N.A. (iv) (a) 6-8 ploughings, 6-8 plankings. (b) Behind the plough. (c) As per treatments. (d) and (e) N.A. (v) 44.8 Kg/ha. of N and 44.8 Kg/ha. of P₂O₅ at the time of sowing. (vi) As per treatments. (vii) Irrigated. (viii) 2 weedings. (ix) and (x) N.A.

2. TREATMENTS:

Main-plot treatments :

4 seed rates : S₁=49.4, S₂=74.1, S₃=98.8 and S₄=123.6 Kg/ha.

Sub-plot treatments :

3 varieties :— V₁=C-273. V₂=C-306 and V₃=C-286.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication; 3 sub-plots/main-plot, (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/247ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961—64. (Treatments modified every year) (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 3134 Kg/ha. (ii) (a) 294.3Kg/ha. (b) 335.2Kg/ha. (iii) Main effect of V alone is significant. (iv) Av. yield of grain in Kg/ha.

	S ₁	S ₂	S ₃	S ₄	Mean
V ₁	3202	3324	3338	3299	3291
V ₂	3190	3422	3114	3294	3255
V ₃	2676	2656	2936	3151	2855
Mean	3023	3134	3129	3248	3134

C.D. for V marginal means=244.6 Kg/ha.

Crop :- Wheat (Rabi).**Ref :- Pb. 62(88).****Site :- Reg. Wheat. Res. Stn., Gurdaspur.****Type :- 'CV'.****Object :-**To study the effect of different dates of sowing on the yield of different varieties of Wheat.**1. BASAL CONDITIONS:**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) As per treatments. (iv) 6-8 ploughings, 6-8 plankings. (b) Behind the plough. (c) to (e) N.A. (v) 33.6Kg/ha. of N. (vi) As per treatments. (vii) Irrigated. (viii) 2 weedings. (ix) and (x) N.A.

2. TREATMENTS:**Main-plot treatments :**4 dates of sowing :- $D_1=30$ th. Nov., $D_2=14$ th. Nov., $D_3=30$ th. Nov. and $D_4=14$ th Dec, 62.**Sub-plot treatments :**3 varieties :- $V_1=C-286$, $V_2=C-306$ and $V_3=C-273$.**3. DESIGN :**

(i) Split-plot (ii) (a) 4 main-plots/replication, 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/197-ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-64. (Treatments modified every year). (b) and (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 1409 Kg/ha. (ii) (a) 199.1 Kg/ha. (b) 146.3 Kg/ha. (iii) Main effects of D and V are significant. (iv) Av. yield of grain in Kg/ha.

	V_1	V_2	V_3	Mean
D_1	2086	2283	2056	2142
D_2	1745	1715	1601	1687
D_3	1102	1394	1191	1229
D_4	504	707	519	577
Mean	1359	1525	1342	1409

C.D for D marginal means = 183.9 Kg/ha.

C.D for V marginal means = 106.7 Kg/ha.

Crop :- Wheat (Rabi).**Ref :- Pb. 63(106).****Site :- Reg. Wheat. Res. Stn., Gurdaspur.****Type :- 'CV'.****Object :-**To study the effect of different dates of sowing on the yield of different varieties of Wheat.**1. BASAL CONDITIONS :**(i) (a) to (c) N.A. (ii) Sandy loam. (iii) As per treatments. (iv) (a) 6-8 ploughings, 6-8 plankings. (b) Behind the plough. (c) to (e) N.A. (v) 44.8 Kg/ha. of N + 28 Kg/ha of P_2O_5 at the time of sowing. (vi) As per treatments. (vii) Irrigated. (viii) 2 weedings. (ix) and (x) N.A.

2. TREATMENTS:

Main-plot treatments :4 dates of sowing : $D_1=21\text{st Oct.}$, $D_2=14\text{th Nov.}$, $D_3=2\text{ 1st Nov.}$ and $D_4=7\text{th Dec., 63.}$ **Sub-plot treatments :**3 varieties : $V_1=C-303$, $V_2=C-306$, and $V_3=C-273$.

3. DESIGN:

(i) Split-plot. (ii) (a) 4 main-plots/replication 3, sub-plots/main-plot. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/247 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962 to 64 (Treatments modified every year). (b) N.A. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 2362 Kg/ha. (ii) (a) 111.3 Kg/ha. (b) 445.5 Kg/ha. (iii) Main effects of D and V are significant. (iv) Av. yield of grain in Kg/ha.

	V_1	V_2	V_3	Mean
D_1	1927	2076	2273	2092
D_2	1829	2669	2792	2430
D_3	2323	2644	2693	2553
D_4	2249	2422	2446	2372
Mean	2082	2453	2551	2362

C.D. for D marginal means=102.8 Kg/ha.

C.D. for V marginal means=325.1 Kg/ha.

Crop :- Wheat (Rabi).**Ref :- Pb. 64(275).****Site :- Ag. Res. Stn., Gurdaspur.****Type :- 'CV'.**

Object : - To study the effect of different dates of sowing on different varieties of Wheat.

1. BASAL CONDITIONS:

(i) (a) Cotton-Wheat. (b) Cotton. (c) N.A. (ii) Heavy loam. (iii) As per treatments. (iv) (a) 4 ploughings. (b) Kera. (c) 70 Kg/ha. (d) and (e) 22cm. (v) 45 Kg/ha. of N+28 Kg/ha. of P_2O_5 . (vi) As per treatments. (vii) Irrigated. (viii) One hoeing and one weeding. (ix) 59.34cm. (x) 2nd fort night of April.

2. TREATMENTS:

Main-plot treatments :4 dates of sowing : $D_1=20\text{th Oct.}$, $D_2=4\text{th Nov.}$, $D_3=21\text{st Nov.}$ and $D_4=3\text{rd Dec.}$ **Sub-plot treatments :**3 varieties : $V_1=C-273$, $V_2=C-306$, and $V_3=286$.

3. DESIGN:

(i) Split-plot. (ii) (a) 4 main plots/replication; 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/247 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Satisfactory. (ii) Nil. (iii) Germination Counts and yield of grain. (iv) (a) 1962-64 (Treatments modified every year) (b) No. (c) Nil. (v) No. (vi) and (vii) Nil.

5. RESULTS :

(i) 2470 Kg/ha. (ii) (a) 216.7 Kg/ha. (b) 250.5 Kg/ha. (iii) Main effects of D, V and interaction D×V are highly significant. (iv) Av. yield of grain in Kg/ha.

	V ₁	V ₂	V ₃	Mean
D ₁	2605	2536	2175	2439
D ₂	2892	2924	3181	2999
D ₃	2588	1841	2348	2259
D ₄	2368	2054	2128	2183
Mean	2613	2339	2458	2470

C.D for D marginal means = 200.2 Kg/ha.

C.D. for V marginal means = 182.9 Kg/ha.

C.D for D means at the same level of V = 212.4 Kg/ha.

C.D for V means at the same level of D = 365.7 Kg/ha.

Crop :- Wheat. (Rabi).

Ref :- Pb. 64(272).

Site :- Punjab. Agri. University (Ludhiana, Campus); Ludhiana.

Type :- 'CV'.

Object— To study the effect of seed rates and dates of sowing on the yield of different varieties of Wheat.

1. BASAL CONDITIONS :

(i) (a) Maize — Fallow-Wheat. (b) Fallow. (c) Nil. (ii) Loamy Sand. (iii) As per treatments. (iv) (a) 3 ploughings. (b) Kera. (c) As per treatments. (d) 22cm. (e) — (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) One hoeing. (ix) 11cm. (x) Second week of April, 65,

2. TREATMENTS :

Main-plot treatments:

3 dates of sowing : D₁=1st Nov., D₂=21st Nov., and D₃=15th Dec,

Sub-plot treatments :

All combinations of (1) and (2)

(1) 2 varieties : V₁=C-306, and V₂=C-273.

(2) 4 seed rates : S₁=74, S₂=99, S₃=124, and S₄=148 Kg/ha.

3. DESIGN:

(i) Split-plot. (ii) (a) 3 main-plots/replication, 8 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/286.7 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Germination count and yield of grain. (iv) (a) 1964—only (b) N.A. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 3418 Kg/ha. (ii) (a) 331.3 Kg/ha. (b) 321.1 Kg/ha. (iii) Main effects of D, V, S and in teractions D×V, D×S and S×V are highly significant. (iv) Av. yield of grain in Kg/ha.

	S ₁	S ₂	S ₃	S ₄	V ₁	V ₂	Mean
D ₁	4055	3552	3696	3524	3465	3947	3706
D ₂	3836	3497	3967	4382	3959	3880	3920
D ₃	2499	2509	2706	2803	2308	2949	2629
Mean	3463	3185	3456	3569	3244	3592	3418
V ₁	3277	2993	3126	3579			
V ₂	3648	3376	3786	3558			

C.D. for D marginal means=202.7 Kg/ha.

C.D. for S marginal means=185.5 Kg/ha.

C.D. for V marginal means=131.0 Kg/ha.

C.D. for the body of S×V table =262.2 Kg/ha.

C.D. for D means at the same level of V=257.0 Kg/ha.

C.D. for V means at the same level of D=227.0 Kg/ha.

C.D. for D means at the same level of S=342.8 Kg/ha.

C.D. for S means at the same level of D=321.0 Kg/ha.

Crop :- Wheat (Rabi).

Site :- Agri. Res. Stn., Abohar.

Ref:-Pb. 65(50).

Type :- 'CM'.

Object :--To study the residual effect of mixed cropping and manuring on the yield of succeeding Wheat crop.

1. BASAL CONDITIONS :

(i) (a) Cotton-Wheat. (b) Cotton. (c) N.A. (ii) Sandy loam. (iii) 4.11.65. (iv) (a) to (c) N.A. (v) As per treatments (vi) N.A. (vii) Irrigated. (viii) Suhaga-3. (ix) N.A. (x) 15.4.66.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 8 mixed crop treatments :—T₁=Cotton (n) 60cm. × 45cm., T₂=Cotton (w) 90cm. × 30cm., T₃=Cotton + Bhindi (one row), T₄=Cotton + Bhindi (2 rows), T₅=Cotton + Cowpeas (one row), T₆=Cotton + Cowpeas (two rows), T₇=Cotton + Guara fodder and T₈=Cotton + Guara (green manure).

(2) 2 levels of N: N₁=60 and N₂=120 Kg/ha.

25 Kg/ha. of N at sowing, rest at flowering 40 Kg/ha. of P₂O₅ applied to Cowpeas and Guara.

3. DESIGN :

(i) Fact. in R.B.D (ii) (a) 16. (b) N.A. (iii) 4 (iv) (a) N.A. (b) 1/440.3 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) 2 sprayings of Endrine 0.02% solu. (iii) Yield of grain. (iv) (a) 1965—only (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 601 Kg/ha. (ii) 106.6 Kg/ha. (iii) Main effects of T and N are highly significant and interaction T×N is significant. (iv) Av. yield of grain in Kg/ha.

	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	Mean
N ₁	369	306	403	305	1102	540	557	545	516
N ₂	411	501	536	407	1444	782	558	849	686
Mean	390	403	469	356	1273	661	557	697	601

C.D. for T marginal means=107.4 Kg/ha.

C.D. for N marginal means=53.7 Kg/ha.

C.D. for the body of T×N table=151.9 Kg/ha.

Crop :- Wheat (Rabi).

Ref. :- Pb. 62(86), 63(109), 64(98).

Site :- Reg. Wheat Res. Stn., Gurdaspur.

Type :- 'CM'

Object :- To study the effect of different spacings and levels of N on the yield of Wheat.

1. BASAL CONDITIONS

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) Mid of Nov. (iv) (a) 6 to 8 ploughings, 6 to 8 plankings. (b) Behind the plough. (c) 98.8 Kg/ha. (d) As per treatments. (e) N.A. (v) N.A. (vi) C-273. (vii) Irrigated. (viii) 2 weedings. (ix) and (x) N.A.

3. DESIGN :

Main-plot treatments :

3 levels of N as C/A/N : N₀=0, N₁=28 and N₂=56 Kg/ha.

Sub-plot treatments :

3 spacings between rows : S₁=15, S₂=23 and S₃=30cm.

N applied at the time of sowing.

2. TREATMENTS :

(i) Split-plot. (ii) (a) 3 main-plots/replication, 3 sub-plots/main-plot. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/247 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962 to 64. (b) No. (c) Nil. (v) N.A. (vi) N.A. (vii) Since the sub-plot error variances are heterogeneous, therefore results of individual years are presented under 5. Results.

5. RESULTS :

62 (86)

(i) 970 Kg/ha. (ii) (a) 136.4 Kg/ha. (b) 94.4 Kg/ha. (iii) Main effect of N is highly significant, and that of 'S' is significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	Mean
S ₁	435	1100	1522	1019
S ₂	440	1001	1411	951
S ₃	427	978	1416	940
Mean	434	1026	1450	970

C.D. for N marginal means=101.4 Kg/ha.

C.D. for S marginal means=64.3 Kg/ha.

Crop Wheat (*Rabi*).**Ref :-** Pb. 64(276).**Site :-** Agri Res. Stn., Gurdaspur.**Type :-** 'CM'**Object :-** To find out the best row to row spacing for Wheat at different levels of Nitrogen.**1. BASAL CONDITIONS:**

(i) (a) Fallow-Wheat. (b) Fallow. (c) Nil. (ii) Sandy loam. (iii) Up to 20th Nov., 64. (iv) (a) 4 ploughings by tractor. (b) Kera. (c) 98.9 Kg/ha. (d) 20 cm. (e) — (v) C/A/N applied, quantity N.A. (vi) C-273 (vii) Irrigated. (viii) 2 weedings. (ix) 11cm. (x) Second week of April, 65.

2. TREATMENTS :**Main-plot treatments :**3 levels of Nitrogen : $N_0=0$, $N_1=28$ Kg/ha. and $N_2=56$ Kg/ha.**Sub-plot treatments :**3 spacings : $S_1=15.2$ cm. $S_2=22.9$ cm. and $S_3=30.5$ cm.**3 DESIGN :**

(i) Split-plot. (ii) (a) 3 main-plots/replication and 3 sub-plots/main-plot. (b) N.A. (iii) 6. (iv) (a) 1/2472ha. (v) No. (vi) Yes.

4. GENERAL :

(i) Satisfactory. (ii) Nil. (iii) Germination, no. of plants and yield of grain. (iv) (a) 1965-contd. (b) No. (c) Nil. (v) No. (vi) and (vii) Nil.

5. RESULTS :

(i) 2621 Kg/ha. (ii) (a) 213.5 Kg/ha. (b) 377.4 Kg/ha. (iii) Main effects of N and S are highly significant. (iv) Av. yield of grain in Kg/ha.

	N_0	N_1	N_2	Mean
S_1	2452	2689	2855	2665
S_2	2511	2659	2768	2646
S_3	2355	2637	2664	2552
Mean	2439	2662	2763	2621

C.D. for N marginal means=158.5 Kg/ha.

C.D. for S marginal means=256.9 Kg/ha.

Crop :- Wheat. (*Rabi*).**Ref:-** Pb. 64(281).**Site :-** Agri. Res. Stn., Gurdaspur.**Type :-** 'CM'.**Object :-** To study the method of application of fertilizer on the yield of Wheat. under rainfed conditions.**1. BASAL CONDITIONS :**

(i) (a) Fallow-Wheat. (b) Fallow. (c) Nil. (ii) Sandy loam. (iii) Up-to 20th Nov., 64. (iv) (a) 4 ploughings by tractor. (b) As per treatments. (c) 75 Kg/ha. (d) 20 cm. (e) — (v) 40Kg/ha. of N. (vi) C-286. (vii) Irrigated. (viii) 2 weedings. (ix) 11.0 cm. (x) 3rd week of April, 65.

2. TREATMENTS :

Main-plot treatments :

All combinations of (1) and (2)

(1) 2 levels of P_2O_5 : $P_0=0$ and $P_1=40$ Kg/ha.(2) 2 levels of K_2O : $K_0=0$ and $K_1=40$ Kg/ha.

Sub-plot treatments :

3 methods of sowing : $T_1=Kera$, $T_2=Pora$ and $T_3=Broadcast$.

3. DESIGN :

(i) Split-plot. (ii) 4 main-plots/replication; 3 sub-plots/main-plot. (iii) 6. (iv) 1/27ha. (v) No. (vi) Yes.

4. GENERAL:

(i) Good. (ii) Nil. (iii) Germination Counting and yield of grain. (iv) (a) 1964-Contd. (b) No. (c) Nil. (v) No. (vi) and (viii) Nil.

5. RESULTS :

(i) 2735 Kg/ha. (ii) 215.4 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	T_1	T_2	T_3	K_0	K_1	Mean
P_0	2674	2741	2727	2625	2804	2715
P_1	2727	2813	2725	2751	2759	2755
Mean	2701	2777	2726	2688	2782	2735
K_0	2687	2689	2688			
K_1	2715	2865	2764			

Crop. Wheat. (Rabi).

Site :- Reg. Wheat Res. Stn., Gurdaspur.

Ref :- Pb. 64(103)

Type 'GM'.

Object :—To study the requirements of N for Wheat in different rotations.

1. BASAL CONDITIONS:

(i) (a) and (b) As per treatments. (c) N.A. (ii) Sandy loam. (iii) Up to 20th Nov., 64. (iv) 6-8 ploughings, 6-8 plankings. (b) Behind the plough. (c) 75 Kg/ha. (d) 22cm. (e) — (v) N.A. (vi) C-273. (vii) Irrigated. (viii) 2 weedings. (ix) 59.3cm. (x) 1st week of April, 65.

2. TREATMENTS :

Main-plot treatments :

5 different rotations :

 $R_1=$ Fallow —Wheat, $R_2=$ Dhaincha-Wheat (G.M.), $R_3=$ Maize-Wheat, $R_4=$ Rice-Wheat and $R_5=$ Chari-Wheat.

Sub-plot treatments :

4 levels of N : $N_0=0$, $N_1=33.6$, $N_2=67.3$ and $N_3=100.2$ Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 5 main-plots/replication, 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/247ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) No. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 2620 Kg/ha. (ii) (a) 429.4 Kg/ha. (b) 442.5 Kg/ha. (iii) Main effects of R and N are significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	N ₃	Mean
R ₁	1712	2659	2955	2881	2552
R ₂	2303	2899	3072	3089	2841
R ₃	2582	2733	2871	3005	2798
R ₄	1834	2427	3029	3133	2606
R ₅	1381	2241	2721	2871	2303
Mean	1962	2592	2930	2996	2620

C.D. for R marginal means=331.2 Kg/ha.
C.D. for N marginal means=282.0 Kg/ha.

Crop :- Wheat. (Rabi).

**Site :- Punjab Agri. University (Ludhiana
Campus) Ludhiana.**

Ref :- Pb. 64(277).

Type :- 'CM'

Object :- To study the effect of different dates of sowing and the application of Nitrogen and Phosphorus on the yield of Wheat.

1. BASAL CONDITIONS:

(i) (a) Fallow or maize -Wheat. (b) Fallow. (c) Nil. (ii) Loamy sand. (iii) As per treatments. (iv) (a) 3 ploughings, (b) Kera. (c) 85 Kg/ha. (d) 20 cm. (e) - (v) 40 Kg/ha. of N+25 Kg/ha. of P₂O₅. (vi) C-306. (vii) Irrigated. (viii) One hoeing. (ix) 11.0 cm. (x) Second week of April, 65.

2. TREATMENTS:

Main-plot treatments :

All combinations of (1) and (2).

(1) 3 levels of Nitrogen :- N₀=0, N₁=44.8 Kg/ha. and N₂=89.6 Kg/ha.

(2) 2 levels of P₂O₅ : P₀=0 and P₁=67.3 Kg/ha.

Sub-plot treatments :

4 dates of sowing : D₁=1st Nov., D₂=15th., Nov., D₃=1st Dec. and D₄=15th Dec..

3. DESIGN :

(i) Split-plot. (ii) (a) 6 main-plots/replication. 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) 1/286.7 ha. (v) No. (vi) Yes.

4. GENERAL :

(i) Good. (ii) Nil. (iii) Germination and yield of grain. (iv) (a) 1964-contd. (design changed in 65). (b) No. (c) Nil. (v) No. (vi) and (vii) Nil.

5. RESULTS :

(i) 2833 Kg/ha. (ii) (a) 580.6 Kg/ha. (b) 246.4 Kg/ha. (iii) Main effects of N and D are highly significant. Interaction D×N is significant and D×P is highly significant. (iv) Av. yield of grain in Kg/ha.

	D ₁	D ₂	D ₃	D ₄	P ₀	P ₁	Mean
N ₀	2909	2512	2088	1863	2323	2363	2343
N ₁	3411	3296	2523	2538	2910	2975	2942
N ₂	3564	3267	3203	2826	3040	3390	3215
Mean	3295	3025	2605	2409	2757	2909	2833
P ₀	3233	2942	2635	2219			
P ₁	3356	3108	2575	2598			

C.D. for N marginal means=309.3 Kg/ha.

C.D. for D marginal means=143.2 Kg/ha.

C.D. for N means at the same level of D=375.9 Kg/ha.

C.D. for D means at the same level of N=247.1 Kg/ha.

C.D. for P means at the same level of D=306.9 Kg/ha.

C.D. for D means at the same level of P=201.8 Kg/ha.

Crop :- Wheat. (Rabi).
Site :- Punjab Agri. University, (Ludhiana
Campus) Ludhiana.

Ref :- Pb. 65(160).

Type :- 'CM'

Object :- To study the effect of different dates of sowing and the application of Nitrogen and Phosphorus on the yield of Wheat.

1. BASAL CONDITIONS :

(i) (a) Fallow-Wheat. (b) Fallow. (c) Nil. (ii) Loamy sand. (iii) Upto 20 th. Nov., 65. (iv) 3 ploughings. (v) Kera. (c) 85 Kg/ha. (d) 20cm. (e) — (v) N.A. (vi) C—273. (vii) Irrigated. (viii) One hoeing. (ix) 9.1cm. (x) Second week of April, 66.

2. TREATMENTS :

Main-plot treatments:

4 dates of sowing :-D₁=1st Nov., D₂=15th Nov., D₃=1st Dec. and D₄=15 th Dec.

Sub-plot treatments

All combinations of (1) and (2)

(1) 3 levels of nitrogen:- N₀=0, N₁=45 and N₂=90 Kg/ha.

(2) 2 levels of P₂O₅:-P₀=0 and P₁=60 Kg/ha.

3. DESIGN :

(i) Split-plot (ii) 4 main-plots/replication, 6 sub-plots/main-plot- (iii) 4. (iv) 1/250 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Good. (ii) Nil. (iii) Yield of grain. (iv) (a) 1964-contd. (design changed in 65) (b) No. (c) Nil. (v) No. (vi) Nil.

5. RESULTS :

(i) 7552 Kg/ha. (ii) (a) 415.1 Kg/ha. (b) 523.3Kg/ha. (iii) Main effects of D ,N and P are highly significant and interaction D × P is significant (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	Mean
D ₁	7998	8883	9157	8181	9177	8679
D ₂	6898	7783	7936	7387	7691	7539
D ₃	6685	7691	7446	6714	7835	7274
D ₄	5586	7051	7509	6470	6960	6715
Mean	6792	7852	8012	7188	7916	7552
P ₀	6288	7523	7753			
P ₁	7296	8187	8272			

C.D. for D marginal means=271.0 Kg/ha.

C.D. for N marginal means=261.2 Kg/ha.

C.D. for P marginal means=213.6 Kg/ha.

C.D. for D means at the same level of P=404.9 Kg/ha.

C.D. for P means at the same level of D=427.3 Kg/ha.

Crop :- Wheat.

Site :- M.A.E. Centre, Nasirpur.

Ref. :- Pb. 60, 61 (M.A.E.)

Type :- 'CM'.

Object : Type VIII—To study the optimum requirements of seed rate, time of sowing and different combinations with fertilizer doses for Wheat.

1. BASAL CONDITIONS :

(i) N.A. (ii) Indus alluvium. (iii) to (x) N.A.

2. TREATMENTS :

Main-plot treatments.

All combinations of (1) and (2)

(1) 3 seed rates : S₁=59.0, S₂=78.4 and S₃=100.8 Kg/ha.

(2) 3 dates of sowing : D₁=21.10.60, D₂=31.10.60 and D₃=10.11.60.

Sub-plot treatments :

All combinations of (1) and (2)

(1) 3 levels of N as A/S : N₀=0, N₁=22.4 and N₂=44.8 Kg/ha.

(2) 3 levels of P₂O₅ as Super : P₀=0, P₁=22.4 and P₂=44.8 Kg/ha.

3. DESIGN:

(i) Split-plot. (ii) (a) 9 main-plots/replication, 2 sub-plots/main-plot. (b) N.A. (iii) 2. (iv) (a) and (b) N.A. (v) N.A. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1957-61. (b) N.A. (c) Nil (v) Sirsa. (vi) N.A. (vii) Nil.

5. RESULTS :

60 (M.A.E.)

(i) 2676 Kg/ha. (ii) (a) and (b) N.A. (iii) Main effects of D and N are significant. (iv) Av. yield of grain in Kg/ha.

Treatment	S ₁	S ₂	S ₃	D ₁	D ₂	D ₃
Av. yield	2757	2625	2647	2496	3163	2370

C.D.=226 Kg/ha.

Treatment	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂
Av. yield	2438	2687	2904	2628	2653	2747

61(M.A.E.)

(i) 828 Kg/ha. (ii) (a) and (b) N.A. (iii) Main effects of S and N are significant. (iv) Av. yield of grain in Kg/ha.

Treatment	S ₁	S ₂	S ₃	D ₁	D ₂	D ₃
Av. yield	1091	727	667	931	673	881

C.D._s=307 Kg/ha.

Treatment	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂
Av. yield	615	876	994	808	879	798

C.D._s=85 Kg/ha.**Crop :- Wheat. (Rabi).****Ref. :- Pb.60, 61(M.A.E.).****Site :- M.A.E. Centre Nasirpur.****Type :- 'CM'.**

Object :—Type IV : To study the effect of Phosphatic manures on legumes and their residual effect on succeeding Wheat manured with N.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Guara; N.A. (c) As per treatments; N.A. (ii) Sandy loam, Alluvial soil. (iii) 6-11-60 Ist week of Oct., 61. (iv) (a) 3-4 ploughings. (b) Pora method. (c) 50.7 Kg/ha. (d) 23cm. between rows. (v) Nil. (vi) C-273. (vii) Irrigated. (viii) One hoeing. (ix) N.A. (x) 17.4.61; Ist week of April, 62.

2. TREATMENTS :**Main-plot treatments**

All combinations of (1) and (2) + a control (Lo Po)

(1) 2 previous legumes: L₁=Guara and L₂=Mosh.(2) 3 levels of P₂ O_s : P₀=0, P₁=44.8 and P₂=89.6 Kg/ha.**Sub-plot treatments**3 levels of N as A/S applied to wheat : N₀=0, N₁=16.8 and N₂=33.6 Kg/ha.**3. DESIGN :**

(i) Split-plot. (ii) (a) 7 main-plots/replication; 3 sub-plots/main-plot. (b) N.A. (iii) 3. (iv) (a) and (b) N.A. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1957-61. (b) N.A. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

60(M.A.E.)

(i) 2716 Kg/ha. (ii)(a) 172.2 Kg/ha. (b) 286.6 Kg/ha. (iii) Main effects of L, N and control vs. others are highly significant and interaction L × P is significant. (vi) Av. yield of grain in Kg/ha.

	L ₀ P ₀	L ₁ P ₀	L ₁ P ₁	L ₁ P ₂	L ₂ P ₀	L ₂ P ₁	L ₂ P ₂	Mean
N ₀	2813	2564	2730	2693	1983	2112	1733	2375
N ₁	2997	2905	3034	2933	2647	2462	2481	2780
N ₂	3219	2997	2997	3311	2878	2878	2675	2994
Mean	3010	2822	2920	2979	2503	2484	2296	2716

61(M.A.E.)

- (i) 2402 Kg/ha. (ii) (a) 553.3 Kg/ha. (b) 396.6 Kg/ha. (iii) Main effect of N alone is highly significant.
 (iv) Av. yield of grain in Kg/ha.

	L ₀ P ₀	L ₁ P ₀	L ₁ P ₁	L ₁ P ₂	L ₂ P ₀	L ₂ P ₁	L ₂ P ₂	Mean
N ₀	1835	2509	2296	2399	1872	2444	2029	2198
N ₁	1964	2352	2398	2629	1974	2942	2426	2384
N ₂	2462	2564	2702	2666	2324	2841	2804	2623
Mean	2087	2475	2465	2565	2057	2742	2420	2402

Crop :- Wheat (Rabi).

Ref. :- Pb. 62(87).

Site :- Reg. Wheat. Res. Sta., Gurdaspur.

Type :- 'P'.

Object :- To study the effect of different depths of irrigation and intervals of irrigation on the yield of Wheat crop.

1. BASAL CONDITIONS :

(i) to (v) N.A. (vi) C-281. (vii) As per treatments. (viii) 2 weedings. (ix) and (x) N.A.

2. TREATMENTS :

Main-plot treatments :

3 irrigation intervals week :- I₁=2, I₂=3, and I₃=4.

Sub-plot treatments :

3 depths of irrigation :- D₁=0, D₂=3.7 and D₃=7.5cm.

3. DESIGN :

(i) Split-plot, (ii) (a) 3 main-plots/replication, 3 sub-plots/main-plot. (b) N.A. (c) 6. (iv) (a) N.A. (b) 1/423ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) and (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 2453 Kg/ha. (ii) (a) 775.2 Kg/ha. (b) 250.5 Kg/ha. (iii) Main effect of D alone is significant. (iv) Av. yield of grain in Kg/ha.

	D ₀	D ₁	D ₂	Mean
I ₁	1997	2357	2948	2434
I ₂	2214	2553	2790	2519
I ₃	2330	2421	2471	2407
Mean	2180	2444	2736	2453

C.D. for D marginal means=170.5 Kg/ha.

Crop :- Wheat (*Rabi*).
Site :- Agri. Res. Stn., Jullundur.

Ref :- Pb. 65(36).
Type :- 'IM'.

Object—: To determine the irrigational requirement of Wheat with manuring treatments.

1. BASAL CONDITIONS :

(i) (a) Cotton-Wheat- (b) Cotton. (c) N.A. (ii) Sandy loam. (iii) Mid. of Nov., 65. (iv) (a) 4-5 ploughings. (b) to (e) N.A. (v) N.A. (iv) C—273. (vii) Irrigated. (viii) 2 hoeings, 2 weedings. (ix) N.A. (x) 3rd week of April, 66.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 2 levels of N : $N_1=60$ and $N_2=120$ Kg/ha.

(2) 8 irrigational treatments of intensity and time of application. First irrigation was given before flowering and second irrigation was given after flowering. $T_1=t_1t_1$, $T_2=t_2t_1$, $T_3=t_3t_2$, $T_4=t_2t_2$, $T_5=t_3t_1$, $T_6=t_3t_2$, $T_7=t_{33}$ and T_8 =local method.

Note (1) t_1 =Irrigation when 25% of the available soil moisture on the 30 cm. of the soil consumed. t_2 =Irrigation when 50% of the available soil moisture is consumed. t_3 =Irrigation when 75% of the available soil moisture is consumed.

(2) on $T_1=t_1t_1$ indicates first irrigation as T_1 and second irrigation as t_1 Similarly $T_6=t_3t_2$ indicates first as irrigation as t_3 and second irrigation as t_2 and so on.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 16. (b) N.A. (iii) 4. (iv) 1/400 ha. (v) N.A. (vi) Yes.

4. GENERAL

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1965—contd. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 1181 Kg/ha. (ii) 139.4 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	Mean
N_1	1190	1130	1050	1080	1130	1250	1130	1230	1149
N_2	1050	1200	1190	1320	1170	1310	1180	1280	1212
Mean	1120	1165	1120	1200	1150	1280	1155	1255	1181

Crop :- Wheat (*Rabi*).
Site :- M.A.E. Centre, Nasirpur.

Ref :- Pb. 60 to 62(M.A.E.)
Type :- 'IM'.

Object :- Type I: To study the effect of different intensities and frequencies of irrigation along with different levels of N and P on the yield of Wheat.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Fallow for 60 and 61; N.A. (c) Nil for 60 and 61; N.A. (iii) Sandy loam; Alluvial soil; N.A. (iv) 27.10.60; 25.10.61; N.A. (iv) (a) 6 ploughings; 4 ploughings; N.A. (b) Pora method for 60 and 61; N.A. (c) 80.7 Kg/ha.; 78.4 Kg/ha; N.A. (d) 23cm. between rows; N.A. for 61 and 62. (v) 5600 Kg/ha. of F.Y.M. for 60 and 61; N.A. for 62. (vi) C—273 for 60 and 61; N.A. for 62. (vii) Irrigated for 60 and 61; N.A. for 62. (viii) One hoeing for 60 and 61; N.A. for 62 (ix) N.A. (x) 13.4.61; 1st week of April; N.A.

2. TREATMENTS :

All combinations of (1), (2), (3) and (4)

(1) 3 frequencies of irrigation: $F_1=2$, $F_2=3$ and $F_3=4$ irrigations.

- (2) 3 Intensities of irrigation: $I_1=5.0$, $I_2=7.5$ and $I_3=10.0$ cm.
 (3) 3 levels of N as A/S: $N_0=0$, $N_1=33.6$ and $N_2=67.2$ Kg/ha.
 (4) 3 levels of P_2O_5 as Super: $P_0=0$, $P_1=33.6$ and $P_2=67.2$ Kg/ha.

3. DESIGN :

- (i) 3³ confd. (ii) 9 plots/block; 9 blocks/replication. (b) N.A. (iii) to (v) N.A. (vi) Yes.

4. GENERAL :

- (i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1957-1962. (b) N.A. (c) Nil. (v) Nil. (vi) N.A. (vii) Nil.

5. RESULTS:

60(M.A.E.)

- (i) 3390 Kg/ha. (ii) and (iii) N.A. (iv) Av. yield of grain in Kg/ha.

	F ₁	F ₂	F ₃	Mean	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂
I ₁	2970	2997	3080	3016	2767	3210	3392	2967	3062	3240
I ₂	3108	3237	3025	3123						
I ₃	3053	3237	3099	3130						
Mean	3044	3157	3068	3090						

61(M.A.E.)

- (i) 2569 Kg/ha. (ii) and (iii) N.A. (iv) Av. yield of grain in Kg/ha.

	F ₁	F ₂	F ₃	Mean	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂
I ₁	2352	2416	2657	2475	2619	2453	2666	2597	2561	2548
I ₂	2287	2739	2711	2579						
I ₃	2546	2730	2683	2653						
Mean	2395	2628	2684	2569						

62(M.A.E.)

- (i) 2272 Kg/ha. (ii) and (iii) N.A. (iv) Av. yield. of grain in Kg/ha.

	F ₁	F ₂	F ₃	Mean	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂
I ₁	2219	1919	2282	2140	1783	2478	3408	2123	2291	2402
I ₂	2449	2222	2303	2325						
I ₃	2388	2210	2458	2352						
Mean	2352	2117	2348	2272						

Crop :- Wheat. (Rabi).

Site :- Punjab Agri. University. (Ludhiana campus),
Ludhiana.

Ref :- Pb. 65(159).

Type :- 'IMV'.

Object :- To test the effect of irrigations on different varieties of Wheat in the presence of different levels of Nitrogen.

1. BASAL CONDITIONS :

- (i) (a) Fallow-Wheat. (b) Fallow. (c) Nil. (ii) Loamy sand. (iii) 20.11.65 (iv) (a) 3 ploughings. (b) Kera. (c) 85 Kg/ha. (d) 20 cm. (e) — (v) 40 Kg/ha. of N+25 Kg/ha. of P_2O_5 . (vi) and (vii) As per treatments. (viii) One hoeing. (ix) 9'10cm. (x) 2nd week of April, 66

2. TREATMENTS:

Main-plot treatments:

3 intervals of irrigation: $I_1=15$ days $I_2=30$ days and $I_3=45$ days.

Sub-plot treatments:

All combinations of (1) and (2)

(1) 3 levels of N:- $N_1=50, N_2=100$ and $N_3=150$ Kg/ha.(2) 2 varieties:- $V_1=C-306$ and $V_2=P.V. 18$ **3. DESIGN :**

(i) Split-plot. (ii) (a) 3 main-plots/replication, 6 sub-plots/main-plot. (b) N.A. (iii) 4 (iv) (a) N.A. (b) 1/250 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Good. (ii) Nil. (iii) Germination and yield of grain. (iv) (a) 1965-contd. (b) No. (c) Nil. (v) No. (vi) and (vii) Nil.

5. RESULTS :

(i) 2397 Kg/ha. (ii) (a) 601.7 Kg/ha. (b) 690.8 Kg/ha. (iii) Main effect of I alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	N_1	N_2	N_3	V_1	V_2	Mean
I_1	3225	2575	2837	2692	3067	2879
I_2	2212	2337	2212	2167	2342	2254
I_3	2237	1987	1950	1950	2167	2058
Mean	2558	2300	2333	2270	2525	2397
V_1	2425	2208	2175			
V_2	2692	2392	2492			

C. D. for I marginal means = 425.0 Kg/ha.

Crop :- Wheat (Rabi)
Site :- Govt. Agri. Stn., Jullundur.

Ref :- Pb. 61(9).
Type :- 'D'.

Object :- To study the results of spraying with sodium salt for weed control on Wheat.

1. BASAL CONDITIONS :(i) and (ii) N.A. (iii) 28.11.61. (iv) (a) to (e) N.A. (v) Nil. (vi) C-273. (vii) Irrigated. (viii) One hoeing in treatments T_1 and T_2 . (ix) N.A. (x) 26.4.62.**2. TREATMENTS :**4 weedicidal treatments: T_0 =Control (no weeding and weedicide) T_1 =Local method of weeding, T_2 =Spraying with weedicide once and T_3 =Spraying with weedicide once + one weeding.**3. DESIGN :**

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 6. (iv) (a) and (b) 1/198 ha. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Av. yield of grain. (iv) (a) N.A. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS

(i) 594 Kg/ha. (ii) 320.2 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃
Av. yield	583	567	567	659

Crop :- Maize (Kharif)

Ref :- Pb. 60(111).

Site :- Govt. Agri. Stn., Gurdaspur.

Type :- 'M'.

Object :—To study the effect of different doses of N on the yield Maize crop.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Wheat. (c) N.A. (ii) Sandy loam. (iii) 9.6.60. (iv) N.A. (v) 50 Kg/ha. of P₂O₅ as Super + 56 Kg/ha. of K₂O₅ and 251 Q/ha. of F.Y.M. (vi) Hybrid. (vii) Irrigated. (viii) and (ix) N.A. (x) 20.9.60.

2. TREATMENTS :

6 levels of N as C/A/N : N₀=0, N₁=56, N₂=112, N₃=168, N₄=224 and N₅=336 Kg/ha.
Half of N applied at sowing and half N side-dressed when crop was 30cm. high.

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) 1/133.4/ha. (b) 1/149.5 ha. (v) N.A. (vi) Yes.

4. GENERAL

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—only (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 1761 Kg/ha. (ii) 284.6 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅
Av. yield	1161	1784	1712	1995	1756	2156

C. D. = 428.8 Kg/ha.

Crop :- Maize (Kharif).

Ref :- Pb. 60(112).

Site :- Govt. Agri. Stn., Gurdaspur.

Type :- 'M'.

Object :—To study the comparative efficiency of C/A/N and F.Y.M. on the yield of Maize crop.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Wheat. (c) N.A. (ii) Sandy loam. (iii) 13.6.60 (iv) and (v) N.A. (vi) Local. (vii) Irrigated. (viii) and (ix) N.A. (x) 15.9.60.

2. TREATMENTS :

6 manurial doses : M₀=control (no manure), M₁=67.2 Kg/ha. of N as C/A/N, M₂=67.2 Kg/ha. of N as F.Y.M., M₃=134.4 Kg/ha. of N as F.Y.M., M₄=M₁+M₂ and M₅=201.6 Kg/ha. of N as F.Y.M.

3. DESIGN:

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) 1/165.5Kg/ha. (b) 1/186.5ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 1946 Kg/ha. (ii) 230.3 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄	M ₅
Av. yield	1737	1846	1971	1941	2074	2104

Crop :- Maize. (Kharif).

Ref :- Pb. 60(113).

Site :- Govt. Agri. Stn., Gurdaspur.

Type :- 'M'.

Object;—To study the effect of various sources of N on the yield of Maize crop.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) Wheat. (c) N.A. (ii) Sandy loam. (iii) 14.6.60, (iv) and (v) N.A. (vi) Local. (vii) Irrigated. (viii) and (ix) N.A. (x) 15.9.60.

2. TREATMENTS:

7 sources of N at 67.2 Kg/ha.: —T₀—Control (No manure), T₁—A/S, T₂—C/A/N, T₃—Urea, T₄—Amm. Chloride, T₅—Amm. liquor and T₆—A/N.

3. DESIGN:

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 4. (iv) (a) 1/165.49 ha. (b) 1/186.48 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—only (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 1960 Kg/ha. (ii) 353.2 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment.	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	1889	2153	2245	1903	1873	1794	1865

Crop :- Maize. (Kharif).

Ref :- Pb. 60(116).

Site :- Govt. Agri. Stn., Gurdaspur.

Type :- 'M'.

Object :- To study the effect of different combinations of N and P on the yield of Maize crop.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Wheat. (c) N.A. (ii) Sandy loam. (iii) 21.6.60. (iv) and (v) N.A. (vi) Local. (vii) Irrigated. (viii) and (ix) N.A. (x) 21.9.60.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 3 levels of N : $N_0=0$, $N_1=67.2$ and $N_2=134.4$ Kg/ha.

(2) 3 levels of P_2O_5 as Super : $P_0=0$, $P_1=33.6$, $P_2=67.2$ Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) 1/168 ha. (b) 1/198 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 1496 Kg/ha. (ii) 189.3 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	N_0	N_1	N_2	Mean
P_0	1135	1532	1976	1548
P_1	1083	1463	1679	1408
P_2	1057	1584	1953	1531
Mean	1092	1526	1869	1496

C.D. for N marginal means = 159.5 Kg/ha.

Crop :- Maize (Kharif).

Ref :- Pb. 60(170).

Site :- Agri. Res. Stn., Gurdaspur.

Type :- 'M'.

Object :- To study the effect of different levels of N, P and K on the yield of Maize crop.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Wheat. (c) N.A. (ii) Sandy loam. (iii) 23.6.60. (iv) and (v) N.A. (vi) Hybrid. (vii) irrigated. (viii) and (ix) N.A. (x) 26.6.60.

2. TREATMENTS :

All combinations of (1), (2) and (3) + One control (No fertilizer).

(1) 3 levels of N : $N_1=56$, $N_2=112$ and $N_3=168$ Kg/ha.

(2) 3 levels of P_2O_5 as Super. : $P_1=28$, $P_2=56$ and $P_3=112$ Kg/ha.

(3) 3 levels of K_2O as Mur. pot. : $K_1=56$, $K_2=112$ and $K_3=224$ Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 28. (b) N.A. (iii) 2. (iv) 1/170 ha. (b) 1/222 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) N.A. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 1369 Kg/ha. (ii) 509.1 Kg/ha. (iii) Main effect of N is highly significant and control Vs. others is significant. (iv) Av. yield of grain in Kg/ha.

	P ₁	P ₂	P ₃	K ₁	K ₂	K ₃	Mean
N ₁	926	1159	1470	1075	1263	1217	1158
N ₂	911	1279	1218	1408	931	1069	1136
N ₃	1682	1891	2043	1879	1907	1830	1872
Mean	1173	1443	1577	1454	1367	1372	1398
K ₁	1250	1393	1719				
K ₂	1170	1474	1457				
K ₃	1099	1462	1555				

C.D. for N marginal means = 348.2 Kg/ha.

C.D. for control vs. others = 752.2 Kg/ha.

Crop :- Maize. (Kharif).

Ref :- Pb. 60(120), 61(92).

Site :- Agri. Govt. Stn., Gurdaspur

Type :- 'M'.

Object :- To study the effect of different levels of N, P and K on the yield of Maize crop.

1. BASAL CONDITIONS

(i) (a) N.A. (b) Fallow; Wheat. (c) Nil; N.A. (ii) Sandy loam (iii) 26.5.60; 28.7.61 (iv) (a) and (b) N.A. (c) 13 Kg/ha. (d) and (e) N.A. (v) N.A. (vi) N.A.; Illinois 1656 Kg/ha. (vii) Irrigated. (viii) and (ix) N.A. (x) 15/16. 9.60; 6.11.61.

2. TREATMENTS :

All combinations of (1) and (2) + one control (no manure)

(1) 2 levels of N as C/A/N: N₁ = 112 and N₂ = 224 Kg/ha.

(2) 3 manurial treatments := M₀ = manure, M₁ = 112 Kg/ha. of P₂O₅ as Super and M₂ = M₁ + 112 Kg/ha. of K₂O as Mur. Pot.

Half N and full P and K applied at sowing and half N at 30cm. plant height.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 7. (b) N.A. (iii) 4. (iv) (a) 1/84.0 ha.; N.A. (b) 1/98.8 ha.; 1/207.6 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-61. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Nil. (vii) Error variances are homogeneous and Treatments × Years interaction is absent.

5. RESULTS:

(i) 2172 Kg/ha. (ii) 271.4 Kg/ha. (based on 41 d.f. made up of pooled error and Treatments \times Years interaction). (iii) Control Vs. others' alone is highly significant. (iv) Av. yield of grain in Kg/ha. Control=1968 Kg/ha.

	M ₀	M ₁	M ₂	Mean
N ₁	2121	2292	2152	2188
N ₂	2156	2295	2222	2224
Mean	2138	2293	2187	2206

C.D. for 'Control Vs. others'=280.2 Kg/ha.

Individual results

Treatment	N ₁	N ₂	Sig.	M ₀	M ₁	M ₂	Sig.	Control	Sig.	G.M.	S.E./plot
Year 1960	2258	2250	N.S.	2255	2249	2257	N.S.	2447	N.S.	2254	200.9
1961	2120	2199	N.S.	2022	2338	2117	N.S.	1489	*	2159	320.9
Pooled	2188	2224	N.S.	2138	2293	2187	N.S.	1968	**	2206	217.4

Crop :- Maize (Kharif).

Ref:-Pb. 61(108) ; 64(163).

Site :-Agri. Res. Stn., Gurdaspur.

Type :- 'M'.

Object :—To study the effect of different levels of N, P and K on the yield of Maize crop.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) Wheat. (c) N.A. (ii) Sandy loam. (iii) 8.7.61 ; 7.7.64. (iv) (a) to (e) N.A. (v) N.A. (vi) N.A. ; Local. (vii) Irrigated. (viii) and (ix) N.A. (x) 5.10.61 ; 8.10.64.

2. TREATMENTS:

All combinations of (1), (2) and (3)+One control.

(1) 3 levels of N :—N₁=56, N₂=112 and N₃=224 Kg/ha.

(2) 3 levels of P₂O₅ as Super :—P₁=28, P₂=56 and P₃=112 Kg/ha.

(3) 3 levels of K₂O as Mur. of Pot. :—K₁=56, K₂=112 and K₃=224 Kg/ha.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 28. (b) N.A. (iii) 2. (iv) (a) N.A. (b) 1/197.7 ha. ; 1/177.9 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961 to 64 (Expt. for 62 and 63 N.A.) (b) No. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Nil. (vii) Error variances are heterogeneous and Treatments \times Years interaction for (P \times K) table is absent and for others is present.

5. RESULTS:

Pooled results

(i) 2066 Kg/ha. (ii) 817.9 Kg/ha. (based on 14 d.f. made up of Treatments \times Years interaction). (iii) Main

effect of N and "Control Vs. others are highly significant. (iv) Av. yield of grain in Kg/ha.

Control=879 Kg/ha.

	P ₁	P ₂	P ₃	K ₁	K ₂	K ₃	Mean
N ₁	1343	1493	1489	1465	1451	1409	1412
N ₂	2078	2241	2290	2097	2235	2278	2203
N ₃	2559	2700	2796	2622	2705	2728	2685
Mean	1993	2145	2192	2061	2130	2138	2110

C.D. for N marginal means=413.5 Kg/ha.

C.D. for Control Vs. others=885.1 Kg/ha.

Individual results

Treatment	N ₁	N ₂	N ₃	Sig.	P ₁	P ₂	P ₃	Sig.	K ₁	K ₂	K ₃	Sig.	Control	Sig.	G.M.	S.E./plot
Year 1961	755	1048	1315	**	1005	1058	1055	N.S.	961	1075	1082	N.S.	754	N.S.	1039	289.7
1964	2129	3359	4055	**	2982	3232	3329	**	3162	3186	3195	N.S.	1005	**	3118	175.4
Pooled	1442	2203	2685	**	1993	2145	2192	N.S.	2061	2130	2138	N.S.	879	**	2110	817.9

Crop :- Maize (Kharif).

Ref :- Pb. 63(212).

Site :- Govt. Agri. Stn., Gurdaspur.

Type :- 'M'

Object :—To study the effect of P and K on the yield of Maize crop.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 7.7.63. (iv) and (v) N.A. (vi) Local. (vii) Irrigated. (viii) and (ix) N.A. (x) 8.10.63.

2. TREATMENTS :

All combinations of (1) and (2)+ a control (No manure)

(1) 2 levels of P₂O₅ as Super :—P₁=28 and P₂=56Kg/ha.

(2) 3 levels of K₂O as Mur. Pot. :—K₁=56, K₂=112 Kg/ha. and K₃=224 Kg/ha.

56 Kg/ha. of N as C/A/N applied to all plots except control plot.

3. DESIGN :

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 2. (iv) (a) N.A. (b) 1/196 6 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1963—only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 3209 Kg/ha. (ii) 473.3 Kg/ha. (iii) Main effects of K and control vs. others treatments are highly significant. (iv) Av. yield of grain in Kg/ha.

Control=1700 Kg/ha.

	K ₁	K ₂	K ₃	Mean
P ₁	2916	4359	2817	3364
P ₂	3015	4952	2698	3555
Mean	2966	4656	2758	3460

C.D. for K marginal means=818.9 Kg/ha.

C.D. for Control vs. others=884.5 Kg/ha.

Crop :- Mazie (Kharif).

Ref :- Pb. 63(213), 64(201).

Site :- Agri. Res. Stn., Gurdaspur.

Type :- 'M'.

Object :- To study the effect of different times of application of C/A/N.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) Wheat. (c) N.A. (ii) Sandy loam. (iii) 9.6.63; 27.6.64. (iv) (a) to (e) N.A. (v) N.A.; 56 Kg/ha. of P₂O₅ + 56 Kg/ha. of K₂O at the time of sowing. (vi) Hybrid. (vii) Irrigated. (viii) and (ix) N.A. (x) 20.9.63; 1.10.64.

2. TREATMENTS:

7 methods of application of 112 Kg/ha. of N as C/A/N: T₀=Control (No fertilizer), T₁=Drilled at sowing, T₂=Kera at sowing, T₃=Broad casted at sowing, T₄=Band application at sowing, T₅=Band application at 30 cm. plant height and T₆=Broad cast at 30 cm. plant height.

3. DESIGN :

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/163 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1963-64. (b) No. (c) Nil. (v) and (vi) Nil. (vii) As error variances are heterogeneous and Treatments × Years interaction is absent, results of individual years are presented under 5. Results.

5. RESULTS :

63(213)

(i) 3610 Kg/ha. (ii) 586 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	2088	4144	3576	3855	3951	3667	3989

C.D.=870.6 Kg/ha.

64(231)

(i) 4376 Kg/ha. (ii) 187.0 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	3099	4785	4558	4819	4456	4489	4424

C.D.=277.8 Kg/ha.

Crop :- Maize. (Kharif).**Ref :- Pb. 60(109), 61(8), 62(16).****Site : Govt. Agri. Res. Stn , Jullundur.****Type : 'M'.**

Object :—To study the effect of different combinations of N,P and K on the yield of Maize crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 28.7.60; 29.7.61; 27.7.62. (iv) (a) and (b) N.A. (c) 13.5 Kg/ha. (d) and (e) N.A. (v) N.A. (vi) Illinois 1656; Hybrid Maize ; Ganga No. 101. (vii) Irrigated. (viii) 2 to 3 weeding. (ix) N.A. (x) 1st week of Nov.

2. TREATMENTS :

7 manurial :— T_0 =Control, T_1 =112 Kg/ha. of N as C/A/N, T_2 =224 Kg/ha. of N as C/A/N, T_3 =112 Kg/ha. of P_2O_5 as Super, T_4 = T_2 +112 Kg/ha. of P_2O_5 as Super, T_5 = T_3 +112 Kg/ha. of K as Mur. of Pot. and T_6 = T_4 +112 Kg/ha. of K as Mur. of Pot.

Whole of P and K applied at sowing + $\frac{1}{2}$ of N at sowing + $\frac{1}{2}$ of N at 30 cm. crop height.

3. DESIGN :

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/207.6 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) 1960-62. (b) No. (c) Nil. (v) and (vi) Nil. (vii) As the error variances are heterogeneous and Treatments \times Years interaction is absent, results of individual years are presented under 5. Results.

5. RESULTS :

60 (109)

(i) 3206 Kg/ha. (ii) 493 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6
Av. yield	1847	3125	3021	2938	4000	3140	4374

C.D.=732.4 Kg/ha.

61 (8)

(i) 2070 Kg/ha. (ii) 1027 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6
Av. yield	1541	2065	1980	2239	2431	2055	2179

62(16)

(i) 2597 Kg/ha. (ii) 547.8 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6
Av. yield	1779	1925	3277	2100	3359	2357	3383

C.D.=813.7 Kg/ha.

Crop :- Maize (Kharif).**Ref :- Pb. 61(101).****Site :- Govt. Agri. Stn., Jullundur.****Type :- 'M'.**

Object :—To study the effect of different combinations of N, P and K with F.Y.M. on the yield of Maize crop.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 27.6.61 (iv) (a) and (b) N.A. (c) 12.7 Kg/ha. (d) and (e) N.A. (v) N.A. (vi) Illinois 1656. (vii) Irrigated. (viii) and (ix) N.A. (x) Nov., 61.

2. TREATMENTS :

All combinations of (1), and (2).

(1) 6 levels of N as C/A/N :— $N_0=0$, $N_1=56$, $N_2=112$, $N_3=168$, $N_4=224$ and $N_5=336$ Kg/ha.

(2) 2 levels of F. Y. M. :— $F_0=No.$ F. Y. M. and $F_1=With$ F. Y. M.

3. DESIGN :

(i) Fact. in R. B. D. (ii)(a) 12. (b) N.A. (iii) 4. (iv) (a) N.A., (b) 1/257 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) N.A. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 1587 Kg/ha. (ii) 353.6 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	N_0	N_1	N_2	N_3	N_4	N_5	Mean
F_0	1298	1124	1336	1677	2101	2123	1608
F_1	1240	1381	1311	1683	1769	2011	1566
Mean	1269	1252	1324	1675	1935	2067	1587

C.D. for N marginal means=360.0 Kg/ha.

Crop :- Maize (Kharif).

Ref :- Pb. 60(46), 61(7), 62(19).

Site :- Govt. Agri. Sta., Jullundur.

Type : 'M'.

Object :—To study the effect of different doses of N in the presence of F. Y. M. on the yield of Maize.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 21.7.60; 29.7.61; 27.7.62. (iv) (a) N.A. (b) N.A. (c) 12.7 Kg/ha. for 60; N.A. for others. (d) and (e) N.A. (v) 251 Q/ha. of F. Y. M. + 56 Kg/ha. of P_2O_5 + 56 Kg/ha. of K_2O applied at sowing. (vi) Local; N.A.; Ganga no. 101; (vii) Irrigated. (viii) N.A. for 60; 2-3 hoeings for others. (ix) N.A. (x) November; 60; 4.11.61; N.A.

2. TREATMENTS :

6 levels of N: $N_0=0$, $N_1=56$, $N_2=112$, $N_3=168$, $N_4=224$ and $N_5=336$ Kg/ha. of N applied as C/A/N for 62, source of N for others is N.A.

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. for 60 and 62, 15.85 m. × 1.83m. for 61. (b) 1/29.5ha; 15.85m. × 1.83m., 1/259.5ha. (v) N.A. for 60 and 62, Nil. for 61. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-62. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Nil. (vii) Error variances are homogenous and Treatments \times Years interaction is present.

5. RESULTS:

Pooled results

(i) 2391 Kg/ha. (ii) 1011.5 Kg/ha. (based on 10 d. f. made up of Treatments \times Years Interaction) (iii) Treatment differences are not significant (iv) Av. yield of grain in Kg/ha.

Treatment	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅
Av. yield	2132	2114	2469	2380	2653	2597

Treatment Year	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅	Sig.	G.M.	S.E./polt
1960	2286	2562	3016	2549	2951	2696	N.S.	2677	370.0
1961	2033	1699	1388	1323	1784	1249	N.S.	1579	394.4
1962	2027	2081	3004	3268	3223	3847	**	2917	421.6
Pooled	2132	2141	2469	2380	2653	2597	N.S.	2391	1011.5

Crop :- Maize (Kharif).

Ref :- Pb 60(37), 61(7A), 62(15).

Site :- Govt. Agri. Stn., Jullundur.

Type : 'M'.

Object:—To find out the best dose of N in the absence of F.Y.M. on the yield of Maize.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loam. (iii) 29.7.60; 29.7.61; 27.7.62. (iv) N.A. (v) 56 Kg/ha. of P₂O₅ + 56 Kg/ha. of K₂O. (vi) N.A. for 60 and 61; Ganga No.101. (vii) Irrigated. (viii) 3 hoeings. (ix) N.A. (x) 9.11.60; 4.11.61; N.A.

2. TREATMENTS :

Same as in Expt. no. 60(46), 61(7), 62(19) and presented on page no 531.

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/296.5 ha.; 15.85m. \times 1.87m.; 1/259.5ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1960-62. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) and (vi) Nil. (vii) Error variances are homogeneous and Treatments \times Years interaction is present.

5. RESULTS :

Pooled results:-

(i) 2361 Kg/ha. (ii) 1205.8 Kg/ha. (based on 10 d. f. made up of Treatments \times Years interaction) (iii) Treatment differences are significant (iv) Av. yield of grain in Kg/ha.

Treatment	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅
Av. yield	2048	2010	2185	2523	2754	2645

C. D. = 1343.3 Kg/ha.

Individual results :

Treatment	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅	Sig.	G.M.	S.E./plot
Year 1960	2162	2274	2741	2711	2970	2512	**	2562	235.9
1961	2144	1674	1135	1346	2121	1307	**	1622	329.5
1962	1838	2081	2678	3511	3170	4116	**	2899	361.8
Pooled	2048	2010	2185	2523	2754	2645	*	2361	1205.8

Crop :- Maize. (Kharif).

Ref :- Pb. 60,61,62,63,64(M.A.E.).

Site :- M.A.E. Center, Nasirpur.

Type :- 'M'.

Object : - To study the effect of different levels of N,P,K and F.Y.M on the yield of Maize.

1. BASAL CONDITIONS:

(i) (a) Maize-Wheat-cotton-Senji for 60 and 61; N.A. for others. (b) Senji for 60 and 61; N.A. for others. (c) N.A. (ii) Sandy loam; Alluvial; N.A.; Indus Alluvium for 63 and 64. (iii) 6.7.60, 31.7.61: N.A.; 30.6.63; 22.7.64. (iv) (a) 8 ploughings, 7 ploughings: N.A. for 62 to 64. (b) Pora method, Drilling, N.A. for 62 to 64. (c) 17.9 Kg/ha., 23 to 35 Kg/ha., N.A. for 62 to 64. (d) N.A.; 30cm. x 30cm, N.A. for 62 to 64. (e) Nil. (v) Nil. (vi) Local. (vii) Irrigated (viii) 2 weedings; 2 weedings and hoeings; N.A. for others. (ix) N.A. (x) 30.9.60; 21.9.61 to 23.9.61; N.A.; 28. 9.63; 10.10.64.

2. TREATMENTS:

All combinations of (1), (2), (3) and (4)

(1) 3 levels of P₂O₅ as Super : P₀=0, P₁=22.4 and P₂=44.8 Kg/ha.

(2) 3 levels of N as C/A/N: N₀=0, N₁=22.4 and N₂=44.8 Kg/ha.

(3) 3 levels of K₂O as Mur. Pot. : K₀=0, K₁=22.4 and K₂=44.8 Kg/ha.

(4) 3 levels of F.Y.M. : F₀=0, F₁=5560 and F₂=11200 Kg/ha.

N applied by broadcasting. P and K drilled into the soil before sowing.

3. DESIGN:

(i) 3⁴ fact confd. (ii) (a) 9 plots/block, 9 blocks/replication. (b) N.A. (iii) 1 for 60 and 61; N.A. for others. (iv) (a) 10.08m. x 5.04m. for 60 and 61; N.A. for others. (b) 9.47m. x 4.27m. for 60 and 61; N.A. for others. (v) 30cm. x 38cm. for 60 and 61; N.A. for others (vi) Yes.

4. GENERAL:

(i) Normal for 60 and 61; N.A. for others. (ii) Nil; Maize borer attack; N.A. for others. (iii) Yield of grain. (iv) (a) 1960-64. (b) N.A. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

60(M.A.E.)

(i) 963 Kg/ha. (ii) 282 Kg/ha. (iii) Main effect of N is highly significant and interaction P x K is significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	824	887	1047	793	884	1080	906	887	964	919
F ₁	703	878	1175	979	940	838	831	1068	858	919
F ₂	815	1094	1243	971	1099	1083	1015	1022	1116	1051
Mean	781	953	1155	914	974	1000	917	992	979	963
K ₀	790	869	1092	872	1003	876				
K ₁	772	966	1238	1080	1005	891				
K ₂	780	1024	1134	790	914	1233				
P ₀	734	950	1058							
P ₁	784	896	1242							
P ₂	824	1013	1164							

C. D. for N marginal means=194.6 Kg/ha.

C. D. for the body of P×K table=337.1 Kg/ha.

61(M.A.E.)

Phase I (cumulative effect)

(i) 1004 Kg/ha. (ii) 326.5 Kg/ha. (iii) Main effects of F and N are highly significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	599	664	1217	812	784	885	867	738	876	827
F ₁	553	1015	1356	1024	931	970	913	978	1034	975
F ₂	848	1356	1430	1033	1420	1180	1346	1199	1088	1211
Mean	667	1012	1334	956	1045	1012	1042	972	999	1004
K ₀	636	1070	1420	950	1153	1023				
K ₁	673	913	1330	1014	978	924				
K ₂	692	1053	1252	904	1004	1089				
P ₀	673	978	1217							
P ₁	599	1051	1485							
P ₂	729	1007	1300							

C.D. for N marginal means=225.3 Kg/ha.

C.D. for F marginal means=184.0 Kg/ha.

Phase (ii) Residual effect

(i) 592 Kg/ha. (ii) 254.5 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	461	609	535	470	627	508	461	590	554	53
F ₁	590	535	618	581	526	666	516	719	508	581
F ₂	627	646	710	552	775	655	673	664	646	661
Mean	559	597	621	534	643	600	550	658	569	592
K ₀	544	563	543	470	664	516				
K ₁	655	572	747	692	673	609				
K ₂	478	656	573	440	592	675				
P ₀	544	535	523							
P ₁	609	692	628							
P ₂	524	564	712							

Phase (iii) (Direct)

(i) 903 Kg/ha. (ii) 350.5 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	406	858	1125	738	830	820	858	756	774	796
F ₁	526	913	1208	812	867	967	692	1005	949	882
F ₂	710	1042	1337	1033	1005	1052	987	1042	1061	1020
Mean	547	938	1223	861	901	946	846	934	928	903
K ₀	507	950	1081	821	931	786				
K ₁	563	959	1280	895	885	1022				
K ₂	571	905	1308	867	887	1030				
P ₀	526	959	1098							
P ₁	535	839	1329							
P ₂	580	1016	1242							

C.D. for N marginal means = 241.8 Kg/ha.

62(M.A.E)

Cumulative Phase

(i) 1309Kg/ha. (ii) 230.1Kg/ha. (iii) Main effects of F and N are highly significant (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	1058	1105	1142	1039	1128	1138	992	1211	1103	1102
F ₁	1207	1350	1514	1338	1373	1359	1347	1392	1332	1357
F ₂	1275	1675	1456	1523	1424	1459	1365	1494	1547	1469
Mean	1180	1377	1371	1300	1308	1319	1235	1366	1327	1309
K ₀	1162	1273	1270	1262	1301	1142				
K ₁	1163	1461	1474	1341	1330	1426				
K ₂	1216	1397	1368	1298	1294	1388				
P ₀	1238	1333	1329							
P ₁	1108	1423	1394							
P ₂	1194	1374	1389							

C.D. for F marginal means = 129.6Kg/ha.

C.D. for N marginal means = 158.8Kg/ha.

Residual Phase

(i) 1095Kg/ha. (ii) 293.1Kg/ha. (iii) Main effect of F and interaction F × N are significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	1077	881	915	903	1052	918	998	868	1007	958
F ₁	1182	934	1260	1246	1053	1076	1158	1023	1194	1125
F ₂	1086	1340	1180	1176	1178	1251	1181	1182	1243	1202
Mean	1115	1052	1118	1108	1094	1082	1112	1024	1148	1095
K ₀	1188	1074	1075	1235	1092	1010				
K ₁	1012	940	1120	893	1096	1084				
K ₂	1145	1141	1158	1197	1094	1152				
P ₀	1063	1052	1210							
P ₁	1186	1025	1072							
P ₂	1096	1078	1072							

C.D. for F marginal means = 165.0Kg/ha.

C.D. for the body of F × N table = 285.8 Kg/ha.

Direct Phase

(i) 1165 Kg/ha (ii) 289.8 Kg/ha (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₁	1037	1010	1132	1095	1097	987	1050	1034	1095	1060
F ₂	1095	1276	1260	1254	1072	1305	1138	1328	1164	1210
F ₃	1106	1322	1248	1320	1320	1035	1288	1210	1178	1225
Mean	1079	1203	1213	1223	1163	1109	1159	1191	1146	1165
K ₀	1123	1120	1234	1223	1112	1142				
K ₁	1053	1228	1291	1195	1237	1140				
K ₂	1061	1261	1115	1252	1141	1045				
P ₀	1134	1261	1274							
P ₁	1107	1210	1173							
P ₂	997	1137	1193							

63(M.A.E.)

Direct effect

(i) 1292 Kg/ha. (ii) 284.5 Kg/ha. (iii) Main effects of F and N are significant, and interaction F×P is highly significant (vi) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	1046	1155	1300	1127	1138	1236	1070	1371	1059	1167
F ₁	1262	1302	1468	1607	1114	1312	1223	1416	1394	1344
F ₂	1168	1536	1387	1323	1534	1235	1463	1334	1294	1364
Mean	1159	1331	1385	1352	1262	1261	1252	1374	1249	1292
K ₀	1131	1213	1411	1470	1159	1127				
K ₁	1239	1421	1461	1396	1361	1364				
K ₂	1106	1359	1283	1191	1265	1291				
P ₀	1258	1308	1490							
P ₁	1066	1327	1393							
P ₂	1153	1357	1272							

C.D. for N marginal means=196.3Kg/ha.

C.D. for F marginal means=160.3Kg/ha.

C.D. for the body of F×P table=277.6 Kg/ha.

Cummulative effect)

(i) 1395 Kg/ha. (ii) 347.3 Kg/ha. (iii) Main effects of F and N are highly significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	1007	1147	1507	996	1331	1334	1013	1353	1295	1220
F ₁	1332	1306	1492	1294	1321	1515	1350	1346	1434	1377
F ₂	1357	1614	1796	1522	1691	1555	1662	1503	1603	1589
Mean	1232	1356	1598	1271	1448	1468	1342	1401	1444	1395
K ₀	1290	1306	1429	1234	1390	1401				
K ₁	1227	1363	1612	1334	1449	1419				
K ₂	1180	1398	1754	1245	1504	1584				
P ₀	1236	1179	1397							
P ₁	1223	1494	1626							
P ₂	1238	1394	1772							

C.D for N marginal means=239.6 Kg/ha.

C.D. for F marginal means=195.6 Kg/ha.

Residual effect

(i) 1117 Kg/ha. (ii) 254.8 Kg/ha. (iii) Main effect of F alone is significant (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	1089	934	1015	884	1051	1140	967	1113	959	1013
F ₁	1127	1172	1245	1214	1050	1279	1111	1188	1243	1181
F ₂	1069	1235	1170	1142	1249	1084	1225	1184	1065	1158
Mean	1095	1114	1143	1080	1105	1168	1101	1162	1089	1117
K ₀	1032	1126	1145	985	1165	1154				
K ₁	1108	1151	1227	1201	1081	1203				
K ₂	1146	1064	1058	1054	1068	1146				
P ₀	1169	1021	1050							
P ₁	945	1137	1232							
P ₂	1171	1184	1148							

C.D. for F marginal means=143.1 Kg/ha.

64(M.A.E.)

Cummulative Phase

(i) 397 Kg/ha. (ii) 279.1 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
M ₀	765	785	941	827	873	791	831	920	740	830
M ₁	787	944	955	897	997	792	898	855	933	895
M ₂	956	962	980	918	954	1027	798	1043	1058	669
Mean	836	897	959	881	941	870	843	939	910	897
K ₀	796	866	866	786	938	804				
K ₁	878	900	1040	911	972	934				
K ₂	834	926	970	945	913	872				
P ₀	883	765	994							
P ₁	880	1072	872							
P ₂	745	854	1011							

Direct Phase

(i) 730 Kg/ha. (ii) 247.3 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	688	606	754	691	730	627	673	744	631	683
F ₁	598	744	820	752	763	647	737	718	708	721
F ₂	748	755	854	768	724	865	675	783	899	786
Mean	678	702	809	737	739	713	695	748	746	730
K ₀	711	697	677	656	745	683				
K ₁	644	729	871	790	740	715				
K ₂	680	680	878	765	733	741				
P ₀	712	604	895							
P ₁	637	834	746							
P ₂	686	668	785							

Residual phase

(i) 533 Kg/ha. (ii) 187.0Kg ha. (iii) None of the effects is significant (iv) Av yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
M ₀	576	430	547	511	554	488	513	595	446	518
M ₁	452	554	495	507	562	431	515	554	431	500
M ₂	597	609	540	573	583	590	530	559	656	582
Mean	542	531	527	530	566	503	519	569	511	533
K ₀	541	512	505	531	573	454				
K ₁	552	597	558	506	637	565				
K ₂	532	484	517	554	488	491				
P ₀	622	437	532							
P ₁	515	640	543							
P ₂	488	516	505							

Crop :- Maize.

Ref. :- Pb. 63, 64(M.A.E.)

Site :- M.A.E. Centre, Nasirpur.

Type :- 'M'.

Object—Type XII: To study the effect of different fertilizer treatments and their methods of application on the yield of Maize.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Arid, brown. (iii) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

Main-plot treatments :

4 fertilizer treatments : F₁=112.0 Kg/ha. of N as A/S, F₂=67.2 Kg/ha. of P₂O₅ as Super, F₃=112.0 Kg/ha. of N+67.2 Kg/ha. of P₂O₅ and F₄=112.0 Kg/ha. of N+67.2 Kg/ha. of P₂O₅ +67.2 Kg/ha. of K₂O.

Sub-plot treatments :

All combinations of (1) and (2)+2 extra treatments

(1) 3 methods of application : M₁=Soil application, M₂=Foliar application and M₃=Soil application and foliar application.

(2) 2 levels of application : L₁=½ dose and L₂=Full dose
C₀=Water spray and C₁=Absolute control.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication, 8 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) and (b) N.A. (v) N.A. (vi) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain (iv) (a) 1963-64. (b) N.A. (c) Nil. (v) Nil (vi) N.A. (vii) Nil.

5. RESULTS :

63(M.A.E.)

(i) 2344 Kg/ha. (ii) (a) and (b) N.A. (iii) N.A. (iv) Av. yield of grain in Kg/ha.

C₀=2368 and C₁=2096 Kg/ha.

	L ₁ M ₁	L ₂ M ₁	L ₁ M ₂	L ₂ M ₂	L ₁ M ₃	L ₂ M ₃	Mean
F ₁	3042	3017	2242	1961	2333	2511	2517
F ₂	1772	1643	2131	2196	1800	2155	1950
F ₃	2884	2548	2291	2260	1982	2304	2378
F ₄	2718	2844	2267	3246	2616	2359	2675
Mean	2604	2513	2233	2416	2188	2332	2381

C.D. for F marginal means=769 Kg/ha.

C.D. for LM marginal means=410 Kg/ha.

64(M.A.E.)

- (i) 2166 Kg/ha. (ii) (a) and (b) N.A. (iii) N.A. (iv) Av. yield of grain in Kg/ha.
 $C_0=1607$ and
 $C_1=1368$ Kg/ha.

	L ₁ M ₁	L ₂ M ₁	L ₁ M ₂	L ₂ M ₂	L ₁ M ₃	L ₂ M ₃	Mean
F ₁	2504	3 78	2 03	2480	2592	3665	2770
F ₂	1640	2237	1647	1620	1663	1572	1728
F ₃	2544	3631	1724	2220	2531	2612	2544
F ₄	2251	2426	2200	1917	2328	3034	2359
Mean	2235	2868	1944	2059	2278	2721	2392

C.D. for F marginal means=857 Kg/ha.

C.D. for LM marginal means=362 Kg/ha.

Crop :- Maize (Kharif)

Ref :- Pb. 64, 65(M.A.E.)

Site :- M.A.E. Center, Nasirpur.

Type :- 'M'.

Object :-Type XI :-To determine the effect of micro nutrients application and to study the merits of two methods of application.

1. BASAL CONDITIONS:

- (i) (a) to (c) N.A. (ii) Indus alluvium (iii) 5.8.64 ; N.A. (iv) (a) to (e) N.A. (v) N.A. (vi) GNG-101; N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) 7.11.64 ; N.A.

2. TREATMENTS:

15 micro nutrient treatments: T₀=Control (no fertilizer), T₁=NPK applied to soil only, T₂=T₁+Spartin at 395 Kg/ha, by Soil application, T₃=T₁+Manganese as Manganese Sul. at 60 Kg/ha, T₄=T₁+Zn as Zinc Sul. at 30 Kg/ha, T₅=T₁+Cu as Copper Sul. at 30 Kg/ha., T₆=T₁+Boron as Borax at 17.5 Kg/ha., T₇=T₁+Molybdenum as Sodium Molybdate at 1.25 Kg/ha., T₈=T₁+Mn+Zn+Cu+Bo+Mo, T₉=T₁+Manganese as Manganese Sul. at 17.5 Kg/ha., T₁₀=T₁+Zn as Zinc Sul. at 12.5 Kg/ha., T₁₁=T₁+Cu as Copper Sul. at 12.5 Kg/ha., T₁₂=T₁+Boron as Borax at 6.2 Kg/ha., T₁₃=T₁+Molybdenum as Sodium Molybdate at 0.62 Kg/ha., and T₁₄=T₁+Mn+Zn+Cu+Bo+Mo.

Treatments T₃ to T₆ by soil application and T₉ to T₁₄ by foliar spray. T₁=67.2 Kg/ha. of N+44.8 Kg/ha. of P₂O₅+44.8 Kg/ha. of K₂O for 63 and 64 and 70 Kg/ha. of N+50 Kg/ha. of P₂O₅+50 Kg/ha. of K₂O for 1965.

3. DESIGN

- (i) R.B.D. (ii) (a) 15. (b) N.A. (iii) N.A. (iv) (a) and (b) N.A. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1964-66. (b) N.A. (c) Nil. (v) Nil. (vi) N.A. (vii) Nil.

5. RESULTS :

64(M.A.E.)

(i) 1484 Kg/ha. (ii) and (iii) N.A. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	912	1518	1575	1568	1527	1536	1493	1555	1561	1500
	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄					
	1518	1475	1487	1530	1506					

65 (M.A.E.)

(i) 1546 Kg/ha. (ii) and (iii) N.A. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	625	1484	2596	1577	1580	1478	1587	1543	1512	1521
	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄					
	1552	1555	1524	1481	1577					

Crop :- Maize. (Kharif)

Ref :- Pb. 60(107).

Site :- Khanara Hoshiarpur (c.f.)

Type :- 'M'.

Object :- To study the effect of different levels of N, P and K on the yield of Maize.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Wheat. (c) N.A. (ii) Silty loam. (iii) N.A. (iv) Local. (v) (a) to (e) N.A. (vi) 11.7.60. (vii) Irrigated. (viii) and (ix) N.A. (x) 6.10.60.

2. TREATMENTS:

All combinations of (1), (2) and (3)

(1) 2 levels of N : N₀=0 and N₁=22.4 Kg/ha.

(2) 2 levels of P₂O₅:P₀=0 and P₁=22.4 Kg/ha.

(3) 2 levels of K₂O:K₀=0 and K₁=22.4 Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D, 8,4. (ii) N.A. (iii) (a) N.A. (b) 1/98.8 ha. (iv) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) N.A. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 976 Kg/ha. (ii) 157.0 Kg/ha. (iii) Main effects of N and K are highly significant. (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	K ₀	K ₁	Mean
N ₀	654	749	541	863	702
N ₁	1168	1335	1228	1375	1252
Mean	911	1042	834	1119	976
K ₀	777	892			
K ₁	1046	1192			

C.D. for N or K marginal means=115.6 Kg/ha.

Crop :- Maize (Kharif).

Ref :- Pb. 60(132), 60(133).

Site :- : Phulanwal and Salandi—Ludhiana (c.f.)

Type :- 'M'

Object:—To study the effect of balanced doses of N, P and K on the yield of Maize.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) Nil. (iv) Local (v) (a) 4 to 5 ploughings. (b) to (e) N.A. (vi) 11.7.60. (vii) Irrigated (viii) 2 hoeings (ix) N.A. (x) 6.10.60.

2. TREATMENTS:

All combinations of (1), (2) and (3).

(1) 2 levels of N as C/A/N: N₀=0 and N₁=56 Kg/ha.

(2) 2 levels of P₂O₅ as Super :P₀=0 and P₁=28 Kg/ha.

(3) 2 levels of K₂O as Mur. pot. :K₀=0 and K₁=28 Kg/ha.

3 DESIGN :

(i) Fact. in R.B.D., 8,4, (ii) N.A. (iii) (a) and (b) N.A. (iv) Yes.

4 GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960—only. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Nil. (vii) Error variances are homogeneous and Treatments × places interaction is absent.

5. RESULTS :

Pooled results :

(i) 1792 Kg/ha. (ii) 89.5 Kg/ha. (based on 48 d.f. made up of Treatments × Places interaction and pooled error). (iii) Main effects of N, P and interaction P × K are highly significant (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	K ₀	K ₁	Mean
N ₁	1621	1684	1643	1663	1653
N ₂	1884	1978	1917	1945	1931
Mean	1753	1831	1780	1804	1792
K ₀	1726	1839			
K ₁	1785	1823			

Individual results.

Treatments	N ₀	N ₁	Sig.	P ₀	P ₁	Sig.	K ₀	K ₁	Sig.	G.M.	S.E./plot
Year											
Phulanwal	1485	1707	**	1564	1628	**	1583	1609	**	1596	103.4
Salandi	1821	2155	**	1942	2034	**	1977	1999	**	1988	79.0
Pooled	1653	1931	**	1753	1831	**	1780	1804	**	1792	89.5

Crop :- Maize (Kharif).

Ref :- Pb. 60(S.F.T.) for Ferozepur, Jullun-

District :- Ferozepur, Jullundur, Hoshiarpur and Ludhiana, Patiala and Sangrur.

dur, Hoshiarpur, Ludhiana, Patiala and Sangrur and 61(S.F.T.) for Ferozepur, Jullundur, Hoshiarpur and Ludhiana.

Type :- 'M'.

Object :—Type A : To study the response of Maize to levels of N, P and K applied individually and in combination .

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Tarai and submountain for Hoshiarpur and Alluvial for others. (iii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments:

O=Control (no manure),,

N=22.4Kg/ha. of N.,

P=22.4Kg/ha. of P₂O₅.,

K=22.4Kg/ha. of K₂O.,

NP=22.4Kg/ha. of N+22.4Kg/ha. of P₂O₅.,

NK=22.4Kg/ha. of N+22.4Kg/ha. of K₂O.

PK=22.4 Kg/ha. of P₂O₅+22.4 Kg/ha. of K₂O and

NPK=22.4Kg/ha. of N+22.4Kg/ha. of P₂O₅+22.4Kg/ha. of K₂O.

3. DESIGN :

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle/thana is changed once in two years within the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on Kharif cereal, 8 on a Rabi cereal, 8 on Cash crop, 4 on an Oilseed crop and 3 on a leguminous crop. Half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. The three trials on legumes are of type C. Residual effects of phosphate application are studied on Type C trials in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98.8ha. (b) 1/197.7 ha. (iv) Yes

4. GENERAL :

(i) and (ii) N A. (iii) Yield of grain (iv) to (vii) N.A.

5. RESULTS :

Av. response in Kg/ha.

60 (S.F.T.)		Av. response in Kg/ha.										
District	No. of trials	Control yield in Kg/ha.	N	P	K	S.E.	NP	NK	PK	NPK	S.E.	
Ferozepur	3	1620	50	50	60	18.0	—10	—20	20	10	6.0	
Jullundur	13	1140	380	150	80	32.0	—30	10	10	—40	25.0	
Hoshiarpur	12	520	650	260	170	26.0	110	—10	40	60	18.0	
Ludhiana	8	1860	30	240	170	65.0	—90	—20	160	140	37.0	
Patiala	9	1110	200	180	130	31.0	10	20	—20	20	18.0	
Sangrur	5	1480	410	270	160	65.0	120	110	90	190	90.0	

61 (S.F.T.)											
Ferozepur	3	2150	310	150	70	68.0	-20	50	0	0	20.0
Jullundur	18	1910	430	180	20	26.0	10	10	0	40	26.0
Hoshiarpur	22	1180	560	180	60	71.0	20	50	30	40	89.0
Ludhiana	12	2140	390	330	140	54.0	0	0	20	10	49.0

Crop :- Maize (Kharif). Ref :- Pb. 60(S.F.T.)for Jullundur, Ferozepur, Patiala and Ludhiana and 61(S.F.T.)for Ferozepur, Jullundur and Hoshiarpur.

District :- Ferozepur, Jullundur, Hoshiarpur, Patiala and Ludhiana.

Type :- 'M'.

Object— :- Type B: To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS:

(i) to (x) N.A.

2. TREATMENTS:

7 manurial treatments:

O=Control (no manure)

N₁=22.4 Kg/ha. of N as A/S.,

N₂=44.8 Kg/ha. of N as A/S.,

N₁'=22.4Kg/ha. of N as Urea.,

N₂'=44.8 Kg/ha. of N as Urea.,

N₁"=22.4 Kg/ha. of N as A/S/N. and

N₂"=44.8 Kg/ha. of N as A/S/N.

3. DESIGN :

Same as in type A conducted on Maize crop on page No. 544.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) to (vii) N.A.

5. RESULTS :

60 (S.F.T.)

Av. response in Kg/ha.

District.	No. of trials	Control yield in Kg/ha.	N ₁	N ₂	N ₁ '	N ₂ '	N ₁ "	N ₂ "	S.E.
Jullundur	12	1250	200	510	280	270	360	650	91.0
Ferozepur	2	1500	60	60	90	120	100	170	27.0
Patiala	2	1000	210	230	280	400	410	500	108.0
Ludhiana	7	1490	220	340	240	390	180	740	71.0

61 (S.F.T)

District	No. of trials	Control yield in Kg/ha.	N ₁	N ₂	N ₁ '	N ₂ '	N ₁ "	N ₂ "	S.E.
Ferozepur	7	1630	150	290	120	240	270	270	97.0
Jullundur	12	2260	400	540	210	740	440	850	77.0
Hoshiarpur	3	340	310	610	240	480	290	610	—

Crop :- Maize (Kharif).

District :- Patiala, Sangrur,

Jullundur, Ludhiana and Hoshiarpur.

Ref :- Pb. 60(S.F.T.) for Patiala, Hoshiarpur

and Sangrur and 61(S.F.T.) for Jullundur,

Ludhiana and Hoshiarpur.

Type :- 'M'.

Object :- Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS

7 manurial treatments :

O=Control (no manure)

N₁=22.4 Kg/ha. of N as A/S

N₂=44.8 Kg/ha. of N as A/S

N₁'=22.4 Kg/ha. of N as Urea

N₂'=44.8 Kg/ha. of N as Urea

N₁"=22.4 Kg/ha. of N as C/A/N and

N₂"=44.8 Kg/ha. of N as C/A/N

3. DESIGN :

Same as in type A conducted on Maize crop on page. No. 544.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain (iv) to (vii) N.A.

5. RESULTS :

Av. response in Kg/ha.

60 (S.F.T.)

District	No. of trials	Control yield in Kg/ha.	N ₁	N ₂	N ₁ '	N ₂ '	N ₁ "	N ₂ "	S.E.
Patiala	6	1400	230	510	230	530	190	610	100.0
Sangrur	4	1070	420	100	350	500	420	770	142.0
Hoshiarpur	14	650	340	660	220	440	530	670	63.0

61 (S.F.T.)

District	No. of trials	Control yield in Kg/ha.	N ₁	N ₂	N ₁ '	N ₂ '	N ₁ "	N ₂ "	S.E.
Jullundur	4	2020	420	770	400	440	360	530	166.0
Ludhiana	11	2080	450	770	350	650	420	790	138.0
Hoshiarpur	18	1280	500	1060	270	870	580	960	71.0

Crop :- Maize (Kharif)

Ref :- Pb., 62, 63 and 65(S.F.T.) for Sangrur, 62, 63

(S.F.T.) for Jullundur, 62, 63, 65(S.F.T.)

for Patiala, 62 to 65(S.F.T.) for Ludhiana

and 65(S.F.T.) for Ferozepur.

District :- Sangrur, Jullundur, Patiala, Ludhiana and Ferozepur, Type :- 'M'.

Object :- Type A₁ : To study the response curves of important cereal, cash, and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS:

8 manurial treatments.

O=Control (no manure)

 $N_1=60$ Kg/ha. of N, $N_2=120$ Kg/ha. of N, $P_1=35$ Kg/ha. of P_2O_5 , $N_1P_1=60$ Kg/ha. of N+35 Kg/ha. of P_2O_5 , $N_2P_1=120$ Kg/ha. of N+35 Kg/ha. of P_2O_5 , $N_2P_2=120$ Kg/ha. of N+70 Kg/ha. of P_2O_5 and $N_2P_2K_1=120$ Kg/ha. of N+70 Kg/ha. of P_2O_5 +35 Kg/ha. of K_2O

3. DESIGN:

(i) and (ii) A selected district is divided into four agriculturally homogeneous zones based on climate, soil cropping pattern etc. In each zone one block is selected at random. A block normally consists of a group of 50-100 villages. In each block 36 experiments are conducted in a year of which 11 are of type A_1 , 11 of type A_2 , 11 of type A_3 and 3 are of type C. The eleven experiments under type A_1 , A_2 and A_3 are distributed as 3 on Kharif cereal, 3 on Rabi cereal, 3 on Cash crop and 2 on Oil seed. All the three type-C experiments are conducted on a legume crop. For the purpose of conducting the A_1 , A_2 and A_3 experiments 11 villages are randomly selected in each block and in each village 3 experiments one each of type A_1 , A_2 and A_3 are laid out. For conducting these experiments the three villages are randomly selected in each block. (iii) (a) 1/100 ha. (b) 1/200 ha. (iv) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of Maize. (iv) (a) 1962 to 66 for Sangrur (64 N.A.), 1962,63 for Jullundur, 1962 to 66 for Patiala (64 N.A.) 1962 to 66 for Ludhiana and 1965 to 66 for Ferozepur. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

Sangrur

62 (S.F.T.)

Treatment	N_1	N_2	P_1	N_1P_1	N_2P_1	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of grain in Kg/ha.	185	273	152	356	303	349	596	73.6

Control yield=1365 Kg/ha., No. of trials=10

63 (S.F.T.)

Treatment	N_1	N_2	P_1	N_1P_1	N_2P_1	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of grain in Kg/ha.	255	592	123	529	883	1074	1042	141.0

Control yield=2030 Kg/ha.; No. of trials=7

65 (S.F.T.)

Treatment	N_1	N_2	P_1	N_1P_1	N_2P_1	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of grain in Kg/ha.	380	369	—35	198	268	569	815	179.0

Control yield=2138 Kg/ha.; No. of trials=7

Jullundur

62 (S.F.T.)

Treatment	N_1	N_2	P_1	N_1P_1	N_2P_1	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of grain in Kg/ha.	547	617	140	420	573	823	931	98.0

Control yield=1386 Kg/ha.; No. of trials=13

63 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	380	708	197	469	776	924	1123	84.0

Control yield=521 Kg/ha. ; No. of trials=4

Patiala

62 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	705	1197	876	704	941	1110	1244	144.0

Control yield=1969 Kg/ha.; No. of trials=15

63(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	192	518	328	509	830	917	710	169.6

Control yield=2446 Kg/ha. ; No. of trials=6

65(S.F.T)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	506	351	-128	122	972	538	658	301.8

Control yield=3091 Kg/ha.; No. of trials=6

Ludhiana

62 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	442	316	278	382	455	489	570	180.8

Control yield=1368 Kg/ha. ; No. of trials=8

63 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.F.
Av. response of grain in Kg/ha.	409	600	166	796	922	1060	1289	132.0

Control yield=1375 Kg/ha. ; No. of trials=9

64 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	410	701	115	425	697	838	949	151.2

Control yield=1283 Kg/ha. ; No. of trials=6

65 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	831	1277	622	708	1434	1617	1661	120.2

Control yield=2337 Kg/ha.; No. of trials=7

Ferozepur

65 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	75	162	75	200	250	312	325	23.4

Control yield=1450 Kg/ha.; No. of trials=4

Crop:- Maize (Kharif).

**Ref:- Pb. 65(S.F.T) for Gurdaspur.62 to 65
(S.F.T.) for Hoshiarpur. 63,64 (S.F.T.)for Patiala.
and 64 (S.F.T.) for Sangrur**

District :-Gurdaspur, Hoshiarpur,Patiala and Sangrur Type :- 'M,'

Object : Type A₁ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients,

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Irrigated (viii) to (x) N.A.

2 Treatments 3 Design :

Same as in type A₁ conducted under irrigated condition on Maize crop on page No. 547.

4. GENERAL

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1965 to 66 for Gurdaspur, 1962 to 66 for Hoshiarpur, 1963 to 66 for Patiala and 1964 only for Sangrur. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

Gurdaspur

65 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	396	646	126	526	813	953	1013	119.0

Control yield=969 Kg/ha., No. of trials=3

Hoshiarpur

62 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	707	1529	270	156	1568	1768	1998	127.6

Control yield=1390 Kg/ha, No of trials=9

63 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	560	933	33	529	921	1097	1219	87.0

Control yield=1525 Kg/ha, No. of trials=15

64 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	566	779	34	684	1050	935	1010	89.1

Control yield=1222 Kg/ha., No. of trials=14

65(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	465	837	84	550	935	1085	1095	65.7

Control yield=1074 Kg/ha., No. of trials=13

Patiala

63 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	509	926	200	753	1198	1247	1344	253.0

Control yield=1359 Kg/ha.; No. of trials=4

64 (S.F.T)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₁ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	65	362	97	307	623	625	608	170.0

Control yield=1696 Kg/ha.; No. of trials=4

Sangrur

64 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₁ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	208	308	68	197	359	488	716	0.0

Control yield=1303 Kg/ha.; No. of trials=2

Crop:-Maize (Kharif).**Ref : Pb.65(S.F.T). for Gurdaspur,63to65(S.F.T.)
for Hoshiarpur and 63,64 (S.F.T) for Patiala.****District:- Gurdaspur, Hoshiarpur and Patiala.****Type :- 'M'.**Object:—Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

Same as in type A₂ conducted under irrigated conditions on Maize crop on page No. 551.

3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Maize crop on page No. 547.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of Maize. (iv) 1965 to 66 for Gurdaspur; 1962 to 66 for Hoshiarpur (62 N.A.) and 1963, 64 for Patiala. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

Gurdaspur

65(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₁ P ₃	N ₁ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	260	52	242	410	535	760	885	104.4

Control yield=1092 Kg/ha; No of trials=4

Hoshiarpur

63(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	542	71	113	596	674	1081	1238	79.0

Control yield=1313Kg/ha; No. of trials=15

64(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	594	45	115	734	831	1075	1161	102.7

Control yield=1158 Kg/ha; No. of trials=14

65(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	491	20	92	561	598	1036	1074	86.6

Control yield=1075 Kg/ha; No. of trials=13

Patiala

63(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	610	163	286	812	904	1146	1314	127.0

Control yield=1146 Kg/ha; No. of trials=4

64(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	217	112	82	579	757	797	1337	213.4

Control yield=1179 Kg/ha; No. of trials=3

Crop : Maize (Kharif). Ref :- Pb. 65 (S.F.T.) for Ferozepur, 62 to 65 (S.F.T.) for Ludhiana, 62,63, 65 (S.F.T.) for Patiala, 62, 63, 65 (S.F.T.) for Sangrur and 62, 63(S.F.T.) for Jullundur.

Distirct :- Ferozepur, Ludhiaana, Patiala, Sangrur, Type 'M' and Jullundur.

Object :-Type A₂ To study the res ponse curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments:

O=Control (no manure)

N₁=60 Kg/ha. of N.

P₁=35 Kg/ha. of P₂O₅.

P₂=70 Kg/ha. of P₂O₅.

N₁P₁=60 Kg/ha. of N+35 Kg/ha. of P₂O₅.

N₁P₂=60 Kg/ha. of N+70 Kg/ha. of P₂O₅.

N₂P₂=120 Kg/ha. of N+70 Kg/ha. of P₂O₅ and

N₂P₂K₂=120 Kg/ha. of N+70 Kg/ha. of P₂O₅+70 Kg/ha. of K₂O

3. DESIGN:

Same as in type A₁ conducted under irrigated condition on Maize crop on page No. 547.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of Maize. (iv) 1965 for Ferozepur, 1962 to 66 for Ludhiana, 1962 to 66 for Patiala, Sangrur (64 N.A.) and 1962, 63 for Jullundur; (v) to (vii) N.A.

5. RESULTS:

Ferozepur

65(S.F.T)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	62	150	87	201	287	362	450	18.7

Control yield=1412 Kg/ha. ; No. of trials=4

Ludhiana

62 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	253	—56	261	553	485	658	756	289.3

Control yield=1644Kg/ha.; No. of trials=7

63(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	245	56	384	700	663	858	1045	137.0

Control yield=1763 Kg/ha. ; No of trials=9

64(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	758	415	546	801	956	1382	1609	126.5

Control yield=2577 Kg/ha. ; No. of trials=7

65(S.F.T)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	555	549	641	685	778	1168	1336	115.5

Control yield=2008 Kg/ha. ; No. of trials=7

Patiala

62(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	277	205	240	578	564	726	674	123.8

Control yield=2296 Kg/ha. ; No. of trials=9

63 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	543	231	133	495	575	783	1081	241.0

Control yield.=2663 Kg/ha. ; No. of trials=6

65(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	560	368	204	531	698	1179	1126	191.0

Control yield=2147 Kg/ha; No. of trials=7

Sangrur

62(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	105	82	245	241	339	364	587	60.2

Control yield=1018 Kg/ha ; No. of trials=9

63(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	551	115	195	561	994	1453	1085	251.0

Control yield=1946 Kg/ha. ; No. of trials=3

64(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	246	215	666	535	477	1186	1098	139.9

Control yield =1892 Kg/ha. ; No. trials=7

Jullundur

62(S.F.T)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	242	193	300	483	591	695	855	94.3

Control yield=1132 Kg/ha. No. of trials=13

63(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of grain in Kg/ha.	721	246	365	806	1004	1365	1254	131.0

Control yield=1412 Kg/ha.; No. of trials=6

Crop :- Maize (Kharif).
District :- Jullundur, Ludhiana,
Patiala, Sangrur and Ferozepur.

Ref :- Pb.62 and 63(S.F.T) for Jullundur,
62 to 65(S.F.T.) for Ludhiana and Patiala
62, 63 and 65(S.F.T.) for Sangrur and 65
(S.F.T.) for Ferozepur.

Type :- 'M'

Object Type A₃ :- To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

 $N_1=60$ Kg/ha. of N, $K_1=35$ Kg/ha. of K_2O , $K_2=70$ Kg/ha. of K_2O , $N_1K_1=60$ Kg/ha. of N+35 Kg/ha. of K_2O , $N_1K_2=60$ Kg/ha. of N+70 Kg/ha. of K_2O , $N_2K_2=120$ Kg/ha. of N+70 Kg/ha. of K_2O and $N_1P_1K_1=60$ Kg/ha. of N+35 Kg/ha. of P_2O_5 +35 Kg/ha. of K_2O .

3. DESIGN :

Same as in Type A₁ conducted under irrigated condition on Maize crop on page No. 547.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of grain. (vi) (a) 62 to 63 (S.F.T.) for Jullundur; 62 to 65 (S.F.T.) for Ludhiana and Patiala; 62,63 and 65 (S.F.T.) for Sangrur and 65 (S.F.T.) for Ferozepur (b) and (c) N.A.

Jullundur

62(S.F.T.)

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of grain in Kg/ha.	462	104	125	378	532	700	572	103.7

Control yield=1473 Kg/ha. ; No of trials 10

63(S.F.T.)

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of grain in Kg/ha.	521	179	253	535	551	866	864	64.0

Control yield=1645Kg/ha. ; No. of trials=15

Ludhiana

62(S.F.T.)

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of grain in Kg/ha.	362	-79	-63	397	373	507	451	139.2

Control yield=1377 Kg/ha. ; No. of trials=8

63(S.F.T.)

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of grain in Kg/ha.	275	64	106	378	568	647	702	129.0

64(S.F.T.)

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of grain in Kg/ha.	640	153	352	578	808	1241	1258	118.8

Control yield=1763 Kg/ha. ; No. of trials=5

65 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	546	283	421	648	933	1055	1022	107.1

Control yield=1245 Kg/ha. ; No. of trials=15

Patiala

62(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	635	30	475	687	576	832	821	232.1

Control yield=1402 Kg/ha. ; No. of trials=4

63(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	432	262	30	171	356	504	555	212.0

Control yield=2467 Kg/ha. ; No. of trials=6

64(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	112	-138	-32	289	375	790	724	249.8

Control yield=1120Kg/ha. ; No. of trials=3

65(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	23	-163	-84	132	95	199	551	230.3

Control yield=2375 Kg/ha. ; No. trials=7

Sangrur

62(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	471	440	423	569	520	650	740	98.4

Control yield=1213 Kg/ha. ; No. of trials=8

63 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	354	92	93	497	529	937	871	151.0

Control yield=2029 Kg/ha. ; No. of trials=6

65(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	432	180	226	605	385	960	877	51.8

Control yield=1452 Kg/ha. No. of trials=7

Ferozepur 65(S.F.T)								
Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₁	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	75	112	275	350	412	525	450	49.8

Control yield=1650Kg/ha. ; No. of trials=4

Crop :- Maize (Kharif).

Ref. :- Pb 62 to 65(S.F.T.) for Hoshiarpur, 63(S.F.T.) for Patiala, and 65(S.F.T.) for Gurdaspur.

District : Hoshiarpur, Patiala and Gurdaspur.

Type :- 'M'.

Object :-Type A₃ : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS

Same as in type A₃ conducted under irrigated condition on Maize crop on page No. 554.

3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Maize crop on page No. 547.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of maize. (iv) (a) 1962 to 66 for Hoshiarpur, 1963 only for Patiala, and 65 for Gurdaspur. (v) to (vii) N.A.

5. RESULTS :

Hoshiarpur

62(S.F.T.)								
Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	755	119	254	868	1049	1583	1240	83.4

Control yield=1523 Kg/ha. ; No. of trials=9

63(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	471	-19	78	493	497	952	605	84.0

Control yield=1380Kg/ha. ; No. of trials=15

64(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	711	111	176	484	601	1037	797	202.3

Control yield=1091 Kg/ha.; No. of trials=13

65(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	330	2	28	284	475	885	687	99.9

Control yield=1110 Kg/ha. ; No. of trials=13

Patiala

65(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	578	130	284	328	533	1060	985	121.0

Control yield=914 Kg/ha. ; No. of trials=4

Gurdaspur

65(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of grain in Kg/ha.	223	50	160	263	283	650	620	114.3

Control yield=1003 Kg/ha.; No. of trials=3

Crop :- Barley (Rabi).**Ref :- Pb. 64(282).****District :- Punjab, Agri. University, Ludhiana.****Type :- 'M'.**

Object :— To see the effect of different levels of N and P on the yield of Barley crop.

1. BASAL CONDITIONS :

(i) (a) Maize - Barley. (b) Maize. (c) N.A. (ii) Sandy loam. (iii) 15 to 30.11.64. (iv) (a) 2 ploughings. (b) Kera. (c) 35 Kg/ha. (d) N.A. (e) — (v) N.A. (vi) C-164 (vii) Irrigated. (viii) one hoeing. (ix) 11cm. (x) 10th week of April, 65.

2. TREATMENTS

Main-plot treatments :-

3 levels of N : N₀=0, N₁=28 and N₂=56Kg/ha.

Sub-plot treatments :-

3 levels of P₂O₅ : P₀=0, P₁=28 and P₂=56Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication; 3 sub-plots/main-plot. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 10.12 sq metre. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Satis-factory. (ii) Nil. (iii) Germination, no. of ears, yield of grain. (iv) (a) 1964— only. (b) No (c) Nil. (v) to (vii) No.

5. RESULTS :

(i) 2524 Kg/ha. (ii) (a) 595.7 Kg/ha. (b) 323.2 Kg/ha. (iii) Main effect of N alone is significant. (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	P ₂	Mean
N ₀	1700	1878	1512	1697
N ₁	2669	2353	2373	2465
N ₂	3391	3243	3599	3411
Mean	2587	2491	2495	2524

C.D. for N marginal means = 442.4 Kg/ha.

Crop :- Barley. (Rabi).

Ref :- Pb. 65(164).

Site :- Punjab Agri. University; Ludhiana.

Type :- 'M'.

Object :—To study the effect of different spacings and seed-rates on the yield of Barley.

1. BASAL CONDITIONS :

(i) (a) Maize-Barley. (b) Maize. (c) N.A. (ii) Loamy sand. (iii) 15 and 30.11.65. (iv) (a) 2 ploughings, (b) Kera. (c) As per treatments. (v) N.A. (vi) C-164. (vii) Irrigated. (viii) One hoeing (ix) 9cm. (x) 10th week of April, 66.

2. TREATMENTS :

Main-plot treatments

3 levels of spacing : S₁=15, S₂=23 and S₃=30cm.

Sub-plot treatments :

3 levels of seed-rate : R₁=60, R₂=86 and R₃=111 Kg/ha.

3. DESIGN:

(i) Split-plot. (ii) (a) 3 main-plots/replication; 3 sub-plots/main-plot. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 10*12. sq-metre. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Good. (ii) Nil. (iii) Germination, no. of plants/meter; no. of ears head etc. (iv) (a) 1965-continued (b) No. (c) Nil. (v) No. (vi) and (vii) Nil.

5. RESULTS :

(i) 3005 Kg/ha. (ii) (a) 392.5 Kg/ha. (b) 529.8 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	S ₁	S ₂	S ₃	Mean
R ₁	2897	3134	2897	2976
R ₂	3282	2827	3084	3064
R ₃	2808	2857	3262	2976
Mean	2997	2939	3081	3005

Crop :- Barley. (Rabi).**Ref :- Pb :- 65(165).****Site :- Punjab Agri. University, Ludhiana.****Type :- 'CM'.**

Object :--To study the effect of different levels of N and seed-rates on the yield of Barley.

1. BASAL CONDITIONS :

(i) (a) Fallow or maize-barley. (b) Maize. (c) N.A. (ii) Loamy sand. (iii) 15 and 30.11.65. (iv) 2 ploughings. (b) Kera. (c) 75 to 110Kg/ha. (d) and (e) N.A. (v) N.A. (vi) C-164. (vii) Irrigated. (viii) one hoeing. (ix) 9cm. (x) 1st week April, 66.

2. TREATMENTS :**Main-plot treatments :-**3 levels of N : $N_0=0$, $N_1=35$ and $N_2=70$ Kg/ha.**Sub-plot treatments:-**2 seed-rates: $R_1=75$ and $R_2=110$ Kg/ha.**3. DESIGN :**

(i) Split-plot. (ii) (a) 3main-plots/replication, 2 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 20'24. sq. cm. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Good. (ii) Nil. (iii) Yield of grain. (iv) (a) 1955-contd. (b) No. (c) Nil. (v) No. (vi) and (vii) Nil.

5. RESULTS :

(i) 2801Kg/ha. (ii) (a) 278.7 Kg/ha. (b) 334.6 Kg/ha. (iii) Main effect of N alone is significant. (iv) Av. yield of grain in Kg/ha.

	N_0	N_1	N_2	Mean
R_1	2879	2792	2422	2698
R_2	2928	3212	2570	2903
Mean	2904	3002	2570	2801

C.D. for N marginal means=341.0 Kg/ha.

Crop :- Barley (Rabi).**Ref :- Pb. 65(166).****Site :- Punjab Agri. University, Ludhiana.****Type :- '1M'.**

Object : - To study the effect of different levels of N and irrigation on the yield of Barley.

1. BASAL CONDITIONS :

(i) (a) Maize-Barley. (b) Maize. (c) Nil. (ii) Loamy sand. (iii) 15 and 30.11.65. (a) 2 ploughings. (b) Kera. (c) 75 Kg/ha. (d) and (e) N.A. (v) N.A. (vi) C-164. (vii) Irrigated. (viii) One hoeing. (ix) 9cm (x) 1st week of April, 66.

2. TREATMENTS :**Main-plot treatments**3 levels of irrigation : $I_1=1$, $I_2=2$ and $I_3=3$.

Sub-plot treatments :

3 levels of N : $N_0=0, N_1=35$ and $N_2=70\text{Kg/ha}$.

3. DESIGN :

(i) Split-plot (ii) (a) 3 main-plots/replication, 3 sub-plots/main-plot (b) N.A. (iii) 4. (iv) (a) N.A. (b) 20.24 sq metres. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Good. (ii) Nil. (iii) Yield of grain. (iv) (a) 1965-contd. (b) No. (c) Nil. (v) No. (vi) and (vii) Nil.

5. RESULTS:

(i) 2103 Kg/ha. (ii) (a) 420.4 Kg/ha. (b) 317.1 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	I_1	I_2	I_3	Mean
N_0	2273	2268	1984	2175
N_1	2046	2347	2120	2171
N_2	1984	2120	1787	1964
Mean	2101	2245	1964	2103

Crop :- Bajra. (Kharif).

Ref :- Pb. 61(26),62(30),63(46).

Site :- Agri. Res. Stn, Ferozepur Cantt.

Type :- 'M'.

Object:—To study the effect of different levels of N, P and K on the yield of Bajra.

BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 27.7.61, 4.7.62, 19.7.63. (iv) (a) to (e) N.A. (v) Nil. (vi) A 1/3 (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) 16.10.61, 14.10.62, 18.10.63.

2. TREATMENTS**Main-plot treatments :**

2 levels of P_2O_5 : $P_0=0$, and $P_1=44.8\text{ Kg/ha}$.

Sub-plot treatments:

2 levels of K_2O : $K_0=0$ and $K_1=44.8\text{Kg/ha}$.

Sub-Sub-plot treatments:—

4 levels of N : $N_0=0, N_1=22.4, N_2=44.8$ and $N_3=67.2\text{ Kg/ha}$.

3. DESIGN :

(i) Split-plot. (ii) 2 main-plots/replication, 2 sub-plots/main-plot, and 4 sub-sub-plots/sub-plot. (b) N.A. (iii) 2 for 61; 4 for others. (iv) (a) N.A. (b) 1/247 ha. for 61; 1/296.5 ha. for others. (v) N.A. (vi) Yes.

4 GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1961 to 63. (b) No. (c) Nil. (v) N.A. (vi) Heavy rain fall in 62, (vii) Since the sub-sub-plot-error variances are heterogeneous, therefore the results of individual years are given below.

5. RESULTS :

61(26)

(i) 1803 Kg/ha, (ii) (a) 119.1 (b) 518.8 Kg/ha. (c) 93.7 Kg/ha. (iii) Main effect of N alone is significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	N ₃	P ₀	P ₁	Mean
K ₀	1579	1719	1969	2058	1949	1713	1831
K ₁	1468	1730	1825	2073	1779	1768	1774
Mean	1524	1724	1897	2066	1864	1741	1803
P ₀	1612	1837	1880	2128			
P ₁	1435	1612	1813	2003			

C.D. for N marginal means = 102.0 Kg/ha.

62(30)

(i) 1006 Kg/ha. (ii) (a) 286.8 Kg/ha. (b) 181.7 Kg/ha. (c) 121.8 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	N ₃	P ₀	P ₁	Mean
K ₀	836	916	1115	1054	983	977	980
K ₁	864	1056	1105	1102	1046	1077	1032
Mean	850	986	1110	1078	1015	997	1006
P ₀	816	1008	1112	1123			
P ₁	884	964	1108	1034			

C.D. for N marginal means = 87.4 Kg/ha.

63(46)

(i) 1036 Kg/ha. (ii) (a) 175.9 Kg/ha. (b) 149.9 Kg/ha. (c) 166.8 Kg/ha. (iii) Main effect of N alone is highly significant. (vi) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	N ₃	P ₀	P ₁	Mean
K ₀	835	1080	1093	1291	1055	1095	1075
K ₁	832	950	1000	1209	1029	967	998
Mean	834	1015	1046	1250	1042	1031	1036
P ₀	874	1033	995	1266			
P ₁	744	997	1098	1234			

C.D. for N marginal means = 119.7 Kg/ha.

Crop :- Bajra (Kharif).**Ref :- Pb. 61(24), 62(33), 63 (37).****Site :- Agri. Res. Stn., Ferozepur Cantt.****Type :- 'M'.**

Object :- To study the effect of different methods and times of application of N on the yield of Bajra

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Gram for 61; N.A. (c) N.A. (ii) Clay loam. (iii) 14.7.61; 1st week of July, mid of July. (iv) (a) 3 to 4 ploughings. (b) to (e) N.A. (v) N.A. (vi) A1/3. (vii) Irrigated. (viii) and (ix) N.A. (x) 7.10.61.; mid. of Nov.; 1st week of Oct.

2. TREATMENTS:

8 times and methods of application of 44.8 Kg/ha. of N : T₀=Control, T₁=Full dose applied at sowing by broad casting, T₂=Full dose applied by plough furrow, T₃=1/2 dose at sowing+1/2 dose at thinning, T₄=1/2 dose at sowing+1/2 dose at earing, T₅=Full dose at thinning, T₆=Full dose at earing and T₇=1/2 dose at thinning.+1/2 dose at earing.

3. DESIGN:

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 6. (iv) (a) 19.51m. x 3.05m. for 61; 18.29m. x 3.05 m. for others. (b) 16.60m. x 2.44m. (v) 145cm. x 30cm. for 61, 85cm. x 30cm. for others. (vi) Yes.

4. GENERAL :

(i) Satisfactory for 61 and 63; Unsatisfactory for 62. (ii) N.A. (iii) Yield of grain. (iv) (a) 1961-63. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Unusual weather conditions and heavy rains for 62 only, Nil. for others. (vii) Error variances are heterogeneous and Treatments x Years interaction is present.

5. RESULTS:

(i) 1719Kg/ha. (ii) 607.8Kg/ha. (based on 14d.f. made up of Treatments x Years interaction), (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇
Av. yield	1694	1893	1772	1734	1449	1775	1704	1729

Individual results

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	Sig.	G.M.	S.E./plot
Year											
1961	1679	2373	2388	2338	1986	2387	2053	2259	N.S.	2183	163.3
1962	1359	1224	1117	1055	1285	1225	1294	1131	N.S.	1211	148.3
1963	2043	2081	1810	1810	1077	1712	1765	1797	**	1762	387.0
Pooled	1694	1893	1772	1734	1449	1775	1704	1729	N.S.	1719	607.8

Crop :- Bajra (Kharif).**Ref :- Pb 63(51).****Site:- Agri. Res. Stn., Ferozepur.****Type :- 'C'.**

Object :- To study the effect of different methods of sowing and cultural practices on the yield of Bajra.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 13.7.63. (iv) (a) N.A. (b) As per treatments. (c) to (e) N.A. (v) N.A. (vi) T-55. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) 28.10.63.

2. TREATMENTS

Main-plot treatments :—

3 methods of sowing :— M_1 =Pora. M_2 = Kera and M_3 =Broadcasting.

Sub-plot treatments :—

2 cultural treatments :— T_0 =Control (no thinning) and T_1 =Thinning.

3. DESIGN:

(i) Split-plot. (ii) (a) 3 main-plots/replication; 2 sub-plots/main-plot. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/494 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1963—only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 1358 Kg/ha. (ii) (a) 254.0 Kg/ha. (b) 197.7 Kg/ha. (iii) Interaction $M \times T$ is highly significant. (iv) Av. yield of grain in Kg/ha.

	M_1	M_2	M_3	Mean
T_0	1468	1441	1174	1361
T_1	1231	1303	1532	1355
Mean	1350	1372	1353	1358

C.D. for T means at the same level of $M=243.2$ Kg/ha.

C.D. for M means at the same level of $T=287.8$ Kg/ha.

Crop :- Bajra. (Kharif).

Site :- Agri. Res. Stn., Ferozepur.

Ref :- Pb. 65(86),

Type :- 'CV'.

Object :—To study the effect of spacings, thinnings and varieties on the yield of Bajra.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) Mid of July, 65. (iv) (a) and (b) N.A. (c) 6.25 Kg/ha. for T.S.S., 3.75 Kg/ha. for HB-1 (d) As per treatments. (e) Nil. (v) 75 Kg/ha. of N. (vi) As per treatments (vii) to (ix) N.A. (x) Nov., 65.

2. TREATMENTS:

Main-plot treatments :—

2 varieties :— V_1 =T.S.S. and V_2 =H.B.-I.

Sub-plot treatments :—

2 cultural treatments :— T_0 =No thinning and T_1 =2 thinnings.

Sub-sub-plot treatments :

3 row spacings :— $S_1=30$, $S_2=60$ and $S_3=90$ cm.

3. DESIGN:

(i) Split-plot. (ii) (a) 2 main-plots/replication; 2 sub-plots/main-plot and 3 sub-sub-plots/sub-plot. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/644 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1965—contd. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 921 Kg/ha. (i) (a) 315.6 Kg/ha. (b) 152.6 Kg/ha. (c) 91.4 Kg/ha. (iii) Main effects of V, S and interaction V × S are highly significant. (iv) Av. yield of grain in Kg/ha.

	T ₀	T ₁	S ₁	S ₂	S ₃	Mean
V ₁	754	760	730	775	765	757
V ₂	1039	1132	1162	1122	972	1085
Mean	896	946	946	948	868	921
S ₁	950	942				
S ₂	894	1003				
S ₃	845	892				

C.D. for V marginal means = 191.2 Kg/ha.

C.D. for S marginal means = 53.3 Kg/ha.

C.D. for S means at the same level of V = 75.4 Kg/ha.

C.D. for V means at the same level of S = 200.2 Kg/ha.

Crop :- Bajra. (Kharif).

Ref :- .Pb. 65(94).

Site :- Agri. Res. Stn., Ferozepur.

Type :- 'M'.

Object :- To find out the best method of application of N on Bajra. crop

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) to (v) N.A. (vi) AI/3. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 times and methods of application of 110Kg/ha. of N :- T₀ = Control. T₁ = Full dose applied at sowing by broad casting; T₂ = Full dose applied by plough furrow, T₃ = 1/2 dose at sowing + 1/2 dose at thinning, T₄ = 1/2 dose at sowing + 1/2 dose at earing, T₅ = Full dose at thinning, T₆ = Full dose at earing and T₇ = 1/2 dose at thinning + 1/2 dose at earing.

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/247 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1965-only. (b) No, (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 1045 Kg/ha. (ii) 136.2 Kg/ha. (iii) Treatment differences are significant. (iv) Av. yield of grain in kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇
Av. yield	1073	1115	1271	1109	1106	904	975	803

C.D. = 200.3 Kg/ha.

Crop : Bajra (Rabi).

Ref :- Pb. 60 and 61(S.F.T.),

District :- Ferozepur and Sangrur.

**Type :- 'M'.
for Ferozepur and Sangrur.**

Object :- Type A : To study the response of Bajra to different levels of N, P and K applied individually and in combination

1. **BASAL CONDITIONS :**

(i) to (x) N.A.

2. **TREATMENTS :**

8 manurial treatments :

O=Control (no manure).

N=22.4 Kg/ha. of N,

P=22.4 Kg/ha. of P_2O_5 ,

K=22.4 Kg/ha. of K_2O ,

NP =22.4 Kg/ha. of N+22.4 Kg/ha of P_2O_5 ,

NK =22.4 Kg/ha. of N+22.4 Kg/ha. of K_2O ,

PK =22.4 Kg/ha. of P_2O_5 +22.4 Kg/ha. of K_2O and

NPK =22.4 Kg/ha. of N+22.4 Kg/ha. of P_2O_5 +22.4 Kg/ha. of K_2O .

3. **DESIGN :**

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle/thana is changed once in two years with in the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on Kharif cereal, 8 on a Rabi cereal, 8 on Cash crop, 4 on an oilseed crop and 3 on a leguminous crop. Half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. Three trials on legumes are of type C. Residual effects of phosphate application are studied on type C trials in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98.8ha. (b) 1/197.7ha. (iv) Yes.

4. **GENERAL :**

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960 and 61. (b) and (c) N.A. (v) to (vii) N.A.

5. **RESULTS.**

Av. response of grain in Kg/ha.

60 (S.F.T.)

District.	No. of trials	Control yield in Kg/ha.	N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Ferozepur	5	840	90	50	40	9.0	-10	0	0	0	6.0
Sangrur	2	1000	160	120	270	84.0	60	0	0	-10	78.0

61 (S.F.T.)

District	No. of trials	Control yield in Kg/ha.	N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Ferozepur	4	700	280	60	70	52.0	20	40	-30	10	46.0
Sangrur	2	1180	320	290	190	24.0	90	70	-30	-10	26.0

Crop :- Bajra (Kharif).**Ref :- Pb. 60(S.F.T).****District :- Ferozepur,****Type :- 'M'.**

Object :- Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (no manure)

 $N_1=22.4$ Kg/ha. of N as A/S., $N_2=44.8$ Kg/ha. of N as A/S., $N_1'=22.4$ Kg/ha. of N as Urea., $N_2'=44.8$ Kg/ha. of N as Urea., $N_1''=22.4$ Kg/ha. of N as C/A/N. and $N_2''=44.8$ Kg/ha. of N as C/A/N.**3. DESIGN :**

Same as in type A conducted on Bajra crop on page No. 565.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960—only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.					S.E.	
			N_1	N_2	N_1'	N_2'	N_1''		N_2''
Ferozepur	3	920	160	230	110	220	130	210	30.0

Crop :- Bajra (Kharif).**Ref :- Pb. 61(S.F.T).****District :- Sangrur and Ferozepur.****Type :- 'M'.**

Object :- Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (no manure),

 $N_1=22.4$ Kg/ha. of N as A/S., $N_2=44.8$ Kg/ha. of N as A/S., $N_1'=22.4$ Kg/ha. of N as Urea., $N_2'=44.8$ Kg/ha. of N as Urea., $N_1''=22.4$ Kg/ha. of N as A/S/N and $N_2''=44.8$ Kg/ha. of N as A/S/N

3. DESIGN :

Same as in type A conducted on Bajra crop on page No. 565

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1961—only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS ;

Av. response in Kg/ha.

61 (S.F.T)

District	No. of trials	Control yield in Kg/ha.	N ₁	N ₂	N ₁ '	N ₂ '	N ₁ '	N ₂ '	S.E.
Sangrur	2	960	350	640	240	580	440	740	50.0
Ferozepur	4	860	490	670	390	600	250	790	43.0

Crop :- Bajra (Kharif).

Ref :- Pb. 63, 65(S.F.T.).

District :- Sangrur.

Type :- 'M'.

Object:—Type A₁: To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure)

N₁=35 Kg/ha. of N,

N₂=70 Kg/ha of N,

P₁=35 Kg/ha of P₂O₅,

N₁P₁=35 Kg/ha. of N+35 Kg/ha. of P₂O₅,

N₂P₁=70 Kg/ha. of N+35 Kg/ha. of P₂O₅,

N₂P₂=70 Kg/ha. of N+70 Kg/ha. of P₂O₅, and

N₂P₂K₁=70Kg/ha. ofN+70Kg/ha. of P₂O₅+35 Kg/ha. of K₂O.

3. DESIGN :

(i) and (ii) A selected district is divided into four agriculturally homogeneous zones based on climate, soil and cropping pattern etc. In each zone one block is selected at random. A block normally consists of a group of 50-100 villages. In each block 36 experiments are conducted in a year of which 11 are of type A₁, 11 of type A₂, 11 of type A₃ and 3 are of type C. The eleven experiments each under type A₁, A₂ and A₃ are distributed as 3 on a Kharif cereal, 3 on a Rabi cereal, 3 on a Cash crop and 2 on Oilseed crop. All the three type-C experiments are conducted on legume crop. For the purpose of conducting the A₁, A₂ and A₃ experiments 11 villages are randomly selected in each block and in each village 3 experiments one each of type A₁, A₂ and A₃ are laid out. For conducting these experiments, three villages are randomly selected in each block. (iii) (a) 1/100 ha. (b) 1/200 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1960 to 61. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Sangrur

63(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	252	425	133	617	691	820	988	46.0

Control yield=2658 Kg/ha., No. of trials=3

65 (S. F. T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S. E.
Av. response of grain in Kg/ha.	266	666	366	800	200	266	1000	281.6

Control yield=1866 Kg/ha., No. of trials=3

Crop :- Bajra (Kharif).**District :- Sangrur.****Ref :- Pb. 64(S.F.T).****Type :- 'M'.**

Object :—Type A₁: To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS and 3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Bajra crop on Page No. 567.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) 1964—only. (b) and (c) N.A. (v) to (vii) N.A.

3. RESULTS :

Sangrur

64 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of grain in Kg/ha.	164	336	69	298	456	652	794	33.3

Control yield=1950 Kg/ha.; No. of trials=4

Gop :- Bajra (Kharif).**District :- Sangrur and Ferozepur.****Ref :- Pb. 63, 63(S.F.T) for Sangrur,
and 62(S.F.T.) for Ferozepur.****Type :- 'M'.**

Object:—Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (No manure)

 $N_1=35$ Kg/ha. of N, $P_1=35$ Kg/ha. of P_2O_5 , $P_2=70$ Kg/ha. of P_2O_5 , $N_1P_1=35$ Kg/ha. of N+35 Kg/ha. of P_2O_5 , $N_1P_2=35$ Kg/ha. of N+70 Kg/ha. of P_2O_5 , $N_2P_2=70$ Kg/ha. of N+70 Kg/ha. of P_2O_5 and $N_2P_2K_1=70$ Kg/ha. of N+70 Kg/ha. of P_2O_5 +35Kg/ha. of K_2O ,

3. DESIGN :

Same as in type A_1 Conducted under irrigated condition on Bajra crop on page No. 567.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of grain. (iv) (a) 1962 to 66 for Sangrur (62, 64 N.A.) and 1962—only for Ferozepur. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Sangrur

63 (S.F.T.)

Treatment	N_1	P_1	P_2	N_1P_1	N_1P_2	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of grain in Kg/ha.	340	222	355	602	761	978	1161	23.0

Control yield=2406 Kg/ha. No. of trials=3.

65(S.F.T.)

Treatment	N_1	P_1	P_2	N_1P_1	N_1P_2	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of grain in Kg/ha.	633	566	566	1200	1013	1533	1640	240.5

Control yield=1966 Kg/ha. No. of trials=3

Ferozepur

62(S.F.T.)

Treatment	N_1	P_1	P_2	N_1P_1	N_1P_2	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of grain in Kg/ha.	29	9	—	69	138	326	128	88.4

Control yield=1363 Kg/ha. No. of trials=2.

Cop :- Bajra (Kharif).

District :- Sangrur.

Ref. :- Pb. 63, 65(S.F.T.).

Type :- 'M'.

Object :- Type A_3 : To study the response curves of important cereal, cash and oil seed crops applied to K singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure)

 $N_1=35$ Kg/ha., of N, $K_1=35$ Kg/ha., of K_2O , $K_2=70$ Kg/ha., of K_2O , $N_1 K_1=35$ Kg/ha. of N + 35Kg/ha. of K_2O , $N_1 K_2=35$ Kg/ha. of N + 70 Kg/ha. of K_2O , $N_2 K_2=70$ Kg/ha. of N + 70Kg/ha. of K_2O and $N_1 P_1 K_1=35$ Kg/ha. of N + 35Kg/ha., of P_2O_5 + 35Kg/ha. of K_2O ,

3. DESIGN :

Same as in type A_1 conducted under irrigated condition on Bajra crop on page No. 567.

4. GENERAL

(i) and (ii) N.A. (iii) Yield of grain (iv) (a) 1962 to 66 (1962 and 64 N.A.) (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Sangrur

63 (S.F.T.)

Treatment	N_1	K_1	K_2	$N_1 K_1$	$N_1 K_2$	$N_2 K_2$	$N_1 P_1 K_1$	S.E.
Av. response of grain in Kg/ha.	202	44	232	365	370	686	968	83.0

Control yield = 2194 Kg/ha. ; No. of trials = 3

65 (S. F. T.)

Treatment	N_1	K_1	K_2	$N_1 K_1$	$N_1 K_2$	$N_2 K_2$	$N_1 P_1 K_1$	S.E.
Av. response of grain in Kg/ha.	1213	326	100	820	1240	913	1060	329.6

Control yield = 1559 Kg/ha., No. of trials = 3

Crop :- Bajra (Kharif).**Ref :- Pb. 65(87).****Site :- Agri. Res. Stn., Ferozepur.****Type :- 'MV'.**

Object :- To study the effect of different levels of N on the yield of different varieties of Bajra crop.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) to (v) N.A. (vi) As per treatments. (vii) to (x) N.A.

Main-plot treatments :—2 varieties :— $V_1=AI/3$ and $V_2=H.B.-1$.**Sub-plot treatments :**5 levels of N : $N_0=0$, $N_1=45$, $N_2=90$, $N_3=135$ and $N_4=180$ Kg/ha.**3. DESIGN:**

(i) Split-plot (ii) (a) 2 main-plots/replication, 5 sub-plots/main-plot. (b) N.A. (iii) 5. (iv) (a) N.A. (b) 1/232 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal (ii) N.A. (iii) Yield of grain (iv) (a) 1965—only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :(i) 876 Kg/ha. (ii) (a) 327.1 Kg/ha. (b) 74.8 Kg/ha. (iii) Main effects of V, N and interaction $V \times N$ are highly significant (iv) Av. yield of grain in Kg/ha.

	N_0	N_1	N_2	N_3	N_4	Mean
V_1	562	646	706	769	891	715
V_2	694	901	1035	1199	1360	1038
Mean	628	774	870	984	1126	876

C.D. for V marginal means=256.8 Kg/ha.

C.D. for N marginal means=68.1 Kg/ha.

C.D. for V means at the same level of N=273.6 Kg/ha.

C.D. for N means at the same level of V=109.6 Kg/ha.

Crop:- Bajra (Kharif).**Ref :- Pb. 61(27),62(39),63(44).****Site:- Agri. Res. Stn., Ferozepur Cantt.****Type :- 'C'.**

Object—To study the effect of dates of sowing and methods of planting on the yield of Bajra.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam for 61; Sandy loam for others (iii) As per treatments. (iv) (a) N.A. (b) As per treatments. (c) to (e) N.A. (v) Nil. (vi) AI/3 (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) 25.10.61; 27.10.62; 14.10.63.

2. TREATMENTS**Main-plot treatments :**4 dates of planting :— $D_1=30$ th June, $D_2=16$ th June, $D_3=1$ st August and $D_4=17$ August.**Sub-plot treatments :**2 methods of planting— $S_1=Sowing$ and $S_2=Transplanting$.**3. DESIGN :**

(i) Split-plot. (ii) (a) 4 main-plots/replication, 2 sub-plots/main-plot. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/247ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1961 to 63. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Nil. (vii) Main-plot error variances are heterogeneous and *Treatments* × *Years* interaction is present. Sub-plot error variances are homogeneous and *Treatments* × *Years* interaction is present.

5. RESULTS :

Pooled results :

(i) 791 Kg/ha. (ii) (a) 1705.4 Kg/ha. (based on 6 d.f. made up of *Treatments* × *Years* interaction). (b) 360.4 Kg/ha. (based on 8 d.f. made up of *Treatments* × *Years* interaction). None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	D ₁	D ₂	D ₃	D ₄	Mean
S ₁	716	1394	630	191	733
S ₂	1079	1635	557	124	849
Mean	897	1514	593	157	791

Individual results

Treatment Year	S ₁	S ₂	Sig.	D ₁	D ₂	D ₃	D ₄	Sig.	G.M.	S.E./plot	
										Main-plot	Sub-plot
1961	961	1210	**	1496	2397	296	152	**	1086	353.3	144.5
1962	387	430	N.S.	428	619	541	45	**	408	183.2	114.6
1973	851	908	N.S.	769	1528	945	276	**	880	179.2	114.2
Pooled	733	849	N.S.	897	1514	593	157	N.S.	791	1705.4	360.4

Crop :- Bajra (*Kharif*).

Ref : Pb. 62(36), 63(45).

Site : Agri. Res. Stn., Ferozepur Cantt.

Type 'C'.

Object :—To study the effect of spacings and number of plants per hill on the yield of Bajra.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam; Sandy loam (iii) 26.7.62; 27.7.63. (iv) (a) N.A.; 3 to 4 ploughings. (b) and (c) N.A. (d) and (e) As per treatments. (v) Nil. (vi) AI/3; T-55. (vii) Irrigated. (viii) N.A.; 2 hoeings. (ix) N.A. (x) 14.10.62; 18.10.63.

2. TREATMENTS :

All combinations of (1) and (2) :

(1) 3 spacings between rows : S₁=30, S₂=46, and S₃=61cm.

(2) No. of plants/hill : P₁=1 and P₂=3.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/148.3 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-63. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Nil. (vii) Error variances are homogeneous and *Treatments* × *Years* interaction is absent.

5. RESULTS :

Pooled results

(i) 1529 Kg/ha. (ii) 180.9 Kg/ha. (based on 35 d.f. made up of Treatments \times Years interaction and pooled error). (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	S ₁	S ₂	S ₃	Mean
P ₁	1475	1439	1457	1457
P ₂	1650	1495	1658	1601
Mean	1562	1467	1557	1529

Individual results :

Treatment	P ₁	P ₂	Sig.	S ₁	S ₂	S ₃	Sig.	G.M.	S.E./plot
Year									
1962	1218	1271	N.S.	1318	1188	1229	N.S.	1245	190.4
1963	1696	1931	**	1808	1746	1886	N.S.	1813	148.7
Pooled	1457	1601	N.S.	1562	1467	1557	N.S.	1529	180.9

Crop Bajra (Kharif).

Ref :- Pb. 61(28), 62(34), 63(43).

Site :- Agri. Res. Stn.; Ferozepur Cantt.

Type :- 'CM'.

Object :—To study the effect of different spacings and levels of N on the yield of Bajra.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 14.10.61; 13.7.62; 26.7.63 (iv) (a) to (c) N.A. (d) As per treatments. (e) N.A. (v) Nil. (vi) AI/3. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) 25.10.61; 13.10.62; 14.10.63.

2. TREATMENTS :

Main-plot treatments :—

3 spacings : S₁=30, S₂=46 and S₃=61cm. between rows.

Sub-plot treatments :—

3 levels of N : N₀=0, N₁=44.8 and N₂=89.6 Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication; 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/148.3 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Satisfactory. (ii) Nil. (iii) Yield of grain. (iv) (a) 1961 to 63. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Nil. (vii) Error variances are homogeneous and Treatments \times Years interaction is present.

5. RESULTS :

Pooled results

(i) 1398 Kg/ha. (ii) (a) 551.8 Kg/ha. (based on 4 d.f. made up of Treatments \times Years interaction) (b) 309.0 Kg/ha. (based on 12 d.f. made up of Treatments \times Years interaction). (iii) None of the effects is significant. (v) Av. yield of grain in Kg/ha.

	S ₁	S ₂	S ₃	Mean
N ₀	1204	1480	1643	1442
N ₁	1185	1240	1472	1299
N ₂	1346	1487	1525	1453
Mean	1245	1402	1547	1398

Individual results :

Treatment	N ₀	N ₁	N ₂	Sig.	S ₁	S ₂	S ₃	Sig.	G.M.	S.E./Plot	
										Main-plot	Sub-plot
Year											
1961	1816	1912	2134	**	1882	1964	2016	N.S.	1954	421.4	222.5
1962	1320	1109	1197	**	899	1167	1559	N.S.	1208	207.3	207.4
1963	1192	878	1028	N.S.	954	1077	1066	**	1032	199.8	164.4
Pooled	1442	1299	1453	N.S.	1245	1402	1547	N.S.	1398	551.8	390.0

Crop :- Bajra (*Kharif*).

Ref :- Pb. 61(30),62(37),63(52).

Site :- Agri. Res. Stn., Ferozepur. Cantt.

Type :- 'CM'.

Object :- To study the effect of different doses and times of application of N in combination with spacings on the yield of Bajra.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 27.6.61; 15.6.62; 16.7.63. (iv) (a) 3 to 4 ploughings. (b) and (c) N.A. (d) As per treatments. (e) N.A. (v) Nil. (vi) T-55 for 61 and 63; AI/3 for 62. (vii) Unirrigated. (viii) 2 weedings. (ix) N.A. (x) 10.10.61; 10.10.62; 28.10.63.

2. TREATMENTS :

Main-plot treatments :-

3 times of application of N :- T₁=Full dose at sowing, T₂=Full dose at thinning and T₃= $\frac{1}{2}$ dose at thinning + $\frac{1}{2}$ dose at sowing.

Sub-plot treatments :-

3 spacings between rows :- S₁=30, S₂=46 and S₃=61cm.

Sub-sub-plot treatments :

3 levels of N :- N₀=0, N₁=22.4 and N₂=44.8 Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication, 3 sub-plots/main-plot and 3 sub-sub-plots/sub-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/598 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Good for 61 and 63; poor for 62. (ii) Nil. (iii) Yield of grain. (iv) (a) 1961 to 63. (b) No. (c) Nil. (v) and (vi) Nil. (vii) Because all the error variances are heterogeneous, there fore the results of individual years are given below.

5. RESULTS:

61(30)

(i) 1414 Kg/ha. (ii) (a) 1291.6 Kg/ha. (b) 569.9 Kg/ha. (c) 232.2 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	S ₁	S ₂	S ₃	Mean
T ₁	1135	1272	1390	1251	1251	1295	1266
T ₂	1182	1291	1434	1237	1345	1325	1302
T ₃	1535	1720	1771	2128	1572	1326	1675
Mean	1284	1428	1532	1539	1389	1315	1414
S ₁	1388	1502	1727				
S ₂	1305	1430	1433				
S ₃	1159	1351	1436				

C.D. for N marginal means=113.0 Kg/ha.

62(37)

(i) 476 Kg/ha. (ii) (a) 57.8 Kg/ha., (b) 146.3 Kg/ha., (c) 79.4 Kg/ha. (iii) Interaction N×S is significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	S ₁	S ₂	S ₃	Mean
T ₁	466	501	509	504	528	444	492
T ₂	507	425	510	443	490	509	481
T ₃	394	490	483	430	448	488	456
Mean	456	472	501	459	489	480	476
S ₁	486	444	447				
S ₂	452	469	545				
S ₃	429	503	510				

C.D. for N means at the same level of S=65.0 Kg/ha.

C.D. for S means at the same level of N=89.9 Kg/ha.

63(52)

(i) 1012 Kg/ha. (ii) (a) 131.8 Kg/ha. (b) 268.1 Kg/ha. (c) 212.5 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	N ₀	N ₁	N ₂	S ₁	S ₂	S ₃	Mean
T ₁	919	1024	1058	1028	1036	937	1000
T ₂	957	1017	1169	1037	1110	996	1048
T ₃	1028	870	1068	1093	955	918	989
Mean	968	970	1098	1053	1034	951	1012
S ₁	932	1076	1150				
S ₂	1041	914	1145				
S ₃	930	922	1000				

C.D. for N marginal means=100.6 Kg/ha.

Crop :- Bajra. (*Kharif*).

Ref :- Pb. 65(92).

Site :- Agri. Res. Stn., Ferozpur Cantt.

Type :- 'CM'.

Object :—To study the effect of different levels of N and spacings on the yield of Bajra.

1. BASAL CONDITIONS:

(f) (a) to (c) N.A. (ii) Sandy loam. (iii) N.A. (iv) (a) to (c) N.A. (d) As per treatments. (e)-(v) N.A. (vi) Hybrid no. 1. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

Main-plot treatments :—

3 levels of N :— $N_1=50$, $N_2=100$ and $N_3=150$ Kg/ha.

Sub-plot treatments :—

3 row to row spacings :— $R_1=30$, $R_2=60$, and $R_3=90$ cm.

Sub-sub-plot treatments :—

(3) 3 plant to plant spacings :— $S_1=10$, $S_2=20$ and $S_3=30$ cm.

3. DESIGN :

(i) Split-split-plot (ii) 3 main-plots/replication, 3 Sub-plots/main-plot, 3 sub-sub-plots/sub-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/540 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal (ii) Nil. (iii) Yield of grain. (iv) (a) 1965—only. (b) No. (c) Nil. (v) Ludhiana. (vi) and (vii) Nil.

5. RESULTS :

(i) 2100 Kg/ha. (ii) (a) 508.1 Kg/ha. (b) 403.9 Kg/ha. (c) 236.0 Kg/ha. (iii) Main effect of R alone is significant. (iv) Av. yield of grain in Kg/ha.

	N_1	N_2	N_3	S_1	S_2	S_3	Mean
R_1	1782	1941	2558	1932	1892	1958	1927
R_2	1925	2192	2286	2147	2204	2025	2134
R_3	2055	2199	2466	2237	2267	2216	2240
Mean	1921	2111	2270	2105	2121	2075	2100
S_1	1987	2029	2300				
S_2	1845	2214	2304				
S_3	1930	2090	2207				

C.D. for R marginal means=200.0 Kg/ha.

Crop :- Bajra (Kharif).**Ref :- Pb. 65(93).****Site :- Agri. Res. Stn., Ferozepur.****Type :- 'CM'.****Object :-**To study the effect of fertilizers and spacings at different levels on the yield of Bajra,**1. BASAL CONDITIONS**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) to (v) N.A. (vi) A1/3. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :**Main-plot(treatments :**3 levels of N :- $N_0=0$, $N_1=50$ and $N_2=100$ Kg/ha.**Sub-plot treatments :**3 spacings between rows :- $S_1=30$, $S_2=45$ and $S_3=60$ cm.**3. DESIGN :**

(i) Split-plot. (ii) (a) 3 main-plots/replication; 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/163 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1965—only, (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 1282 Kg/ha. (ii) (a) 135.6 Kg/ha. (b) 212.4 Kg/ha. (iii) Main effects of N and S are highly significant. (iv) Av. yield of grain in Kg/ha.

	N_0	N_1	N_2	Mean
S_1	1039	1530	1720	1428
S_2	996	1104	1374	1158
S_3	939	1257	1586	1261
Mean	990	1297	1560	1282

C.D. for N marginal means=135.5 Kg/ha.

C.D. for S marginal means=182.2 Kg/ha.

Crop :- Bajra. (Kharif).**Ref :- Pb. 65(12),****Site :- Punjab Agri. University, Ludhiana.****Type :- 'CM'.****Object :-**To study the effect of different doses of N and spacings on the yield of Bajra.**1. BASAL CONDITIONS :**

(i) (a) to (c) Nil. (ii) Sandy soil. (iii) Last week of July, 65. (iv) (a) 3 to 4 ploughings. (b) Dibbling. (c) N.A. (d) As per treatments. (e) 3 to 4 seeds/hill. (v) Nil. (vi) H.B. No. 1. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) End of Oct., 65.

2. TREATMENTS :**Main-plot treatments :**

3 levels of N :— $N_1=45$, $N_2=90$ and $N_3=135$ Kg/ha.

Sub-plot treatments :

3 spacings between rows :— $D_1=30$, $D_2=60$ and $D_3=90$ cm.

Sub-sub-plot treatments :—

3 spacings between plants : $S_1=10$, $S_2=20$ and $S_3=30$ cm.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication; 3 sub-plots/main-plot; 3 sub-sub-plots/sub plot. (b) N.A.
(iii) 4. (iv) (a) N.A. (b) 1/757.5 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1965-contd. (b) No. (c) Nil. (v) Ferozepur. (vi) and (vii) Nil.

5. RESULTS :

(i) 3766 Kg/ha. (ii) (a) 595.0 Kg/ha. (b) 520.0 Kg/ha. (c) 456.0 Kg/ha. (iii) Main effects of N, D, S and interactions, $N \times S$ and $D \times S$ are highly significant, (iv) Av yield of grain in Kg/ha.

	N_1	N_2	N_3	S_1	S_2	S_3	Mean
D_1	2881	3889	4339	3445	3847	3816	3703
D_2	2949	3682	4097	3601	3684	3444	3576
D_3	2944	4558	4554	3733	3882	4441	4019
Mean	2925	4043	4330	3593	3805	3900	3766
S_1	2889	3721	4169				
S_2	3046	3848	4520				
S_3	2839	4560	4302				

C.D. for N marginal means = 343.2 Kg/ha.

C.D. for D marginal means = 257.5 Kg/ha.

C.D. for S marginal means = 215.7 Kg/ha.

C.D. for S means at the same level of N = 373.5 Kg/ha.

C.D. for N means at the same level of S = 456.8 Kg/ha.

C.D. for S means at the same level of D = 373.5 Kg/ha.

C.D. for D means at the same level of S = 387.1 Kg/ha.

Crop :- Gram (Kabuli) (Rabi).

Ref :- Pb. 64(176).

Site :- Govt. Agri. College, Ludhiana.

Type :- 'M'.

Object :- To study the effect of different levels of N, P and K on the yield of Kabuli Gram.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Loamy sand. (iii) End. of Oct., 64. (iv) (a) 3 to 4 ploughings. (b) Kera method. (c) 123.5 Kg/ha. (d) 30cm between rows. (v) Nil. (vi) C-104. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) April, 65.

2. TREATMENTS:

Main-plot treatments:

3 levels of K_2O as Mur. Pot. :- $K_0=0$, $K_1=22.4$ and $K_2=44.8$ Kg/ha.

Sub-plot treatments:

All combinations (1) and (2),

(1) 2 levels of N as C/A/N :- $N_0=0$ and $N_1=22.4$ Kg/ha.

(2) 4 levels of P_2O_5 as Super :- $P_0=0$, $P_1=22.4$, $P_2=44.8$ and $P_3=67.0$ Kg/ha.

3. DESIGN:

(i) Split-plot. (ii) (a) 3 main-plots/replication, 8 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/405 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of grain (iv) (a) 1964 -only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 770 Kg/ha. (ii) (a) 597.6 Kg/ha. (b) 215.0 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	P_0	P_1	P_2	P_3	K_0	K_1	K_2	Mean
N_0	636	835	812	677	631	824	766	740
N_1	846	778	826	753	763	797	842	801
Mean	741	807	819	715	697	810	804	770
K_0	673	743	731	641				
K_1	835	807	747	852				
K_2	716	870	980	651				

Crop :- Gram (*Rabi*).

District:- Patiala, Ferozepur, Sangrur,

Ludhiana and Jullundur.

Ref :- Pb. 61(S.F.T.).

Type :- 'M'.

Object :- Type C: To compare the relative responses to alternative sources of Phosphatic fertilizers each at two levels.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Alluvial. (iii) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (no manure),

 $P_1=33.6\text{Kg/ha. of } P_2O_5 \text{ as Super,}$ $P_2=33.6\text{Kg/ha. of } P_2O_5 \text{ as mono. Amm. Phos.,}$ $P_3=P_1+7.7\text{Kg/ha. of N,}$ $P_1'=66.2\text{Kg/ha. of } P_2O_5 \text{ as Super.,}$ $P_2'=67.2\text{Kg/ha. of } P_2O_5 \text{ as mono. Amm. Phos. and}$ $P_3'=P_1+15.4\text{Kg/ha. of N.}$

3. DESIGN:

(i) and (ii) the district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle or thana is changed once in two years within the same zone. Each field assistant is required to conduct 31 trials in a year 8 on Kharif cereal, 8 on a Rabi cereal, 8 on cash crop, 4 on an oilseed crop and 3 on leguminous. three crop. Half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. the three trials on legumes are of type C, Residual effects of phosphate application Type C trials in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98.8ha. (b) 1/197.7 ha. (iv) Yes.

4. GENERAL:

(i) and (iii) N.A. (ii) Yield of grain. (iv) (a) 1961-only. (b) and (c) Nil. (v) to (vii) N.A.

5. RESULTS:

District	No. of trials	Av. response in Kg/ha.							S.E.
		Control yield in Kg/ha.	P_1	P_2	P_3	P_1'	P_2'	P_3'	
Patiala	3	580	90	180	100	360	410	350	65.0
Ferozepur	8	830	210	60	180	320	200	350	107.0
Sangrur	7	1160	200	270	440	600	400	610	122.0
Ludhiana	9	970	360	300	450	670	470	410	156.0
Jullundur	11	1010	200	210	330	420	270	560	55.0

Crop :- Gram (Rabi).**Ref :- Pb. 64(213).****Site :- Agri. Res. Stn., Ferozepur.****Type :- 'M'.****Object :-**To see the effect of trace-elements on Gram.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 1.11.64. (iv) (a) to (e) N.A. (v) — (vi) S-26. (vii) Un-irrigated. (viii) and (ix) N.A. (ix) Mid of April, 65.

2. TREATMENTS:

5 trace-elements :- T_0 =Control, $T_1=11.2$ Kg/ha. of Spartin, $T_2=11.2$ Kg/ha. of Borax, $T_3=11.2$ Kg/ha. of Zinc Sul. and $T_4=5.6$ Kg/ha. of Zinc Sul. + 5.6 Kg/ha. of Borax.

3. DESIGN :

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/454 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1964-contd. (Modified in 65) (b) N.A. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 553.0 Kg/ha. (ii) 85.8 Kg/ha. (iii) Treatment differences are significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄
Av. yield.	565.2	595.6	701.9	681.0	721.4

C.D.=132.2 Kg/ha.

Crop :- Gram (Rabi).

Ref :- 65(99).

Site :- Agri. Res. Stn., Ferozepur Cantt.

Type :- 'M'.

Object :- To see the effect of trace-elements on the yield of Gram.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 3.11.65. (iv) and (v) N.A. (vi) S-26. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

7 trace-elements: T₀=Control. T₁=5.6 Kg/ha. of Copper Sul.+Borax at 5.6 Kg/ha. T₂=Zinc Sul. at 11.2 Kg/ha. T₃=Borax at 11.2Kg/ha., T₄=Zinc Sul.+Ferrus Sul. at 5.6Kg/ha. T₅=Ferrus Sul. at 11.2 Kg/ha., T₆=5.6 Kg/ha. of Ferrous Sul.+Borax at 5.6 Kg/ha. and T₇=Spartin at 11.2 Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/670 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Poor. (ii) N.A. (iii) Yield of grain. (iv) (a) 1964-contd. (Modified in 65) (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 186.3 Kg/ha. (ii) 56.95 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇
Av. yield.	142.3	234.4	217.6	209.3	209.3	184.2	150.7	142.3

Crop :- Gram (Rabi).

Ref : Pb. 61(23), 64(36), 65(97).

Site :- Agri. Res. Stn., Ferozepur Cantt.

Type :- 'C'.

Object :- To study the effect of dates of sowing and seed-rates on the yield of Gram

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Jowar for 61, N.A. for others. (c) N.A. (ii) Clay loam. (iii) As per treatments. (iv) (a) and (b) N.A. (c) As per treatments. (d) and (e) N.A. (v) N.A. (vi) Pb-7 (vii) Irrigated. (viii) and (ix) N.A. (x) Last week of April.

2. TREATMENTS :

Main-plot treatments :

4 dates of sowing -- $D_1=10$ th Oct., $D_2=17$ th Oct., $D_3=24$ th Oct., and $D_4=31$ st Oct.

Sub-plot treatments :

4 seed-rates :-- $S_1=28$, $S_2=37$, $S_3=46$ and $S_4=55$ Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication, 4 sub-plots/main-plot. (b) N.A. (iii) 4. for 61 and 64, 3 for 65. (iv) (a) N.A. (b) 1/296ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Satisfactory for 62, 64; poor for 65. (ii) Nil, (iii) Yield of grain. (iv) (a) 1961 to 65, (Treatments changed in 62 and 63). (b) No. (c) Nil. (v) and (vi) Nil. (vii) As both the error variances are heterogeneous, results of individual years are given under 5. Results.

5. RESULTS :

61(28)

(i) 648 Kg/ha, (ii) (a) 341.0 Kg/ha. (b) 129.0 Kg/ha. (iii) Main effect of 'S' alone is significant. (iv) Av. yield of grain in Kg/ha.

	S_1	S_2	S_3	S_4	Mean
D_1	827	804	754	849	808
D_2	589	593	671	849	675
D_3	660	667	541	634	626
D_4	378	471	452	634	484
Mean	614	634	604	742	648

C.D. for S marginal means=92.6 Kg/ha.

64(36)

(i) 1726 Kg/ha. (ii) (a) 384.9 Kg/ha. (b) 177.2 Kg/ha. (iii) Main effect of S alone is significant. (vi) Av. yield of grain in Kg/ha.

	S_1	S_2	S_3	S_4	Mean
D_1	1580	1589	1781	1681	1658
D_2	1508	1781	1795	1853	1734
D_3	1419	1753	1822	1919	1728
D_4	1602	1841	1754	1944	1785
Mean	1527	1741	1788	1849	1726

C.D. for S marginal means=127.3 Kg/ha.

65(97)

(i) 464 Kg/ha. (ii) (a) 132.6 Kg/ha. (b) 90.2 Kg/ha. (iii) Main effect of 'D' is significant and that of 'S' is highly significant. (iv) Av. yield of grain in Kg/ha.

	S ₁	S ₂	S ₃	S ₄	Mean
D ₁	396	495	673	634	550
D ₂	327	554	624	703	552
D ₃	278	465	475	495	431
D ₄	218	317	337	426	324
Mean	307	458	527	564	464

C.D. for D marginal means=132.4 Kg/ha.

C.D. for S marginal means=76.0 Kg/ha.

Crop :- Gram (Rabi).

Ref :- Pb. 62(29).

Site :- Agri. Res. Stn., Ferozpur Cantt.

Type :- 'C'.

Object :- To study the effect of dates of sowing and seed-rates on the yield of Gram.

1. BASAL CONDITIONS

(i) (a) to (c) N.A. (ii) Clay loam. (iii) As per treatments. (iv) (a) and (b) N.A. (c) As per treatments. (d) and (e) N.A. (v) N.A. (vi) Pb-7. (vii) Irrigated. (viii) and (ix) N.A. (x) 14.4.63.

2. TREATMENTS

Main-plot treatments :-

4 dates of sowing :- D₁=25th Oct., D₂=1st Nov., D₃=8th Nov. and D₄=15th Nov.

Sub-plot treatments :-

4 seed-rates :- S₁=28, S₂=37, S₃=47 and S₄=57 Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication, 4 sub-plots/main-plot, (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/296ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Growth stunted (ii) N.A. (iii) Yield of grain. (iv) (a) 1961-65. (Treatments changed in 62 and 63). (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 563 Kg/ha. (ii) (a) 282.9 Kg/ha. (b) 82.4 Kg/ha. (iii) Main effect of D alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	S ₁	S ₂	S ₃	S ₄	Mean
D ₁	741	797	834	767	785
D ₂	567	686	660	738	663
D ₃	511	511	656	630	577
D ₄	131	226	289	265	228
Mean	487	555	610	600	563

C.D. for D marginal means = 226.2 Kg/ha.

Crop. - Gram (Rabi).

Ref :- Pb. 63(42).

Site :- Agri. Res. Stn., Ferozepur Cantt.

Type :- 'C'.

Object :- To study the effect of dates of sowing and seed-rates on the yield of Gram.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) As per treatments. (iv) (a) 3 to 4 ploughings. (b) N.A. (c) As per treatments. (d) and (e) N.A. (v) Nil. (vi) Pb.-7. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) 18.4.64.

2. TREATMENTS:

Main-plot treatments :

4 dates of sowing—D₁=13th Oct., D₂=20th Oct., D₃=27th Oct and D₄=3th Nov.

Sub-plot treatments :

4 seed-rates—S₁=28, S₂=37, S₃=47 and S₄=57 Kg/ha.

3 DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication, 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/296 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1961-65. (Treatments changed in 64) (b) No. (c) Nil. (v) and (vi) N.A. (vii) Nil.

5. RESULTS :

(i) 706 Kg/ha. (ii) (a) 376.7 Kg/ha. (b) 100.8 Kg/ha. (iii) Main effect of D is significant and that of S is highly significant. (iv) Av. yield of grain in Kg/ha.

	S ₁	S ₂	S ₃	S ₄	Mean
D ₁	870	960	1036	1081	988
D ₂	640	648	797	840	731
D ₃	410	539	599	560	527
D ₄	522	521	680	593	579
Mean	610	667	778	769	706

C.D. for D marginal means = 301.2 Kg/ha.

C.D. for S marginal means = 72.6 Kg/ha.

Crop :- Gram (Rabi).

Ref :- Pb. 63(47).

Site :- Agri. Res. Stn., Ferozpur Cantt.

Type :- 'C'.

Object :-To study the effect of rotation of crops on the yield of Gram.

1. BASAL CONDITIONS :

(i) (a) and (b) As per treatments (c) N.A. (ii) Clay loam. (iii) and (iv) N.A. (v) Nil. (vi) Pb-7. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) 18.4.64.

2. TREATMENTS :

4 crop rotations : R_1 =Gram-Fallow-Gram., R_2 =Chari-Gram, R_3 =Gram-Fallow-Wheat-Fallow-Gram and R_4 =Bajra-Gram

3. DESIGN :

(i) R B D (ii) a) 4. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/247ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal (ii) Nil. (iii) Yield of grain. (iv) (a) 1963 (Treatments modified in 64) (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS

(i) 562 Kg/ha. (ii) 103.7 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of grain in Kg/ha.

Treatment	R_1	R_2	R_3	R_4
Av. yield.	549	533	749	418

C. D.=127.6 Kg/ha.

Crop :- Gram (Rabi).

Ref :- Pb 64(214), 65(98).

Site : Agri. Res. Stn., Ferozpur Cantt.

Type : 'C'.

Object :-To see the effect of crop rotations on the yield of Gram.

1. BASAL CONDITIONS :

(i) (a) As per treatment. (b) and (c) N.A. (ii) Sandy loam. (iii) 1st week of Nov. (iv) (a) to (e) N.A. (v) N.A. (vi) C-104. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

3 crop rotations:- T_1 =Gram Fallow-Gram, T_2 =Gram-Chari-Gram and T_3 =Gram-Bajra-Gram

3. DESIGN :

(i) R.B.D. (ii) (a) 3. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/247 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1963 to 65 (treatments modified in 64). (b) No. (c) Nil. (v) N.A. (vi) Nil. (vii) As error variances are heterogeneous and Treatments \times Years interaction is absent, results of individual years are given under 5. Results.

5. RESULTS :

64 (214)

(i) 1450Kg/ha. (ii) 109.4Kg/ha. (iii) Treatments differences are significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₁	T ₂	T ₃
Av. yield:-	1495	1511	1344

C.D.=99.5 Kg/ha.

65 (98)

(i) 307.5Kg/ha. (ii) 31.9 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	T ₁	T ₂	T ₃
Av. yield:-	329.5	313.0	280.5

Crop :- Gram (*Rabi*).

Ref :- . 64(70).

Site :- Punjab Agri. University, Ludhiana.

Type :- 'C'.

Object :—To study the effect of different cultural operations on the yield of Gram.

1. BASAL CONDITIONS :

(i) N.A. (ii) Loamy sand. (iii) As per treatments. (iv) (a) 2 ploughings. (b) Line sowing-kera. (c) As per treatments (v) N.A. (vi) C-104. (vii) Irrigated. (viii) and (ix) N.A. (x) April, 65.

2. TREATMENTS :

All combinations of (1),(2) and (3)

(1) 3 dates of sowing D₁=10 th Oct., D₂=20th Oct. and D₃=30th Oct.(2) 3 spacings between rows :- S₁=20, S₂=37.5 and S₃=45cm.(3) 3 seed-rates :- R₁=100, R₂=112 and R₃=124 Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 27. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/296ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain (iv) (a) 1964-only. (b) No. (c) Nil. (v) and (vi) Nil.

5. RESULTS :

(i) 1568Kg/ha. (ii) 496.8Kg/ha. (iii) Main effect of D alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	S ₁	S ₂	S ₃	R ₁	R ₂	R ₃	Mean
D ₁	2097	1737	1841	1801	1686	2188	1892
D ₂	1757	1578	1718	1644	1656	1753	1684
D ₃	1041	1248	1092	1205	1096	1080	1127
Mean	1632	1521	1550	1550	1479	1674	1568
R ₁	1548	1501	1602				
R ₂	1632	1425	1380				
R ₃	1716	1637	1668				

C.D. for D marginal means=231.8 Kg/ha.

Crop :- Gram. (Rabi).

Ref :- Pb. 60(20).

Site :- Agri. Res. Stn., Ferozepur Cantt.

Type :- 'CM'.

Object :—To study the effect of dates of sowing in combination with different levels of N and P on the yield of Gram.

1. BASAL CONDITIONS

(i) N.A. (ii) Sandy loam. (iii) As per treatments. (iv) (a) 3 to 4 ploughings. (b) to (e) N.A. (v) Nil. (vi) Pb. 7. (vii) Irrigated. (viii) 2 hoeing and thrashing. (ix) N.A. (x) 26.4.61.

2. TREATMENTS :

Main-plot treatments

3 dates of sowing : D₁ = 20th Oct., D₂ = 28th Oct. and D₃ = 5th Nov.

Sub-plot treatments

All combinations of (1) and (2)

(1) 2 levels of N : N₀ = 0 and N₁ = 22.4 Kg/ha.

(2) 4 levels of P₂O₅ : P₀ = 0, P₁ = 33.6, P₂ = 67.2 and P₃ = 100.8 Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication; 8 Sub-plots/main-plot. (iii) 3. (iv) (a) N.A. (b) 1/494 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1960-only. (b) and (c) No. (v) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 591 Kg/ha. (ii) (a) 227.3 Kg/ha. (b) 197.3 Kg/ha. (iii) Main effect of D is significant and that of P is highly significant. Interaction P × D is significant. (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	P ₂	P ₃	D ₁	D ₂	D ₃	Mean
N ₀	521	693	555	732	765	647	463	625
N ₁	404	534	633	659	681	581	410	557
Mean	462	613	594	696	723	614	437	591
D ₁	583	718	582	1008				
D ₂	466	689	725	577				
D ₃	338	432	474	502				

C.D. for D marginal means = 182.1 Kg/ha.

C.D. for P marginal means = 132.6 Kg/ha.

C.D. for P means at the same level of D = 255.7

C.D. for D means at the same level of P = 238.7 Kg/ha.

Crop :- Gram. (Rabi).

Ref :- Pb. 61(25),

Site :- Agri. Res. Stn., Ferozepur.

Type :- 'CM'.

Object :—To study the effect of dates of sowing and P on the yield of Gram.

1. BASAL CONDITIONS :

(i) N.A. (b) Jowar. (c) N.A. (ii) Clay loam. (iii) As per treatments. (iv) N.A. (v) Nil. (vi) Pb.7. (vii) Irrigated. (viii) and (ix) N.A. (x) 29.4.62.

2. TREATMENTS :

Main-plot treatments:-

2 dates of sowing : $D_1=20$ th Oct. and $D_2=31$ st Oct.

Sub-plot treatments:-

4 levels of P_2O_5 : $P_0=0$, $P_1=22.4$, $P_2=44.8$ and $P_3=67.2$ Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 2 main-plots/replication: 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/148 ha. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Good. (ii) Nil. (iii) Yield of grain. (iv) (a) 1961-only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) N.J.

5. RESULTS :

(i) 1470 Kg/ha. (ii) (a) 843.6 Kg/ha. (b) 252.0 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	P_0	P_1	P_2	P_3	Mean
D_1	1629	1881	1623	1601	1683
D_2	1244	1245	1245	1294	1257
Mean	1437	1563	1434	1447	1470

Crop :- Gram (Rabi).

Ref :- Pb. 62(38), 63(49), 64(35), 65(96).

Site :- Agri. Res. Stn., Ferozepur Cantt.

Type :- 'CM'.

Object :- To study the effect of P_2O_5 and seed-rates on the yield of Gram.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 27.10.62; 16.10.63; 13.10.64; 13.10.65 (iv) (a) 3 to 4 ploughings. (b) Kera. (c) As per treatments. (d) 30cm. x 7.5cm. (e) N.A. (v) Nil. (vi) S-26 (vii) Un-irrigated. (viii) 2 hoeings and weeding. (ix) N.A. (x) 14.4.63; 14.4.64; 15.4.65; N.A.

2. TREATMENTS :

Main-plot treatments:-

4 levels of P_2O_5 : $P_0=0$, $P_1=10.1$, $P_2=20.2$ and $P_3=30.3$ Kg/ha.

Sub-plot treatments :-

4 seed-rates :- $S_1=28$, $S_2=37$, $S_3=47$ and $S_4=57$ Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication; 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/247 ha. for 62; 1/296 ha. for others. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1962 to 65. (b) No. (c) Nil. (v) and (vi) N.A. (vii) Since the main-plot error variances are heterogeneous and Treatments \times Years interaction is absent therefore individual years results are presented below.

5. RESULTS :

62 (38)

(i) 1327 Kg/ha. (ii) (a) 359.8 Kg/ha. (b) 109.5 Kg/ha. (iii) Main effect of S alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	P ₂	P ₃	Mean
S ₁	1121	1279	1174	1334	1227
S ₂	1276	1483	1260	1421	1360
S ₃	1229	1408	1337	1344	1329
S ₄	1341	1374	1381	1470	1391
Mean	1242	1386	1288	1392	1327

C.D. for S marginal means = 78.6 Kg/ha.

63 (49)

(i) 425 Kg/ha. (ii) (a) 122.0 Kg/ha. (b) 90.6 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	P ₂	P ₃	Mean
S ₁	328	390	354	403	369
S ₂	391	446	448	459	436
S ₃	362	503	472	446	446
S ₄	375	489	451	484	450
Mean	364	457	431	448	425

64 (35)

(i) 1397 Kg/ha. (ii) (a) 322.8 Kg/ha. (b) 121.4 Kg/ha. (iii) Main effect of S alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	P ₂	P ₃	Mean
S ₁	1062	1041	1043	1057	1051
S ₂	1478	1411	1235	1491	1404
S ₃	1459	1534	1317	1532	1460
S ₄	1667	1760	1530	1743	1675
Mean	1416	1436	1281	1456	1397

C.D. for S marginal means = 87.1 Kg/ha.

65 (96)

(i) 766 Kg ha. (ii) (a) 202.0 Kg/ha. (b) 129.0 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	P ₂	P ₃	Mean
S ₁	556	578	586	667	597
S ₂	615	719	734	860	732
S ₃	801	726	993	860	845
S ₄	823	793	986	964	892
Mean	699	704	825	838	766

Crop :- Gram (Rabi).

Ref :- Pb. 64(27).

Site :- Agri. Res. Stn., Ferozpur Cantt.

Type :- 'CMV'.

Object :- To study the effect of P₂O₅, directions of sowing on the different varieties of Gram.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 10.11.64. (iv) (a) to (e) N.A. (v) Nil. (vi) As per treatments. (vii) Irrigated. (viii) and (ix) N.A. (x) Last week of April.

2. TREATMENTS

Main-plot treatments :

4 levels of P₂O₅ :- P₀=0, P₁=10.1, P₂=20.2 and P₃=30.3 Kg/ha.

Sub-plot treatments :

2 varieties :- V₁=S-33 and V₂=C-104.

Sub-sub-plot treatments :

2 directions of sowing :- D₁=East-West and D₂=North-South.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication; 2 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (v) 1/288ha (vi) N.A. (vii) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1964—only (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 1006 Kg/ha. (ii) (a) 114.2 Kg/ha. (b) 52.5 Kg/ha. (c) 22.8 Kg/ha. (iii) Main effect of V is highly significant and that of D is significant. (iv) Av. yield of grain in Kg/ha.

	I ₁	I ₂	I ₃	I ₄	I ₅	I ₆	I ₇	V ₁	V ₂	Mean
L ₀	1263	1032	1093	526	1155	904	901	898	1066	982
L ₁	1181	1004	1073	592	1013	878	787	800	1068	934
Mean	1222	1018	1083	559	1084	891	849	849	1067	958
V ₁	1143	945	985	376	979	753	762			
V ₂	1301	1091	1181	742	1189	1029	936			

C.D. for V marginal means=93.5 Kg/ha.

Crop :- Gram (Rabi).

Ref :- Pb. 62(28).

Site :- Agri. Res. Stn., Ferozepur Cantt.

Type :- 'ICM'.

Object: - To study the effect of dates of sowing, no. of irrigations and levels of P on the yield of Gram.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) As per treatments. (iv) (a) to (e) N.A. (v) Nil. (vi) Pb-7. (vii) Irrigated. (viii) and (ix) N.A. (x) 14.4.63.

2. TREATMENTS :

Main-plot-treatments :

All combinations of (1) and (2)

(1) 2 dates of sowing: D₁=25th Oct., and D₂=9th Oct., 62.

(2) 2 Irrigational treatments: I₁=One irrigation before sowing, I₂=One irrigation before sowing and one irrigation in Dec.

Sub-plot treatments :

4 levels of P₂O₅: P₀=0, P₁=10.1, P₂=20.2 and P₃=30.3 Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication; 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/286 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1962-65 (N.A. for 63 and modified in 64 and 65) (b) No. (c) Nil. (v) N.A. (vi) Affected by wilt. (vii) N.A.

5. RESULTS:

(i) 1146 Kg/ha. (ii) (a) 367.7 Kg/ha. (b) 302.5 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	P ₂	P ₃	D ₁	D ₂	Mean
N ₁	998	1148	1125	1308	1115	1174	1145
N ₂	686	988	800	998	844	891	868
Mean	842	1068	963	1153	980	1032	1006
D ₁	795	1058	934	1133			
D ₂	889	1078	991	1172			

C.D. for V marginal means=28.6 Kg/ha.

C.D. for D marginal means=11.8 Kg/ha.

Crop :- Gram. (Rabi)

Ref :- Pb. 62(35).

Site :- Agri. Res. Stn., Ferozpur Cantt.

Type :- '1CV'.

Object :- To study the effect of irrigations and cultural treatments on different varieties of Gram.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 12.10.62. (iv) (a) 3 to 4 ploughings. (b) to (e) N.A. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) and (ix) N.A. (x) 14.4.63.

2. TREATMENTS :

Main-plot treatments :

7 irrigational treatments : I₁=One irrigation after sowing, I₂=One irrigation after December, I₃=One irrigation after January. I₄=One irrigation February, I₅=One irrigation each Dec. and January, I₆=One irrigation in Dec. and Feb. and I₇=One irrigation in January and February.

Sub-plot treatments :

2 varieties : V₁=Pb-7, V₂=Cloy.

Sub-sub-plot treatments :

2 cultural treatments: L₀=No topping and L₁=Topping.

3 DESIGN:

(i) Split-plot. (ii) (a) 7 main-plots/replication; 2 sub-plots/main-plot and 2 sub-sub-plots/sub-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/294 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Satisfactory. (ii) Nil. (iii) Yield of grain, (iv) (a) 1962—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 958 Kg/ha. (ii) (a) 580.7 Kg/ha. (b) 237.2 Kg/ha. (c) 281.7 Kg/ha. (iii) Main effect of V alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	P ₀	P ₁	P ₂	P ₃	I ₁	I ₂	Mean
D ₁	1130	1186	1384	1277	1215	1273	1244
D ₂	998	1150	912	1130	986	1109	1048
Mean	1064	1168	1148	1203	1100	1191	1146
I ₁	1095	1028	1148	1132			
I ₂	1034	1308	1147	1274			

Crop :- Gram (Rabi).

Ref :- Pb. 64(30), 65(95).

Site :- Agri. Res. Stn., Ferozepur Cantt.

Type :- 'ICM'.

Object :- To study the effect of dates of sowing, times of irrigation and application of P on the yield of Gram.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Heavy loam; Sandy loam. (iii) As per treatments. (iv) (a) to (c) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) Mid of April, 65; N.A.

2. TREATMENTS :

Main-plot treatments :

All combinations of (1) and (2)

(1) 2 dates of sowing : D₁=15th Oct. and D₂=31st October.

(2) 2 times of irrigation : I₁=Rauni (before sowing) and I₂=One irrigation in Dec.

Sub-plot treatments :

4 levels of P₂O₅ : P₀=0, P₁=22.4, P₂=44.5 and P₃=67.2 Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication; 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/300 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Satisfactory; Poor. (ii) N.A. (iii) Yield of grain. (iv) (a) 1962-65 (1963 N.A., Modified in 1964 and 65). (b) No. (c) Nil. (v) Nil. (vi) N.A. (vii) Since the error variances are heterogeneous and Main-plot \times Treatments \times Years interaction is absent, individual years results are presented under 5. Results.

5. RESULTS :

64(30)

(i) 1505 Kg/ha. (iii) (a) 182.5 Kg/ha. (b) 181.7 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of grain in Kg/ha.

	D ₁	D ₂	P ₀	P ₁	P ₂	P ₃	Mean
I ₁	1543	1433	1514	1496	1446	1495	1488
I ₂	1552	1493	1592	1476	1508	1510	1522
Mean	1548	1463	1553	1486	1477	1503	1505
P ₀	1656	1450					
P ₁	1578	1397					
P ₂	1491	1463					
P ₃	1465	1541					

65(95)

- (i) 594 Kg/ha. (ii) (a) 385.2 Kg/ha. (b) 139.8 Kg/ha. (iii) Main effect of D alone is highly significant.
 (iv) Av. yield of grain in Kg/ha.

	D ₁	D ₂	P ₀	P ₁	P ₂	P ₃	Mean
I ₁	840	435	630	622	615	682	637
I ₂	634	470	525	562	570	551	552
Mean	737	452	577	592	592	616	594
P ₀	694	460					
P ₁	709	476					
P ₂	731	454					
P ₃	813	420					

C.D. for D marginal means = 217.8 Kg/ha.

Crop :- Mash (Kharif).

Ref :- Pb. 64(177),

Site :- Punjab Agri. University, Ludhiana.

Type :- 'M'.

Object :- To study the effect of different levels of P₂O₅ on the yield of Mash.

1. BASAL CONDITIONS :

- (i) (a) to (c) N.A. (ii) Sandy loam. (iii) 2nd week of July, 64. (iv) (a) 2 ploughings (b) Kera method.
 (c) 20 Kg/ha. (d) and (e) N.A. (v) 11.2 Kg/ha. of N as C/A/N. (vi) I-1. (vii) Irrigated. (viii) 2 hoeings.
 (ix) N.A. (x) End. of Oct.; 64.

2 TREATMENTS :

5 levels of P₂O₅ as Super : P₀=0, P₁=16.8, P₂=33.6, P₃=50.4 and P₄=67.2 Kg/ha.

3. DESIGN :

- (i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/427.5ha. (v) N.A. (vi) Yes.

4. GENERAL :

- (i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1964-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 1180 Kg/ha. (ii) 189.2 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	P ₀	P ₁	P ₂	P ₃	P ₄
Av. yield	981	1186	1333	1163	1237

Crop :- Mash (Kharif).

Ref :- Pb.64(194).

Site :- Agri. Stn, Gurdaspur.

Type :- 'C'.

Object : To study the effect of dates of sowing, spacings and seed-rates on the yield of Mash.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) As per treatments. (iv) (a) 3-4 ploughings. (b) Kera line sowing. (c) and (d) As per treatments. (e) N.A. (v) N.A. (vi) I-I. (vii) Irrigated. (viii) and (ix) N.A. (x) Oct., 64.

2. TREATMENTS:

Main-plot treatments :

All combinations of (1) and (2)

(1) 3 dates of sowing :-D₁=Mid-June, D₂=End of June and D₃=Mid-July.

(2) 3 spacings between row to row :-S₁=30, S₂=46 and S₃=61cm.

Sub-plot treatments :

4 seed-rates : R₁=15, R₂=20, R₃=25 and R₄=30 Kg/ha.

3. DESIGN:

(i) Split-plot. (ii) (a) 9 main-plots/replication; 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/457ha. (v) N.A. (vi) Yes.

4. GENERAL

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1964-only (b) No. (c) Nil. (v) Ludhiana. (vi) and (vii) N.A.

5. RESULTS:

(i) 485Kg/ha. (ii) (a) 194 Kg/ha. (b) 111 Kg/ha. (iv) Main effect of D is highly significant and that of R is significant. (iv) Av. yield of grain in Kg/ha.

	R ₁	R ₂	R ₃	R ₄	S ₁	S ₂	S ₃	Mean
D ₁	502	518	558	502	499	482	579	520
D ₂	591	584	610	522	599	538	593	577
D ₃	343	371	403	318	349	343	384	359
Mean	479	491	524	447	482	454	519	485
S ₁	518	490	474	449				
S ₂	433	450	514	420				
S ₃	486	534	583	473				

C.D. for D marginal means=81.7 Kg/ha.

C.D. for R marginal means=52.2 Kg/ha.

Crop :- Mash. (Kharif).

Ref :- Pb. 64(212).

Site :- Govt. Agri. College, Ludhiana.

Type :- 'C'.

Object :- To study the effect of different spacings, seed-rates and dates of sowing on the yield of Mash.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) As per treatments. (iv) (a) 2 to 3 ploughings. (b) Kera. (c) and (d) As per treatments. (e) Nil. (v) 11.2 Kg/ha. of N+22.4 Kg/ha. of P_2O_5 as Superphosphate. (vi) N.A. (vii) Irrigated. (viii) 2 hoeings. (ix) and (x) N.A.

2. TREATMENTS :

Same as in Expt. no. 64(194) and presented on page. No. 595.

3. DESIGN :

(i) Split-plot. (ii) (a) 9 main-plots/replication; 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/494ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv)(a) 1964-only. (b) No. (c) Nil. (v) Gurdaspur. (vi) and (vii) Nil.

5. RESULTS :

(i) 773 Kg/ha. (ii) (a) 338.9 Kg/ha. (b) 121.0 Kg/ha. (iii) Main effect of R is highly significant and interaction $R \times D$ is significant. (iv) Av. yield of grain in Kg/ha.

	S ₁	S ₂	S ₃	R ₁	R ₂	R ₃	R ₄	Mean
D ₁	812	804	771	772	751	852	807	796
D ₂	779	717	820	738	783	764	778	765
D ₃	797	859	614	639	722	800	866	757
Mean	796	793	728	716	752	805	817	773
R ₁	738	761	650					
R ₂	735	766	755					
R ₃	836	832	747					
R ₄	874	814	763					

C.D. for R marginal means=57.0 Kg/ha.

C.D. for R means at the same level of D=98.8 Kg/ha.

C.D. for D means at the same level of R=180.5 Kg/ha.

Crop :- Masoor (Rabi).**Ref :- Pb.64(205).****Site :- Govt. Agri. Res. Stn., Gurdaspur.****Type :- 'M'.**Object :—To study the effect of different doses of P_2O_5 on the yield of Lentil.**1. BASAL CONDITIONS :**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 3rd week of Oct, 64. (iv) (a) 3-4 ploughings and 2 plankings. (b) Line sowing (Kera). (c) 37 Kg/ha. (d) Furrows 23cm. (e) N.A. (v) N.A. (vi) 9-12. (vii) Un-irrigated. (viii) 2 weedings and one hoeing. (ix) N.A. (x) 1st week of April, 65.

2. TREATMENTS:(i) 5 doses of P_2O_5 as Super :— $P_0=0$, $P_1=22.4$, $P_2=44.8$, $P_3=67.2$ and $P_4=89.6$ Kg/ha.**3. DESIGN:**

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 5. (iv) (a) N.A. (b) 1/247 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1964-only. (b) No. (c) Nil. (v) and (vi) Nil. (vii) N.A.

5. RESULTS :

(i) 647 Kg/ha. (ii) 135.9 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grain in Kg/ha.

Treatment	P_0	P_1	P_2	P_3	P_4
Av, yield	544	618	613	717	741

Crop :- Masoor (Rabi).**Ref :- Pb. 64(204).****Site :- Govt. Agri. Res. Stn., Gurdaspur.****Type :- 'C'.**

Object :—To study the effect of dates of sowing and seed-rates on the yield of Masoor crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) As per treatments. (iv) (a) 3 to 4 ploughings. 2 plankings. (b) Line sowing by Kera. (c) As per treatments, (d) In furrows 23cm. apart (e) Nil. (v) N.A. (vi) 9-12. (vii) Irrigated. (viii) 1 hoeing and 2 weedings. (ix) N.A. (x) 1st week of April, 65.

2. TREATMENTS:**Main-plot treatments:—**4 dates of sowing :— $D_1=7.10.64$, $D_2=14.10.64$, $D_3=21.10.64$ and $D_4=28.10.64$.**Sub-plot treatments:-**4 seed-rates :— $S_1=30$, $S_2=35$, $S_3=40$ and $S_4=45$ Kg/ha.**3. DESIGN :**

(i) Split-plot. (ii) (a) 4 main-plots/replication. 4 sub-plots/main-plot. (b) N.A. (iii) 5. (iv) (a) N.A. (b) 181/5ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1964—only. (b) No. (c) Nil. (v) Ludhiana (vi) and (vii) N.A.

5. RESULTS :

(i) 2002 Kg/ha. (ii) (a) 397 Kg/ha. (b) 239 Kg/ha. (iii) Main effect of D alone is highly significant. (iv) Av. yield of grain in Kg/ha.

	D ₁	D ₂	D ₃	D ₄	Mean
S ₁	2161	2226	1867	1924	2044
S ₂	2096	2011	1924	1835	1966
S ₃	2132	2047	2153	1688	2005
S ₄	1925	2194	1924	1933	1994
Mean	2078	2120	1967	1845	2002

C.D. for D marginal means=273.5 Kg/ha.

Crop :- Peas (Rabi).

Ref :- Pb. 64(202).

Site :- Agri. Res. Farm, Gurdaspur.

Type :- 'M'.

Object :- To study the effect of different levels of N and P on the yield of Peas.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) Mid of Nov., 64. (iv) (a) 3-4 ploughings and 2 plankings. (b) Kera line sowing (c) 62 Kg/ha. (d) Rows 46cm. apart. (e) — (v) N.A. (vi) T-163. (vii) Un-irrigated. (viii) 3 hoeings and weeding. (ix) N.A. (x) April, 65.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 2 levels of N :—N₀=0 and N₁=22.4Kg/ha.

(2) 4 levels of P₂O₅ as Super :—P₀=0, P₁=22.4, P₂=44.8 and P₃=67.2Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/24.7 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of grain. (iv) (a) 1964—only. (b) No. (c) Nil. (v) Ludhiana. (vi) and (vii) N.A.

5. RESULTS :

(i) 2707 Kg/ha. (ii) 194 Kg/ha. (iii) Main effect of P alone is highly significant. (iv) Av. yield of grain in Kg/bg.

	P ₀	P ₁	P ₂	P ₃	Mean
N ₀	2243	2749	2842	3064	2724
N ₁	2292	2761	2842	2860	2689
Mean	2268	2755	2842	2962	2707

C-D, for P marginal means=201.8Kg/ha.

Crop :- Peas (Rabi).

Ref :- Pb. 64(179).

Site :- Punjab University, Ludhiana.

Type :- 'M'.

Object :- To study the effect of different levels of N and P on the yield of Peas.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loamy sand. (iii) Nov., 64. (iv) (a) 2 ploughings. (b) Kera. (c) 62 Kg/ha. (d) 46cm. between rows. (e) N.A. (v) Nil. (vi) T-163. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) April, 65.

2. TREATMENTS :

Same as in expt no. 64(202) and presented on page. No.598.

3. DESIGN

(i) Fact. in R.B.D. (ii) (a) 8. (b) N.A. (iii) 7. (iv) (a) N.A. (b) 1/593 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of grain. (iv) (a) 1964-only. (b) No. (c) Nil. (v) Gurdaspur. (vi) and (vii) Nil.

5. RESULTS :

(i) 625Kg/ha. (ii) 200.8Kg/ha. (iii) None of the effects is significant. (vi) Av. yield of pea in Kg/ha.

	P ₀	P ₁	P ₂	P ₃	Mean
N ₀	554	567	557	658	548
N ₁	558	595	763	752	667
Mean	556	581	660	704	625

Crop : Potato (*Rabi*).

Ref : Pb.. 60(44).

Site :- Agri. Stn., Jullundur.

Type : 'MV.'.

Object:—To study the effect of different levels of N, P and K on different varieties of Potato.

1. BASAL CONDITIONS :

(i) and (ii) N.A. (iii) 18 to 21.10.60. (iv) (a) to (e) N.A. (v) 627 Q/ha. of F.Y.M. was applied on 17.10.60 to replication no. 2 and 4 (vi) As per treatments. (vii) Irrigated. (viii) 2 hoeings and 2 earthing up (ix) N.A. (x) 24.1.61; 14.2.61 to 23.2.61.

2. TREATMENTS :

Main-plot treatments :—

2 varieties :— V_1 =Kufri white and V_2 =Kufri red.

Sub-plot treatments:—

All combinations of (1), (2) and (3)

(1) 4 levels of N :— $N_0=0$, $N_1=56$, $N_2=112$, and $N_3=168$ Kg/ha.(2) 2 levels of P_2O_5 :— $P_0=0$ and $P_1=56$ Kg/ha.(3) 2 levels of K_2O : $K_0=0$, $K_1=56$ Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 2 main-plots/replication; 16 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) and (b) 1/988 ha. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of tuber. (iv) (a) and (b) No. (c) Nil. (v) and (vi) No. (vii) Nil.

5. RESULTS :

(i) 130.0 Q/ha. (ii) (a) 47.5 Q/ha. (b) 27.5 Q/ha. (iii) Main effect of N and interaction $N \times P$ are significant. (iv) Av. yield of tuber in Q/ha.

	N_0	N_1	N_2	N_3	P_0	P_1	K_0	K_1	Mean
V_1	96.7	121.1	140.3	148.0	124.1	129.0	120.1	133.0	126.5
V_2	103.4	125.6	148.0	156.9	131.5	135.5	131.4	138.6	133.5
Mean	100.1	123.3	144.2	152.4	127.8	132.3	125.8	134.3	130.0
K_0	99.7	115.3	140.1	148.0	117.8	133.7			
K_1	100.5	131.4	148.3	156.9	137.7	130.9			
P_0	102.6	117.7	150.9	139.8					
P_1	97.6	129.0	137.5	165.1					

C.D. for N marginal means=13.7 Q/ha.

C.D. for the body of the $N \times P$ table=19.2 Q/ha.

Crop :- Potato (Kharif).
Site :- Agri. Stn., Jullundur.

Ref :- Pb. 60(6).
Type :- 'MV'.

Object:—To study the effect of different levels of N,P and K on different varieties of Potato.

1. BASAL CONDITIONS

(i) (a) N.A. (b) G.M. (c) N.A. (ii) N.A. (iii) 18 to 21.10.60. (iv) (a) to (e) N.A. (v) 627 Q/ha. of F.Y.M. applied on 17.10.60. (vi) As per treatments. (vii) Irrigated. (viii) 2 hoeings, 2 earthing up. (ix) N.A. (x) 21.1.61, 14.2.61 and 23.2.61.

2. TREATMENTS:

Main-plot treatments :

3 varieties :— V_1 =Up to date, V_2 =ON 2236 and V_3 =Craig's Defiance.

Sub-plot treatments :

All combinations of (1), (2) and (3).

(1) 4 levels of N :— $N_0=0$, $N_1=56$, $N_2=112$ and $N_3=168$ Kg/ha.

(2) 2 levels of P_2O_5 :— $P_0=0$, and $P_1=56$ Kg/ha.

(3) 2 levels of K_2O :— $K_0=0$, and $K_1=56$ Kg/ha.

Fertilizers applied at the time of sowing.

3. DESIGN:

(i) Splot-plot. (ii) (a) 3 main-plots/replication; 16 sub-plots/main-plot. (b) N.A. (iii) 4 (one replication rejected). (iv) (a) N.A. (b) 1/1482ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal (ii) N.A. (iii) Yield of tuber. (iv) (a) and (b) No. (c) Nil. (v) (a) and (b) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 104.2 Q/ha. (ii) (a) 60.0 Q/ha. (b) 22.4 Q/ha. (iii) Main effects of N and K are highly significant. and that of V and P are significant. (iv) Av. yield of tuber in Q/ha.

	N_0	N_1	N_2	N_3	P_0	P_1	K_0	K_1	Mean
V_1	105.6	130.0	145.6	130.1	118.4	137.3	126.3	129.4	127.8
V_2	64.2	88.4	92.7	82.5	76.5	87.4	72.1	91.8	81.9
V_3	77.8	103.4	110.5	109.5	94.6	111.0	98.2	107.4	102.8
Mean	82.5	107.3	119.6	107.4	96.5	111.9	98.9	109.6	104.2
K_0	83.4	103.7	110.2	98.0	92.5	105.2			
K_1	81.7	110.9	129.0	116.7	100.5	118.6			
P_0	77.9	102.8	112.7	92.7					
P_1	87.2	111.8	126.5	122.1					

C.D. for V marginal means=33.9 Q/ha.

C.D. for N marginal means=10.5 Q/ha.

C.D. for P or K marginal means=7.3 Q/ha.

Crop :- Sugarcane.

Ref :- Pb. 61(83), 62(227).

Site : Sugarcane Sub. Stn, Gurdaspur.

Type :- 'M'.

Object :—To study the effect of different levels of N, P and K on the yield of Sugarcane.

1. BASAL CONDITIONS:

(i) (a) N.A.; Chari-Senji-Sugarcane. (b) N.A.; Senji. (c) N.A. (ii) Loamy. (iii) 21 to 23.4.61 ; 29.3.62.
 (iv) (a) 4 ploughings and 4 subagas. (b) N.A. (c) 88920 two budded setts/ha. (d) N.A. (e) Nil.(v) 112 Kg/ha. of N as F.Y.M. applied two weeks before sowing. (vi) Co-312 ; N.A. (vii) Irrigated. (viii) 6 hoeings. (ix) 114cm. : 95cm. (x) 20.1.62 to 6.2.62; 25.12.62.

2. TREATMENTS:

All combinations of (1),(2) and (3).

(1) 2 levels of N:— $N_0=0$, and $N_1=56$ Kg/ha.(2) 2 levels of P_2O_5 :— $P_0=0$, and $P_1=56$ Kg/ha.(3) 2 levels of K_2O :— $K_0=0$ and $K_1=56$ Kg/ha.

N was applied as top dressing in two equal doses in May and June. P_2O_5 and K_2O were drilled in furrows at sowing time.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) 21.95m. × 12.19m. 1/40 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1960-65 (yield data for 60 N.A. treatments modified in 63) (b) No. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Nil. (vii) Error variances are homogeneous and Treatments × Years interaction is present.

5. RESULTS :

Pooled results

(i) 542.0 Q/ha. (ii) 105.1 Q/ha. (based on 6 d.f. made up of Treatments × Years interaction). (iii) Main effect of N alone is highly significant. (iv) Av. yield of cane in Q/ha.

	P_0	P_1	K_0	K_1	Mean
N_0	442.0	454.0	425.0	461.0	448.0
N_1	622.0	650.0	635.0	647.0	636.0
Mean	532.0	552.0	530.0	554.0	542.0
K_0	535.5	524.5			
K_1	528.5	579.5			

C.D. for N marginal means = 64.3 Q/ha.

Individual results

Treatments Years	N ₀	N ₁	Sig.	P ₀	P ₁	Sig.	K ₀	K ₁	Sig.	G.M.	S.E./plo
1961	396·0	534·0	**	458·0	472·0	N.S.	455·0	475·0	N.S.	465·0	44·8
1962	490·0	748·0	**	606·0	632·0	N.S.	605·0	632·0	N.S.	619·0	45·6
Pooled	448·0	636·0	**	532·0	552·0	N.S.	530·0	554·0	N.S.	542·0	105·1

Crop :- Sugarcane.

Ref :- Pb. 63(209).

Site :- Sugar -cane Sub. Stn., Gurdaspur.

Type :- 'M'.

Object :-To study the effect of different levels of N, P and K on the yield of Sugar-cane.

1. BASAL CONDITIONS :

(i) (a) Chari-Senji-Sugarcane. (b) Senji. (c) N.A. (ii) (a) Loamy (b) N.A. (iii) 28.3.63. (iv) (a) 4 ploughings and suhagas. (b) N.A. (c) 88920 two budded setts/ha. (d) N.A. (e) 1. (v) 66 Kg/ha. of N as F.Y.M. applied two weeks before planting. (vi) Co-312. at (vii) Irrigated. (viii) 6 hoeings. (ix) 61cm. (x) 9.2.64.

2. TREATMENTS :

All combinations of (1), (2) and (3).

(1) 2 levels of N as C/A/N :- N₀=0, and N₁=Kg/ha.

(2) 2 levels of P₂O₅ as S/P :- P₀=0, and P₁=56 Kg/ha.

(3) 2 levels of K₂O as Mur. Pot. :- K₀=0 and K₁=56 Kg/ha.

C/A/N. applied as top dressing in two equal doses at planting time and June, P and K drilled at the time of sowing.

3. DESIGN :

(i) 2³ fact. confd. (ii) (a) 4 plots/block; 2 blocks/replication. (b) N.A. (iii) 4. (iv) (a) 21·95m. × 12·19m. (b) 21·05m. × 12·19m. (v) 45cm. on either side. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1960-65 (Modified in 1963). (b) No. (c) Nil. (v) to (vii) Nil.

5 RESULTS :

(i) 625·0 Q/ha. (ii) 36·1 Q/ha. (iii) Main effect of N is highly significant and interactions N × K, N × P × K are significant. (iv) Av. yield of cane in Q/ha.

	P ₀	P ₁	K ₀	K ₁	Mean
N ₀	535.7	553.5	559.1	530.1	544.6
N ₁	697.1	713.7	689.9	722.9	705.4
Mean	616.4	633.6	623.5	626.5	625.0
K ₀	622.4	624.6			
K ₁	610.4	642.6			

C.D. for N marginal means=26.5 Q/ha.

C.D. for the body of N×K table=37.4 Q/ha.

Crop :- Sugarcane.

Ref :- Pb. 64(198).

Site :- Sugarcane Sub-Stn , Gurdaspur.

Type :- 'M'.

Object :—To study the effect of different levels of N, P and K on the yield of Sugarcane.

1. BASAL CONDITIONS ;

(i) (a) Wheat-Fallow-Sugarcane. (b) Fallow. (c) Nil. (ii) Loamy. (iii) 22.2.64. (iv) (a) 4 ploughings and 4 suhagas. (b) N.A. (c) 98800 two budded setts/ha. (d) N.A. (e) 1. (v) N.A. (vi) Co-312. (vi i) Irrigated. (viii) 6 hoeings. (ix) 87cm. (x) 2.1.65.

2. TREATMENTS

Main-plot treatments :

2 levels of N as A/S :—N₀=0 and N₁=123.5 Kg/ha.

Sub-plot treatments:

All combinations (1) and (2).

(1) 2 levels of K₂O as Mur. Pot. :—K₀=0 and K₁=123.5 Kg/ha.

(2) 2 levels of P₂O₅ as Super :—P₀=0 and P₁=123.5 Kg/ha.

Mur. Pot. and Super and 62 Kg of N drilled at the time of planting while 62 Kg of N applied on 4.3.64

3. DESIGN :

(i) Split-plot. (ii) (a) 2 main-plots/replication; 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) 24.08m. × 3.66m. (b) 22.13m × 3.66m. (v) 98cm. on either side of the plot. (vi) Yes

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1960-64 (modified in 1965). (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 619.6 Q/ha. (ii) (a) 65.2 Q/ha. (b) 41.3 Q/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of cane in Q/ha.

	P ₀	P ₁	K ₀	K ₁	Mean
N ₀	742.6	782.0	762.2	762.3	762.3
N ₁	477.1	476.9	480.0	474.1	477.0
Mean	609.4	629.8	621.1	618.2	619.6
K ₀	609.2	633.0			
K ₁	610.4	626.0			

C.D. for N marginal means=73.3 Q/ha.

Crop :- Sugar-cane.

Ref:- Pb.65(72).

Site :- Agri. Res. Sta., Gurdaspur.

Type :- 'M'.

Object :-To study the effect of different levels of N, P and K on the yield of Sugar-cane.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 26.2.65. (iv) (a) 6 ploughings. (b) Flat sowing. (c) 75,00 two budded setts/ha. (d) 60cm. with in rows, (e) Nil. (v) N.A. (vi) C-312 late. (vii) Irrigated. (viii) and (ix) N.A. (x) 29.1.66.

2. TREATMENTS :

All combinations of (1), (2) and (3).

(1) 2 levels of N: - N₀=0 and N₁=124 Kg/ha.

(2) 2 levels of P₂O₅: -P₀=0 and P₁=124 Kg/ha.

(3) 2 levels of K₂O: -K₀=0, K₁=124 Kg/ha.

$\frac{1}{2}$ dose of N and full dose of P and K is applied at sowing and rest $\frac{1}{2}$ dose of N at tillering stage.

3. DESIGN :

(i) 2³ fact. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) 24.08m × 3.66m. (b) 22.07m. × 3.66m. (v) One metre at both ends.(vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1960-65. (Treatment levels are different in other years) (b) No. (c) Nil. (v) Jullundur. (vi) and (vii) Nil.

5. RESULTS :

(i) 550.6 Q/ha. (ii) 80.9 Q/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of cane in Q/ha.

	P ₀	P ₁	K ₀	K ₁	Mean
N ₀	456.0	486.6	488.1	454.5	471.3
N ₁	616.0	643.9	607.9	651.9	629.9
Mean	536.0	565.2	548.0	553.2	550.6
K ₀	557.9	538.2			
K ₁	514.1	592.3			

C.D. for N marginal means=59.5 Q/ha:

Crop :- Sugarcane.

Ref :- Pb. 65(73).

Site :- Agri. Res. Sta., Gurdaspur,

Type :- 'M'

Object :- To study the effect of P through green manures on the yield of Sugarcane

1. BASAL CONDITIONS ;

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 4.3.65. (iv) 10 ploughings. (b) Flat sowing. (c) 75000 two budded retts/ha. (d) 60 cm between rows (e) Nil. (v) N.A. (vi) Co-312. (vii) Irrigated. (viii) and (ix) N.A. (x) 2.2.66.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 3 green manurings : G₁=Dhiancha, G₂=Sunn-hemp and G₃=Guara.

(2) 2 levels of P₀, O₂ applied to G.M. crops : P₀=0 and P₁=56 Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) 21.95m. x 6.10m. (b) 16.59m x 6.10m. (v) 2 rows on either side. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1965-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 727.2 Q/ha. (ii) 71.8 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of cane in Q/ha.

	P ₀	P ₁	Mean
G ₁	748.9	717.3	733.1
G ₂	683.2	778.5	730.8
G ₃	707.4	727.2	717.3
Mean	713.2	741.0	727.1

Crop :- Sugarcane.

Ref :- Pb. 60(108).

Site :- Gadu Ganda Village. District : Hoshiarpur (c.f.)

Type :- 'M'.

Object —To study the effect of different levels of N,P and K on the yield of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Fallow. (c) N.A. (ii) Sandy loam. (iii) N.A. (iv) Co -312. (v) (a) to (c) N.A. (vi) 11.4.60. (vii) Irrigated. (viii) and (ix) N.A. (x) 6 to 8.3 61.

2. TREATMENTS :

All combinations of (1), (2) and (3)

(1) 2 levels of N ;—N₀=0 and N₁=112 Kg/ha.

(2) 2 levels of P₂ O₅ :—P₀=0 and P₁=56 Kg/ha.

(3) 2 levels of K₂O :—K₀=0 and K₁=56 Kg/ha.

All Fertilizers applied at sowing.

3. DESIGN :

(i) Fact. in R.B.D. 8, 4. (ii) N.A. (b) 1/197.684 ha. (iv) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) and (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 236.9 Q/ha. (ii) 37.8 Q/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of cane in Q/ha.

	P ₀	P ₁	K ₀	K ₁	Mean
N ₀	192.5	203.4	201.1	194.7	197.9
N ₁	261.9	289.9	267.4	284.4	275.9
Mean	227.2	246.6	234.2	239.6	236.9
K ₀	224.6	243.9			
K ₁	229.8	249.3			

C.D. for N marginal means=27.8 Q/ha.

Cop :- Sugarcane

Re :- Pb. 60(4), 61(21).

Site :- Sugarcane Res. Stn., Jullundur.

Type :- 'M'.

Object—To study the effect of different sources and methods of application of N on the yield of Sugar cane

1. BASAL CONDITIONS

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 7.4.60; 28/29.3.61 (iv) (a) and (b) N.A. (c) 135 setts/row; 7410 to 86500 setts two budded/ha. (d) and (e) N.A. (v) N.A. (vi) Coj-39. (vii) Irrigated. (viii) and (ix) N.A. (x) 20/ 21.3.61; N.A.

2 TREATMENTS :

All combinations of (1) and (2)

(1) 2 methods of application of N— M_1 =Broadcasting and M_2 =Drilling.(2) 5 sources of N :— S_1 =A/S, S_2 =Urea, S_3 =C/A N, S_4 =A/S/N and S_5 =A/C.

N applied at 112 Kg/ha. in each treatment.

3. DESIGN

(i) Fact. in R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/197.6ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Good. (ii) N.A. ; 15 Kg/ha. of gamaxene applied against white ant at planting. (iii) Yield of cane. (iv) (a) 1960-61. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Crop affected badly by abnormal frost for 61(21); Nil for others. (vii) Error variances are homogeneous and Treatments \times Years. interaction is absent.

5. RESULTS

Pooled results

(i) 484.5 Q/ha. (ii) 70.0 Q/ha. (based on 68 d.f. made up of Treatments \times Years interaction and pooled error). (iii) Main effect of S alone is highly significant. (iv) Av. yield of cane in Q/ha.

	S_1	S_2	S_3	S_4	S_5	Mean
M_1	455.5	483.5	503.0	482.5	404.5	465.8
M_2	510.5	519.0	529.0	508.0	450.0	503.3
Mean	483.0	501.2	516.0	495.2	427.2	484.5

C.D. for S marginal means=48.4 Q/ha.

Treatment	M_1	M_2	Sig.	S_1	S_2	S_3	S_4	S_5	Sig.	G.M.	S.E./plot
Years 1960	556.0	504.0	N.S.	496.0	522.0	515.0	494.0	337.0	**	480.0	85.8
1961	475.0	503.0	N.S.	471.0	481.0	517.0	496.0	481.0	N.S.	489.0	79.3
Pooled	465.8	503.3	N.S.	483.0	501.2	516.0	495.2	427.2	**	484.5	70.0

Crop :- Sugarcane.

Ref :- Pb. 61(82), 62(80), 63(138).

Site :- Sugarcane Res. Sta., Jullundur.

Type :- 'M'.

Object:—To study the effect of different levels of N, P and K alone and in combination on the yield of Sugarcane.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) N.A. for 61; Chari for others. (c) N.A. (ii) Sandy loam. (iii) 1,4.3.61; 26 to 29.3.62; 22.3.63. (iv) (a) and (b) N.A. (c) 74130 two budded setts/ha. (d) and (e) N.A. (v) 112 Kg/ha. of N as compost. (vi) CoJ-29. (vii) Irrigated. (viii) 3 hoeings for 62; N.A. for others. (ix) N.A. (x) 20.21.1.62; 16 to 19.1.63; 24.12.63.

2. TREATMENTS:

All combinations of (1), (2) and (3)

(1) 3 levels of N as A/S :— $N_0=0$, $N_1=112$ and $N_2=224$ Kg/ha.

(2) 3 levels of P_2O_5 as Super :— $P_0=0$, $P_1=112$ and $P_2=224$ Kg/ha.

(3) 3 levels of K_2O as Pot. Sul. : $K_0=0$, $K_1=112$ and $K_2=224$ Kg/ha.

3. DESIGN :

(i) 3³ partially confd. (NPK and NP^2K^2 confd). (ii) (a) 9 plots/block; 3 blocks/replication. (b) N.A. (iii) 2. (iv) (a) N.A. for 61 and 62; 1/98.8 ha. (b) N.A. for 61 and 62, 1/98.8 ha. (v) N.A. for 61 and 62; Nil. (vi) Yes

4. GENERAL:

(i) Good. (ii) N.A. (iii) Yield of cane. (iv) (a) 1961-63. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Nil. (vii) Error variances are homogeneous and Treatments \times Years interaction is present.

5. RESULTS :

Pooled results

(i) 615.6 Q/ha. (ii) 98.3 Q/ha. (based on 36 d.f. made up of Treatments \times Years interaction). (iii) Main effect of N alone is highly significant. (iv) Av. yield of cane in Q/ha.

	P_0	P_1	P_2	K_0	K_1	K_2	Mean
N_0	512.0	524.2	510.2	518.9	528.3	499.2	515.4
N_1	601.2	624.3	667.3	642.9	586.5	664.3	630.9
N_2	703.3	694.8	703.7	646.2	697.2	758.4	700.6
Mean	605.5	614.4	627.0	632.3	634.3	643.6	615.6
K_0	607.0	627.6	572.3				
K_1	598.7	567.4	645.9				
K_2	610.8	648.3	662.9				

Individual results :

Treatment	N_0	N_1	N_2	Sig.	P_0	P_1	P_2	Sig.	K_0	K_1	K_2	Sig.	G.M.	S.E./plot
Year														
1961	651.2	680.4	715.0	N.S.	676.6	661.9	708.1	N.S.	659.2	639.3	748.1	N.S.	682.2	54.1
1962	441.5	622.3	684.4	**	566.1	597.4	584.7	N.S.	585.0	580.1	583.1	N.S.	582.7	54.2
1963	453.8	590.1	702.4	**	573.9	584.0	588.4	N.S.	562.8	592.7	590.8	N.S.	582.1	46.2
Pooled	515.4	630.9	700.6	**	605.5	614.4	627.0	N.S.	602.3	604.0	640.6	N.S.	615.6	98.3

Crop :- Sugarcane.**Ref :- Pb. 61(400), 62(81), 63(137).****Site :- Sugarcane. Res. Stn., Jullundur.****Type :- 'M'.**

Object :—To study the effect of different levels of N, P and K on the yield of Sugarcane crop.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) N.A. for 6t; Chari for others. (c) N.A. (ii) Sandy loam (iii) 1,4.3.61; 26,29.3.62; 22.3.63.
 (iv) (a) and (b) N.A. (c) 74130 two budded setts/ha. (d) and (e) N.A. (v) 112 Kg/ha. of N as cbmpost.
 (vi) COJ-39. (vii) Irrigated. (viii) 3 hoeings for 62; N.A. for others. (ix) N.A. (x) 20/21.1.62; 16.1.63
 to 19.1.63; 24.12.64.

2. TREATMENTS :

All combinations of (1), (2) and (3).

(1) 3 levels of N :— $N_0=0$, $N_1=112$ and $N_2=224$ Kg/ha.(2) 3 levels of P_2O_5 :— $P_0=0$, $P_1=112$ and $P_2=224$ Kg/ha.(3) 3 levels of K_2O :— $K_0=0$, $K_1=112$ and $K_2=224$ Kg/ha.**3. DESIGN :**

(i) 3^3 partially confd. (NPK^2 , NP^2K confd; NP^2K^2 , NPK^2 confd; NPK , NPK^2). (ii) (a) 9 plots/block; 3
 blocks/replication. (b) N.A. (iii) 2. (iv) (a) N.A. (b) 1/98.8 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Good. (ii) N.A. (iii) Yield of cane (iv) (a) 1961-63. (b) No. (c) Results of combined analysis are
 presented under 5. Results. (v) N.A. (vi) Nil. (vii) Error variances are hetrogeneous and $Treatments \times$
 $Years$ interaction is present.

5. RESULTS :

Pooled results

(i) 707 Q/ha. (ii) 155.0 Q/ha. (based on 36 d.f. made up of $Treatments \times Years$ interaction). (iii) Main effect
 of P alone is highly significant. (iv) Av. yield of cane in Q/ha.

	N_0	N_1	N_2	K_0	K_1	K_2	Mean
P_0	593	573	562	542	598	588	576
P_1	741	724	740	722	758	724	735
P_2	806	806	816	814	799	814	809
Mean	713	701	706	693	718	709	707
K_0	707	666	705				
K_1	716	723	716				
K_2	717	712	697				

C.D. for P marginal means=60.5 Q/ha.

Individual Results

Treatment	N_0	N_1	N_2	Sig.	P_0	P_1	P_2	Sig.	K_0	K_1	K_2	Sig.	G.M.	S.E./plot
Year														
1961	745	756	783	N.S.	766	760	758	N.S.	727	776	781	N.S.	761	51.4
1962	427	712	800	**	652	636	651	N.S.	646	664	629	N.S.	646	72.2
1963	557	737	846	**	723	706	710	N.S.	707	716	717	N.S.	713	95.5
Pooled	713	701	706	N.S.	576	735	809	**	693	718	709	N.S.	707	155.0

Crop :- Sugarcane**Ref:-Pb. 63(22).****Site :- Sugarcane, Res. Stn., Jullundur.****Type :- 'M'.**

Object :—To study the effect of dhaincha intercropped in standing crop of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 27.3.63. (iv) (a) 7 plantings, 5 ploughings. (b) N.A. (c) 74130 setts/ha. (d) Row to row 61cm. (e) N.A. (v) N.A. (vi) CoJ-46 (vii) Irrigated. (viii) One blind hoeing and one hoeing. (ix) N.A. (x) 21.1.64.

2. TREATMENTS :

All combinations of (1) and (2).

(1) 2 levels of manure :— M_0 =No manure and M_1 =56 Kg/ha. of P_2O_5 .(2) 2 levels of intercropping :— I_0 =No intercropping and I_1 =Dhaincha as intercrop.**3. DESIGN :**

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 4. (iv) (a) 3.66m. × 32.00m. (b) 3.66m. × 27.66m. (v) 2.17 metre on either side (vi) Yes.

4. GENERAL :

(i) Good. (ii) N.A. (iii) Yield of Sugarcane. (iv) (a) 1963-contd. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :(i) 766.0 Q/ha. (ii) 32.6 Q/ha. (iii) Interaction $M \times I$ is highly significant. (iv) Av. yield of cane in Q/ha.

	M_0	M_1	Mean
I_0	774	788	781
I_1	786	715	751
Mean	780	752	766

C.D. for the body of $M \times I$ table = 52.1 Q/ha.**Crop :- Sugarcane.****Ref:- Pb. 63(23).****Site :- Sugarcane, Res. Stn., Jullundur.****Type :- 'M'.**

Object :—To study the effect of different sources of N on the yield of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) to (c) Nil. (ii) Sandy loam. (iii) 28/29.3.63. (iv) (a) and (b) N.A. (c) 74130 two budded setts/ha. (v) Nil. (vi) COL-29. (vii) Irrigated (viii) and (ix) N.A. (x) 20.12.63.

2. TREATMENTS :2 manurial treatments :— M_1 =56.0 Kg/ha. of N as C/A/N at the time of planting + 56.0 Kg/ha. of N C/A/N on 16.5.63. and M_2 =112.0 Kg/ha. of N as steara meal at planting.**3. DESIGN :**

(i) R.B.D. (ii) (a) 2. (b) N.A. (iii) 6. (iv) (a) 32.00m. × 7.32m. (b) 27.66m. × 7.32m. (v) 2.17 metre on either side. (vi) Yes.

4. GENERAL :

(i) Good. (ii) Nil. (iii) Yield of cane. (iv) (a) 1963—only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 31.4 Q/ha. (ii) 32.8 Q/ha. (iii) Treatment difference is not significant. (iv) Av. yield of cane in Q/ha.

Treatment	M ₁	M ₂
Av. yield	310	318

Crop :- Sugarcane.

Ref :- Pb. 63(24).

Site :- Sugarcane. Res. Stn., Jullundur.

Type :- 'M'.

Object :—To study the effect of compost and Ipomea on the yield of Sugarcane.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 10.4.63. (iv) (a) and (b) N.A. (c) 74130 setts/ha. (d) and (e) N.A. (v) Nil. (vi) CoJ-46 (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) 5/6.2.64.

2. TREATMENTS :

Two manurial treatments :—N₁=112 Kg/ha. of N as compost and N₂=112 Kg/ha. of N as Ipomea.

3. DESIGN:

(i) R.B.D. (ii) (a) 2. (b) N.A. (iii) 8. (iv) (a) N.A. (b) 1/179.3 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1963—only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 513.9 Q/ha. (ii) 30.3 Q/ha. (iii) Treatment difference is not significant. (iv) Av. yield of cane in Q/ha.

Treatment	M ₁	M ₂
Av. yield	529.4	498.5

Crop :- Sugarcane.

Ref :- Pb. 62(65).

Site :- Sugarcane. Res. Stn., Kheri.

Type :- 'M'.

Object :—To study the effect of dhaincha. on the yield of Sugarcane.

1. BASAL CONDITIONS:

(i) (a) G.M.-Sugarcane-G.M. (b) G.M. (c) N.A. (ii) Sandy loam. (iii) 28.3.62. (iv) (a) 6 to 8 ploughings. (b) Flat sowing. (c) 86450 two budded setts/ha. (d) and (e) N.A. (v) Nil. (vi) Co-976 (early.) (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 3rd week of Dec., 62.

2. TREATMENTS :

2 manurial treatments: N₀=Control and N₁=Dhaincha inter cropped.

3. DESIGN :

(i) R.B.D. (ii) (a) 2. (b) N.A. (iii) 8. (iv) (a) 1/74.1 ha. (b) 1/93.8 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1962-only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 392.2 Q/ha. (ii) 46.6 Q/ha. (iii) Treatment difference is significant. (iv) Av. yield of cane in Q/ha.

Treatment	M ₀	M ₁
Av. yield	361.8	422.5

C.D. = 55.1 Q/ha.

Crop :- Sugarcane.

Ref.-Pb. 62(61), 63(72).

Site :- Sugarcane. Sub. Stn., Kheri.

Type:- 'M'.

Object :- To study the effect of different levels of N on the yield of Sugarcane.

1. BASAL CONDITIONS:

(i) (a) G.M.-Sugarcane- G.M. (b) G.M. (c) N.A. (ii) Sandy loam. (iii) 17.3.62; 23.3.63. (iv) (a) 6 to 8 ploughings. (b) Flat sowing. (c) 86450, two budded setts/ha. (d) 61cm. apart. (e) N.A. (v) Nil. (vi) CoJ-46. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) Last week of Feb., 63; 20.1.64.

2. TREATMENTS :

8 manurial treatments :- M₀=Control, M₁=28 Kg/ha. of N at sowing+28 Kg/ha. of N at 2nd irrigation, M₂=56 Kg/ha. of N at sowing+28 Kg/ha. of N each at 2nd and 4th irrigation, M₃=56 Kg/ha. of N at sowing+56 Kg/ha. of N each at 2nd and 4th irrigation, M₄=56 Kg/ha. of N at sowing+84 Kg/ha. of N each at 2nd and 4th irrigation, M₅=56 Kg/ha. of N at sowing+112 Kg/ha. of N each at 2nd and 4th irrigation, M₆=56 Kg/ha. of N at sowing+28 Kg/ha. of N each from 2nd to 5th irrigation, M₇=56 Kg/ha. of N at sowing+28 Kg/ha. of N each from 2nd to 7th irrigation and M₈=56 Kg/ha. of N at sowing+28 Kg/ha. of N each from 2nd to 9th irrigation.

3. DESIGN :

(i) R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) 1/74.1 ha. (b) 1/296.4 ha; 1/98.1 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of cane. (iv) (a) 1962-63. (b) No. (c) Nil. (v) N.A. (vi) Nil. (vii) Since the error variances are heterogeneous and Treatments × Years interaction is absent, individual years results are presented under 5. Results.

5. RESULTS:

62(61)

(i) 317.4 Q/ha. (ii) 99.6 Q/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of cane in Q/ha.

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆	M ₇	M ₈
Av. yield	161.6	220.2	256.5	296.5	381.8	355.8	296.5	370.7	516.7

C.D. = 145.1 Q/ha.

63(72)

(i) 470.2 Q/ha. (ii) 64.6 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of cane in Q/ha.

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆	M ₇	M ₈
Av. yield	343.5	442.3	439.8	434.9	527.6	541.2	432.4	542.4	527.6

Crop :- Sugarcane.

Ref :- Pb. 63(70), 64(59).

Site :- Sugarcane Sub-Stn., Kheri.

Type :- 'M'.

Object :-To study the effect of press-mud on the yield of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 15.3.63; 13.3.64. (iv) (a) to (e) N.A. (v) N.A. (vi) CoJ-46 (late). (vii) Irrigated. (viii) and (ix) N.A. (x) Last week of February.

2. TREATMENTS :

3 manurial treatments :- M_0 = Control, M_1 = 50 Q/ha. of fresh press-mud and M_2 = 50 Q/ha. of old press-mud.

3. DESIGN :

(i) R.B.D. (ii) (a) 3. (b) N.A. (iii) 6. (iv) (a) 1/74.1 ha. (b) 1/98.8 ha.; 1/197.6 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of cane. (iv) (a) 1963-64. (b) No. (c) Nil. (v) N.A. (vi) Nil. (vii) Error variances are heterogeneous. and Treatments \times Years interaction is absent, therefore individual years results are presented under 5. Results.

5. RESULTS:

63(70)

(i) 575.8 Q/ha. (ii) 57.9 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of cane in Q/ha.

Treatment	M_0	M_1	M_2
Av. yield	588.1	577.4	561.9

64(59)

(i) 803.9 Q/ha. (ii) 118.6 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of cane in Q/ha.

Treatment	M_0	M_1	M_2
Av. yield	749.2	854.0	808.5

Crop :- Sugarcane.

Ref :- Pb. 63(71), 64(60).

Site :- Sugarcane Sub-Stn., Kheri.

Type :- 'M'.

Object :-To study the effect of different sources of N on the yield of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 24.3.63; 6.3.64. (iv) (a) to (e) N.A. (v) N.A. (vi) CoJ-46 (late) (vii) Irrigated. (viii) and (ix) N.A. (x) 18.1.64; 5.1.65.

2. TREATMENTS :

2 sources of N at 112 Kg/ha. :- S_1 = Stearameal and S_2 = C/A/N.

3. DESIGN :

(i) (a) R.B.D. (ii) (a) 2. (b) N.A. (iii) 8. (iv) (a) 1/74.1 ha. (b) 1/197.6 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of cane. (iv) (a) 1963-64 (b) No. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Nil. (vii) Error variances are homogeneous and Treatments \times Years interaction is present.

5. RESULTS :

Pooled results

(i) 662.4 Q/ha. (ii) 206.0 Q/ha. (based on 1d.f. made up of interaction of Treatments × Years) (iii) Treatment difference is not significant. (iv) Av. yield of cane in Q/ha.

Treatment	S ₁	S ₂
Av. yield	678.4	646.4

Individual results :

Treatment	S ₁	S ₂	Sig.	G.M.	S.E./plot
Year					
1963	799.3	840.2	N.S.	819.7	61.9
1964	557.5	452.7	**	505.1	42.0
Pooled	678.4	646.4	N.S.	662.4	206.0

Crop :- Sugarcane.

Ref. : Pb. 63(74), 64(64), 65(81).

Site :- Sugarcane Sub-Station, Kheri.

Type :- 'M'.

Object :—To study the effect of P and green manure on the yield of Sugarcane.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 17.3.63; 27.3.64; 23.3.65. (iv) (a) and (b) N.A. (c) 87500 two budded setts/ha. (d) and (e) N.A. (v) N.A. (vi) Co-976; Coj-46; N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) 20.12.63; 10. 1.65; N.A.

2. TREATMENTS:

Same as in. expt. no. 63(22) conducted on Sugarcane crop and presented on page no. 611.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 5. (iv) (a) 1/74.1 ha.; 1/74.1 ha.; N.A. (b) 1/98.8 ha.; 1/98.6 ha.; 1/100 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1963-contd. (b) No. (c) Nil. (v) N.A. (vi) Nil. (vii) Since expt. is contd. beyond 65, hence individual years results are presented under 5. Results.

5. RESULTS :

63 (74)

(i) 84.2Q/ha. (ii) 50.9 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of cane in Q/ha.

	I ₀	I ₁	Mean
M ₀	86.5	83.3	84.9
M ₁	83.8	83.1	83.5
Mean	85.2	83.2	84.2

64 (64)

(i) 601.9 Q/ha. (ii) 36.4Q/ha. (iii) Interaction M × I is highly significant. (iv) Av. yield of cane in Q/ha.

	I ₀	I ₁	Mean
M ₀	563.4	622.7	593.1
M ₁	628.6	593.0	610.8
Mean	596.0	607.9	601.9

C.D. for the body of M × I table = 50.2 Q/ha.

65 (81)

(i) 486.9Q/ha. (ii) 123.1 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of cane in Q/ha.

	I ₀	I ₁	Mean
M ₀	494.6	402.0	448.3
M ₁	536.0	515.0	525.5
Mean	515.3	458.5	486.9

Crop :- Sugarcane.**Ref :- Pb. 64(68).****Site :- Sugarcane Sub-Stn., Kheri.****Type :- 'M'.**

Object :- To study the effect of different levels of N, P and K on the yield of Sugarcane.

1. BASAL CONDITIONS:

(i) N.A. (ii) Sandy loam. (iii) 17 to 26.3.64. (iv) (a) and (b) N.A. (c) 86450 setts/ha. (d) 61 cm. (e) N.A. (v) N.A. (vi) Coj-46. (vii) Irrigated. (viii) and (ix) N.A. (x) 26.1.65.

2. TREATMENTS:**Main-plot treatments:**4 levels of N as C/A/N: N₀=0, N₁=56, N₂=112 and N₃=168 Kg/ha.**Sub-plot treatments:**

All combinations of (1) and (2)

(1) 2 levels of P₂O₅ as Super: P₀=0 and P₁=56 Kg/ha.(2) 2 levels of K₂O as Mur. Pot.: K₀=0 and K₁=56 Kg/ha.**3. DESIGN:**

(i) Split-plot. (ii) (a) 4 main-plots/replication, 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) 1/74.1 ha. (v) 1/97.6 ha. (vi) N.A. (vii) Yes.

4. GENERAL:

(i) Normal (ii) N.A. (iii) Yield of cane. (iv) (a) 1964-only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 536.7 Q/ha. (ii) (a) 102.3 Q/ha. (b) 76.70 Q/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of cane in Q/ha.

	N ₀	N ₁	N ₂	N ₃	K ₀	K ₁	Mean
P ₀	332.8	547.3	585.4	630.1	520.2	527.7	523.9
P ₁	325.7	555.0	620.2	697.1	547.1	551.9	549.5
Mean	329.3	551.2	602.8	663.6	533.6	539.8	536.7
K ₀	320.0	555.5	597.0	662.0			
K ₁	338.5	546.8	608.6	665.2			

C.D. for N marginal means=81.8 Q/ha.

Crop :- Sugarcane.

Ref:-Pb. 65(79).

Site :- Sugarcane Sub-Stn., Kheri.

Type :- 'M'.

Object :- To study the effect of different levels of N, P and K on the yield of Sugarcane.

1. BASAL CONDITIONS:

(i) (a) to (c) Nil. (ii) Sandy loam. (iii) 22.3.65. (iv) (a) and (b) N.A. (c) 875000 two budded setts/ha. (d) and (e) N.A. (v) N.A. (vi) Coj-36. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

All combinations of (1), (2) and (3)

(1) 4 levels of N:-N₀=0, N₁=56, N₂=112 and N₃=168 Kg/ha.

(2) 2 levels of P₂O₅-P₀=0 and P₁=56 Kg/ha.

(3) 2 levels of K₂O:-K₀=0 and K₁=56Kg/ha.

3. DESIGN :

(i) Fact. in R.B D. (a) 16. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/100 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1964-only. (b) and (c) No. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 474.7 Q/ha. (ii) 119.2 Q/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of cane in Q/ha.

	N ₀	N ₁	N ₂	N ₃	K ₀	K ₁	Mean
P ₀	322.5	434.0	474.4	633.1	468.4	463.6	466.0
P ₁	230.6	494.0	538.6	670.6	472.3	494.6	483.5
Mean	276.5	464.0	506.5	651.9	470.4	479.1	474.7
K ₀	285.0	428.4	480.6	687.5			
K ₁	268.1	499.6	532.4	616.3			

C.D. for N marginal means=85.0 Q/ha.

Crop :- Sugarcane.

Ref :- Pb. 65(84).

Site :- Sugarcane Sub-Stn., Kheri.

Type :- 'M'.

Object :- To study the effect of green manures with P on the yield of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 20.2.65. (iv) and (v) N.A. (vi) Coj-46. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

Main-plot treatments :

4 green manures :- G_1 =Fallow, G_2 =Guara, G_3 =Sunhemp and G_4 =Dhaincha.

Sub-plot treatments :

2 levels of P_2O_5 :- $P_0=0$ and $P_1=56$ Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication and 2 sub-plots/main-plot. (iii) 4. (iv) (a) N.A. (b) 1/100ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1965—Contd. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 623.4 Q/ha. (ii) (a) 138.0 Q/ha. (b) 71.0 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of cane in Q/ha.

	P_0	P_1	Mean
G_1	495.0	530.0	512.3
G_2	620.0	592.5	606.2
G_3	680.0	640.0	660.0
G_4	721.2	708.8	715.0
Mean	629.1	617.8	623.4

Crop :- Sugarcane.

District :- Jullundur, Hoshiarpur and, Sangrur.

Ref :- Pb. 60.(S.F.T.) for Jullundur, Hoshiarpur and Sangrur and 61(S.F.T) for Jullundur and Hoshiarpur.

Type :- 'M'.

Object :- Type A : To study the response of Sugarcane to different levels of N, P and K applied individually and in combination.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Alluvial for Jullundur and Tarai and sub-mountain for Hoshiarpur. :

2. TREATMENTS:

8 manurial treatments :

O=Control (no manure)

N=67.2 Kg/ha. of N,

P=44.8 Kg/ha. of P_2O_5 ,K=44.8 Kg/ha. of K_2O ,NP=67.2 Kg/ha. of N+44.8 Kg/ha. of P_2O_5 ,NK=67.2 Kg/ha. of N+44.8 Kg/ha. of K_2O ,PK=44.8 Kg/ha. of P_2O_5 +44.8 Kg/ha. of K_2O andNPK=67.2 Kg/ha. of N+44.8 Kg/ha. of P_2O_5 +44.8 Kg/ha. of K_2O

3. DESIGN:

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle/thana is changed once in two years within the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on Kharif cereal, 8 on a Rabi cereal, 8 on Cash crop, 4 on an oilseed crop and 3 on a leguminous crop. half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. The three trials on legumes are of type C. Residual effects of Phosphate application are studied on Type C trials in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98.8 ha. (b) 1/197.7 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of cane (iv) to (vii) N.A.

5. RESULTS :

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.								
			N	P	K	S.E.	NP	NK	PK	NPK	S.E.
60(S.F.T.)											
Jullundur	30	49880	13980	6150	1480	882.0	1520	680	-130	530	555.0
Hoshiarpur	9	26680	15220	5110	2660	684.0	2343	993	322	112	727.3
Sangrur	4	33663	9313	6363	4873	2682.3	-4813	813	-133	23	1637.3
61(S.F.T.)											
Jullundur	28	47930	12080	4720	1420	464.3	1330	150	-410	460	227.0
Hoshiarpur	13	28840	24920	7850	4560	2957.0	750	-190	-40	-340	289.0

Crop :- Sugarcane.

Ref :- Pb. 60(S.F.T.).

Site :- Jullundur and Sangrur.

Type :- 'M'.

Object :- Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS

(i) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (no manure),

 $N_1=22.4$ Kg/ha. of N as A/S, $N_2=44.8$ Kg/ha. of N as A/S,

$N_1' = 22.4$ Kg/ha. of N as Urea,
 $N_2' = 44.8$ Kg/ha. of N as Urea,
 $N_1'' = 22.4$ Kg/ha. of N as A/S/N and
 $N_2'' = 44.8$ Kg/ha. of N as A/S/N.

3. DESIGN :

Same as in type A conducted on Sugarcane crop on page No. 619.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of cane. (iv) (a) 1961 only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			N_1	N_2	N_1'	N_2'	N_1''	N_2''	
Jullundur	4	15440	14780	24990	13380	23660	18050	27890	2590.0
Sangrur	4	38040	7150	15130	15450	9820	17750	10100	7144.0

Crop :- Sugarcane.

Site :- Hoshiarpur.

Ref :- Pb. 60 and 61(S.E.T.).

Type :- 'M'.

Object :- Type B: To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS:

(i) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (no manure),

$N_1 = 67.2$ Kg/ha. of N as A/S,

$N_2 = 134.4$ Kg/ha. of N as A/S,

$N_1' = 67.2$ Kg/ha. of N as Urea,

$N_2' = 134.4$ Kg/ha. of N as Urea,

$N_1'' = 67.2$ Kg/ha. of N as C/A/N and

$N_2'' = 134.4$ Kg/ha. of N as C/A/N.

3. DESIGN :

Same as in type A conducted on Sugar cane crop on page.No. 619.

4. GENERAL :

(iii) Yield of cane. (iv) (a) 1960 to 61. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

60 (S.F.T.)	District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
				N_1	N_2	N_1'	N_2'	N_1''	N_2''	
	Hoshiarpur	5	26300	10800	18170	6990	14140	16250	20000	14047.0
61 (S.F.T.)	District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
				N_1	N_2	N_1'	N_2'	N_1''	N_2''	
	Hoshiarpur	8	29190	17290	30410	18650	22340	22710	38190	6689.0

Crop :- Sugarcane.
District :- Gurdaspur,
Hoshiarpur, Patiala, Sangrur,
Jullundur and Ludhiana.

Pb. 63,65(S.F.T) for Gurdaspur, Hoshiarpur,
Patiala and Sangrur; 63(S.F.T) for Jullundur
and 65(S.F.T) for Ludhiana.

Type 'M'.

Object :- Type A₁ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS:

8 manurial treatments :

O=Control (no manure),

N₁=70 Kg/ha. of N,

N₂=140 Kg/ha. of N,

P₁=70 Kg/ha. of P₂O₅,

N₁P₁=70 Kg/ha. of N+70 Kg/ha. of P₂O₅,

N₂P₁=140 Kg/ha. of N+70 Kg/ha. of P₂O₅,

N₂P₂=140 Kg/ha. of N+140Kg/ha. of P₂O₅ and

N₂P₂K₁=140 Kg/ha. of N+140 Kg/ha. of P₂O₅+70 Kg/ha. of K₂O.

3. DESIGN :

(i) and (ii) A selected district is divided into four agriculturally homogeneous zones based on climate, soil cropping pattern etc., in each zone one block is selected at random. A block normally consists of a group of 50-100 villages, in each block 36 experiments are conducted in a year of which 11 are of type A₁, 11 of type A₂, 11 of type A₃ and 3 are of type C. The eleven experiments under type A₁, A₂ and A₃ are distributed as 3 on a Kharif cereal, 3 on a Rabi cereal, 3 on a cash crop and 2 on oil seed crop. All the three type-C experiments are conducted on a legume crop and for the purpose of conducting the A₁, A₂ and A₃ experiments 11 villages are randomly selected in each block and in each village 3 experiments one each of type A₁, A₂ and A₃ are laid out. For conducting the three villages are randomly selected in each block. (iii) (a) 1/100 ha. (b) 1/20 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of cane. (iv) (a) 1962 to 66 for Gurdaspur, Hoshiarpur, Patiala and Sangrur. (62 N.A.), 1963 for Jullundur and 1965 for Ludhiana. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Gurdaspur

63(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of cane in Kg/ha.	8851	12163	439	10652	16341	19218	21173	3500.0

Control yield=37734Kg/ha. ; No. of trials=8

65(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of cane in Kg/ha.	7933	10488	1355	10177	15799	19688	22399	1897.3

Control yield=44022 Kg/ha. ; No. of trials=9

Hoshiarpur

63(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of cane in Kg/ha.	8500	16407	823	9818	16769	19702	20097	2565.0

Control yield=25665 Kg/ha. ; No. of trials=6

65(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of cane in Kg/ha.	6766	17433	266	8833	18816	22666	21400	2680.1

Control yield=34349 Kg/ha. ; No. of trials=9

Patiala

62(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of cane in Kg/ha.	5238	9293	3835	7511	11712	11366	15863	4358.3

Control yield=32373 Kg/ha. ; No. of trials=3

65(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of cane in Kg/ha.	7588	14533	7988	11155	18222	23744	19311	3777.2

Control yield=49855 Kg/ha. ; No. of trials=8

Sangrur

65(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of cane in Kg/ha.	1581	5337	-864	2747	7511	8994	11514	1682.2

Control yield=40647 Kg/ha. ; No. of trials=8

65(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of cane in Kg/ha.	6700	16466	2233	7533	16566	26533	22223	4778.5

Control yield=53799 Kg/ha. ; No. of trials=6

Jullundur

63(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of cane in Kg/ha.	10938	18149	5053	11304	17906	22704	2383	2337.0

Control yield=39025Kg/ha. ; No. of trials=13

Ludhiana

64(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of cane in Kg/ha.	11855	19922	6955	116600	27522	27944	30600	4392.1

Control yield=57122 Kg/ha. ; No. of trials=7

Crop :- Sugarcane.**Ref :- Pb. 63(S.F.T.).****District :- Hoshiarpur.****Type :- 'M'.**

Object :—Type A₁ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS : and 3. DESIGN :Same as in type A₁ conducted under irrigated condition on Sugarcane crop on page. No. 621.**4. GENERAL :**

(i) and (ii) N.A. (iii) Yield of cane. (iv) (a) 1963-only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Hoshiarpur

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₁ P ₂ K ₁	S.E.
Av. response of cane in Kg/ha.	16325	28548	371	18450	30541	36208	37921	8828.0

Control yield=41381 Kg/ha.; No. of trials=5.

Crop :- Sugarcane.**Ref :- Pb. 62(S.F.T.) for Gurdaspur,****District :- Gurdaspur, Hoshiarpur, Patiala, Sangrur, Ludhiana and Jullundur.****Hoshiarpur, Patiala, Sangrur, 64(S.F.T.) for Ludhiana and 65(S.F.T.) for Jullundur.****Type :- 'M'.**

Object Type A₁ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments:

O=Control (no manure),

N₁=70 Kg/ha. of N,P₁=70 Kg/ha. of P₂O₅,P₂=140 Kg/ha. of P₂O₅,N₁P₁=70 Kg/ha. of N+70 Kg/ha. of P₂O₅,N₁P₂=70 Kg/ha. of N+140 Kg/ha. of P₂O₅,N₂P₂=140 Kg/ha. of N+140 Kg/ha. of P₂O₅ andN₂P₁K₁=140 Kg/ha. of N+140 Kg/ha. of P₂O₅+140 Kg/ha. of K₂O.**3. DESIGN :**Same as in type A₁ conducted under irrigated condition on Sugarcane crop on page. No. 621.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of cane. (iv) (a) 1963 to 66 for Gurdaspur, Hoshiarpur, Patiala and Sangrur; 1964 to 66 for Ludhiana and 1963 for Jullundur. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Gurdaspur

63(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of cane in Kg/ha.	6193	1537	184	2130	7555	9927	130398	1305.0

Control yield=36065 Kg/ha. ; No. of trials=8

64(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of cane in Kg/ha.	6677	2602	5721	8511	11950	18724	21382	2320.7

Control yield=23304 Kg/ha. ; No. of trials=8

65(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.
Av. response of cane in Kg/ha.	7100	444	2735	10822	11783	19950	20633	1138.1

Control yield=45788 Kg/ha. ; No. of trials=13

Hoshiarpur

63(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of cane in Kg/ha.	9389	494	2965	6918	10872	28663	32123	4511.3

Control yield=37559 Kg/ha. ; No. of trials=2

64(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of cane in Kg/ha.	11135	428	3286	13499	14834	25327	23433	2715.3

Control yield=34651 Kg/ha. ; No. of trials=11

65(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of cane in Kg/ha.	8266	1550	1966	10333	13649	18749	19216	1062.0

Control yield=27066Kg/ha. ; No. of trials=11

Patiala

63(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of cane in Kg ha.	13689	7808	15320	13837	20064	16951	20113	7441.0

Control yield=36521 Kg/ha. ; No. of trials=3

64(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of cane in Kg/ha.	1317	5436	2948	8912	7067	9142	11481	2532.6

Control yield=31678 Kg/ha. ; No. of trials=5

65 (S.F.T)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₁ P ₁ K ₂	S.E.
Av. response of cane in Kg/ha.	7088	6711	5244	10611	10722	16400	17300	2503.5

Control yield = 40911 Kg/ha.; No. of trials = 7

Sangrur

63 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₁ P ₁ K ₂	S.E.
Av. response of cane in Kg/ha.	5658	1457	1902	8475	9587	13862	15690	2231.0

Control yield = 52113 Kg/ha.; No. of trials = 8

64 (S.F.T)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₁ P ₁ K ₂	S.E.
Av. response of cane in Kg/ha.	1834	3876	3261	8324	14381	10039	16281	3819.6

Control yield = 48673 Kg/ha.; No. of trials = 7

65 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₁ P ₁ K ₂	S.E.
Av. response of cane in Kg/ha.	8100	466	7000	8433	10166	16066	12933	2303.7

Control yield = 49033 Kg/ha.; No. of trials = 6

Ludhiana

64 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₁ P ₁ K ₂	S.E.
Av. response of cane in Kg/ha.	5139	8747	6869	9735	11712	14084	21300	4630.3

Control yield = 38597 Kg/ha.; No. of trials = 4

65 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₁ P ₁ K ₂	S.E.
Av. response of cane in Kg/ha.	10399	7366	16399	15299	19766	24633	28933	4255.1

Control yield = 65966 Kg/ha.; No. of trials = 5

Jullundur

63 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₁ P ₁ K ₂	S.E.
Av. response of cane in Kg/ha.	10258	1202	4332	11160	12758	18964	22016	1365.0

Control yield = 46187 Kg/ha.; No. of trials = 14

Crop :- Sugarcane (Annual).**District :- Hoshiarpur.****Ref. :- Pb. 63(S.F.T.).****Type :- 'M'.**Object : Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

Same as in Type A₂ on Sugarcane conducted under irrigated condition on page No. 623.

3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Sugarcane crop on page No. 621.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of cane. (iv) (a) 1963-only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS

Hoshiarpur

63(S.F.T)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of cane in Kg/ha.	6144	922	4348	13178	12173	22848	23466	8411.0

Control yield=26176 Kg/ha. ; No. of trials=9

Crop :- Sugarcane (Annual), Ref :- Pb. 63 to 65 (S.F.T.) for Gurdaspur;
District :- Gurdaspur, Hoshiarpur, 63 to 65(S.F.T.) for Hoshiarpur; 63(S.F.T.)
Jullundur, Patiala, Sangrur and for Jullundur; 63 to 65(S.F.T.) for Patiala; 63
Ludhiana. to 65(S.F.T.) for Sangrur and 64,65(S.F.T.)for Ludhiana.

Type :- 'M'.

Object :- Type A₂ : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8₁ manurial treatments :

O=Control (no manure),

N₁=70 Kg/ha. of N,K₁=70 Kg/ha. of K₂O,K₂=140 Kg/ha. of K₂O,N₁K₁=70 Kg/ha. of N+70 Kg/ha. of K₂O,N₁K₂=70 Kg/ha. of N+140 Kg/ha. of K₂O,N₂K₂=140 Kg/ha. of N+140 Kg/ha. of K₂O andN₁P₁K₁=70 Kg/ha. of N+70 Kg/ha. of P₂O₅+70 Kg/ha. of K₂O.

3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Sugarcane crop on page No. 621.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of cane. (iv) (a) 1963 to 66 for Gurdaspur, Hoshiarpur, Patiala and Sangrur (62 N.A.), 1963 for Jullundur, 1964 to 66 for Ludhiana. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

Gurdaspur

63 (S.F.T)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of cane in Kg/ha.	4458	-1021	-702	4788	5249	7522	6951	1485.0

Control yield=33989 Kg/ha.; No. of trials=7

64 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of cane in Kg/ha.	9450	472	2366	9120	9713	15808	14397	3529.0

Control yield=28713 Kg/ha.; No. of trials=8

65 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of cane in Kg/ha.	6866	-1044	200	8266	8177	15844	14600	1828.4

Control yield=41044 Kg/ha.; No. of trials=7

Hoshiarpur

63 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of cane in Kg/ha.	5913	428	-312	7297	5090	13656	10032	1699.0

Control yield=20526 Kg/ha.; No. of trials=5

64 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of cane in Kg/ha.	10930	-650	3253	11572	13919	200080	12430	3412.9

Control yield=35541 Kg/ha.; No. of trials=9

65 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of cane in Kg/ha.	8091	908	1216	8000	7524	13283	13591	2106.8

Control yield=27433 Kg/ha.; No. of trials=10

Jullundur

63 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of cane in Kg/ha.	11074	1861	4192	12000	11210	19792	16320	1775.0

Control yield=35693 Kg/ha.; No. of trials=14

Patiala

63 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of cane in Kg/ha.	4942	197	741	5189	12058	14134	13046	4128.0

Control yield=31777 Kg/ha.; No. of trials=4

64 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of cane in Kg/ha.	593	-4398	543	4200	11310	11070	14480	3523.2

Control yield=27279 Kg/ha.; No. of trials=4

65 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of cane in Kg/ha.	10044	533	3055	10866	11822	15111	15988	2721.7

Control yield=40855 Kg/ha.; No. of trials=7

Sangrur

63 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of cane in Kg/ha.	6943	148	766	4892	21077	12107	9834	6811.0

Control yield=54707 Kg/ha.; No. of trials=8

64 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of cane in Kg/ha.	2438	1219	5106	8170	12184	13561	13876	2385.7

Control yield=38481 Kg/ha.; No. of trials=4

65 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of cane in Kg/ha.	8066	-1266	233	7166	6766	15433	12266	3523.5

Control yield=48666 Kg/ha. No. of trials=6

Ludhiana

64 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of cane in Kg/ha.	12107	2965	6325	15122	16012	20954	28021	5925.8

Control yield=27477 Kg/ha.; No. of trials=4

65 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of cane in Kg/ha.	16766	6166	8600	13933	18433	25466	22133	2730.1

Control yield=54499 Kg/ha.; No. of trials=6

Crop :- Sugarcane (Annual).**Ref :- Pb. 63(S.F.T.).****District :- Hoshiarpur.****Type :- 'M'.**Object :—Type A₁ : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Raddish chestnut. (iii) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS:

Same as in type A₂ on Sugarcane crop conducted under irrigated condition on page. No. 626.

3. DESIGN:

Same as in type A₁ conducted under irrigated condition on Sugarcane on page No. 621.

4. GENERAL

(i) and (ii) N.A. (iii) Yield of cane. (iv) (a) 1963-only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

63 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of cane in Kg/ha.	12453	131	2174	13145	13475	25863	23787	6857.0

Control yield=32847 Kg/ha.; No. of trials=5

Crop :- Sugarcane.

Ref :- Pb. 62(229).

Site :- Sugarcane Sub-Stn., Gurdaspur.

Type :- 'MV'.

Object :—To study the effect of different levels of N on the yield of different varieties of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Fallow. (c) Nil. (ii) Loamy. (iii) 27.3.62. (iv) 4 ploughings and 4 suhagas. (b) N.A. (c) 88920 two budded setts/ha. (d) N.A. (e) 1. (v) N.A. (vi) As per treatments. (vii) Irrigated (viii) 4 hoeings. (ix) 95cm. (x) N.A.

2. TREATMENTS :

Main-plot treatments :

4 varieties : V₁=Co-976, V₂=Co-1007, V₃=CoJ-46, and V₄=Co-312

Sub-plot treatments :

4 levels of N as A/S : N₀=0, N₁=112, N₂=168 and N₃=224 Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication, 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) 21.95m. × 2.44m. (b) 20.73m. × 2.44m. (v) 61cm. on either side of the plot. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1962-65. (modified in 1963) (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 676.0 Q/ha. (ii) (a) 132.2 Q/ha. (b) 74.5 Q/ha. (iii) Main effect of N is highly significant, and that of V is significant (iv) Av. yield of cane in Q/ha.

	N ₀	N ₁	N ₂	N ₃	Mean
V ₁	583.7	662.9	662.9	831.1	685.2
V ₂	563.9	672.8	742.0	775.7	688.6
V ₃	435.3	603.5	643.1	672.8	588.7
V ₄	613.4	640.9	831.1	880.5	741.5
Mean	549.1	645.0	719.8	790.0	676.0

C.D. for V marginal means=105.7 Q/ha.

C.D. for N marginal means=53.6 Q/ha.

Crop :- Sugarcane.**Ref :- Pb: 63(210).****Site :- Sugarcane Sub-Stn., Gurdaspur.****Type :- 'MV'.**

Object :- To study the effect of different manures and varieties on the yield of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Fallow. (c) Nil. (ii) Loamy. (iii) 13 to 16.3.63. (iv) 4 ploughings, 4 suhagas. (b) N.A. (c) 74100 two budded setts/ha. (d) N.A. (e) 1. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 5 hoeings. (ix) 69cm. (x) 7/8.2.64.

2. TREATMENTS :**Main-plot treatments :**4 varieties: $V_1 = \text{Co-976}$, $V_2 = \text{Co-1007}$, $V_3 = \text{CoJ-46}$ and $V_4 = \text{Co-312}$.**Sub-plot treatments :**4 levels of N as C/A/N: $N_0 = 0$, $N_1 = 124$, $N_2 = 185$ and $N_3 = 247\text{Kg/ha}$.

50% of the dose of N applied at planting and 50% on 17.7.63.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication; 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) 23.77m. x 4.88m. (b) 20.73m. x 4.88m. (v) 1.52m. on either side of the plot. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1962-65 (modified in 1963 and 64) (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 516.9 Q/ha. (ii) (a) 64.0 Q/ha. (b) 48.8 Q/ha. (iii) Main effects of V and N are highly significant. (iv) Av. yield of cane in Q/ha.

	N_0	N_1	N_2	N_3	Mean
V_1	341.3	460.1	533.3	485.3	455.0
V_2	328.7	479.1	540.7	554.3	475.7
V_3	456.4	602.9	676.8	696.8	608.2
V_4	391.7	521.6	585.2	616.8	528.8
Mean	379.5	515.9	584.0	588.3	516.9

C.D. for V marginal means = 51.1 Q/ha.

C.D. for N marginal means = 35.1 Q/ha.

Crop:-Sugarcane.**Ref:-Pb. 64(199).****Site :- Sugarcane Sub-Stn., Gurdaspur.****Type :- 'MV'.**

Object :- To study the effect of different doses of N on different varieties of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Fallow. (c) Nil. (ii) Loamy. (iii) 20.3.64. (iv) (a) 4 ploughings and 4 suhagas. (b) N.A. (c) 88920 two. budded setts /ha. (d) N.A. (e) 1. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 6 hoeings. (ix) 87cm. (x) N.A.

2. TREATMENTS :**Main-plot treatments :**3 varieties: $V_1 = \text{Col-79}$, $V_2 = \text{Col-1007}$ and $V_3 = \text{CoJ-46}$.

Sub-plot-treatments :4 levels of N as A/S : $N_0=0$, $N_1=124$, $N_2=185$, and $N_3=247$ Kg/ha.**3. DESIGN :**(i) Split-plot. (ii) (a) 3 main-plots/replication, 4 sub-plots/main-plot (b) N.A. (iii) 4. (iv) (a) 21.95m. \times 4.88 m. (b) 21.03m. \times 4.88m. (v) 47 cm. on either side of the plot. (vi) Yes.**4. GENERAL :**

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1962-65 (treatments modified in 65). (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 575.0 Q/ha. (ii) (a) 74.6 Q/ha. (b) 26.7 Q/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of cane in Q/ha.

	N_0	N_1	N_2	N_3	Mean
V_1	496.1	637.4	631.9	653.0	604.6
V_2	447.4	542.9	599.7	576.0	541.5
V_3	432.8	611.7	646.2	624.4	578.8
Mean	458.8	597.3	625.9	678.0	575.0

C.D. for N marginal means=22.3 Q/ha.

Crop :- Sugarcane.**Ref:-Pb. 65(74).****Site :-Agri. Res. Stn., Gurdaspur.****Type :- 'MV'.****Object :-**To find the optimum dose of N for the latest improved varieties.**1. BASAL CONDITIONS :**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 6.3.65. (iv) (a) 7 ploughings. (b) Flat sowing. (c) 7000 two budded setts/ha. (d) 60cm. (e) Nil. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) and (ix) N.A. (x) 11.2.66.

2. TREATMENTS :**Main-plot treatments :**3 varieties :- $V_1=CoJ-148$, $V_2=CoJ-975$ and $V_3=CoJ-46$.**Sub-plot treatments :**6 levels of N as A/S : $N_0=0$, $N_1=112$, $N_2=140$, $N_3=168$, $N_4=196$ and $N_5=224$ Kg/ha.**3. DESIGN :**

(i) Split-plot. (ii) (a) 3 main-plots/replication and 6 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/494 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of cane. (iv) (a) 1962-65. (modified every year). (b) N.A. (c) Nil. (v) to (vii) N.A.

5. RESULTS :(i) 703.5 Q/ha. (ii) (a) 33.7 Q/ha. (b) 16.8 Q/ha. (iii) Main effect of N and interaction $V \times N$ are highly significant. (iv) Av. yield of cane in Q/ha.

	V ₁	V ₂	V ₃	Mean
N ₀	684.2	630.0	605.2	639.8
N ₁	748.4	715.1	704.0	722.5
N ₂	707.7	738.5	649.6	698.6
N ₃	763.2	634.8	671.8	690.0
N ₄	724.9	720.0	664.4	703.1
N ₅	805.2	749.6	747.2	767.3
Mean	738.9	698.0	673.7	703.5

C.D. for V marginal means=23.8 Q/ha.

C.D. for N marginal means=13.8 Q/ha.

C.D. for N means at the same level of V=23.9 Q/ha.

C.D. for V means at the same level of N=27.8 Q/ha.

Crop :- Sugarcane.

Ref :- Pb. 60(8).

Site :- Sugarcane Res. Stn., Jullundur.

Type :- 'MV'.

Object:—To study the effect of graded doses and times of application of Nitrogen on the yield of different varieties of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 28/29.3.60. (iv) (a) and (b) N.A. (c) 74100 two budded setts/ha. (d) and (e) N.A. (v) Nil. (vi) As per treatments. (vii) Irrigated. (viii) Hoeings. (ix) N.A. (x) 8/9.2.61.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 2 varieties : V₁=Co-28 and V₂=CoJ-39.

(2) 4 levels of N as A/S : N₀=0, N₁=112 Kg/ha. (28 Kg/ha. of N at planting+42Kg/ha. of N applied in May and June), N₂=112 Kg/ha. of N (28 Kg/ha. of N at planting+16.8Kg/ha. of N applied in May to Sept.-each) N₃=2 N₁ (224 Kg/ha. of N as A/S applied at planting, 125 Kg/ha. of N each on 2.5.60 and 21.6.60, 56 Kg/ha. of N on 21.7.60 and 28 Kg/ha. of N on 2.8.61.)

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/98.8 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of cane. (iv) (a) 1960-62 (modified in 1961). (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 711Q/ha. (ii) 61.3Q/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of cane. in Q/ha.

	N ₀	N ₁	N ₂	N ₃	Mean
V ₁	611	727	670	753	690
V ₂	612	807	778	730	732
Mean	611	767	724	742	711

C.D. for N marginal means=63.8 Q/ha.

Crop :- Sugarcane.

Ref. :- Pb. 61(3), 62(23).

Site :- Sugarcane Res. Sta., Jullundur.

Type :- 'MV'.

Object :- To study the effect of graded doses and times of application of N on the yield of different varieties of Sugarcane.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 9/10.3.61; 9 to 11.3.62. (iv) (a) and (b) N.A. (c) 74100 to 86450 two budded setts/ha. (d) and (e) N.A. (v) Nil. (vi) As per treatments. (vii) Irrigated. (viii) and (ix) N.A. (x) N.A.; 2.12.62.

TREATMENTS

All combinations of (1) and (2)

(1) 2 varieties : V₁=Col-29 and V₂=CoJ-39.

(2) 5 levels of N: N₀=Control, N₁=112Kg/ha. of N (28 Kg/ha at planting+42 Kg each in May and June), N₂=112 Kg/ha. of N (28 Kg at planting+16.8 Kg each in May to Sept.), N₃=224 Kg/ha. of N (56 Kg at planting+84 Kg each in May and June) and N₄=224 Kg/ha. of N (56 Kg at planting+33.6 Kg each in May to September)

60 Kg of A/S applied at planting, 100Kg/ha. of C/A/N on 25 th May, 50 Kg of Urea on 30th June and 150 Kg of Soda nitrate on 22 nd July for 61.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 10. (b) N.A. (iii) 3. (iv) (a) 3.66m. x 32.00m., 1/98.8 ha. (b) 3.66m. x 32.00 m; 1/98.8 ha. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Good. (ii) 1½Kg of Agallol and 20 Kg of Gammaxene applied at planting for 61; 20 Kg of B. H. C. (5%) and 1½ Kg of Agallol sprayed for 62. (iii) Yield of cane. (iv) (a) 1960-62 (modified in 1961) (b) No. (c) Nil. (v) N.A. (vi) Nil. (vii) Error variances are heterogeneous and Treatments x Years interaction is present.

5. RESULTS :

Pooled results

(i) 494Q/ha. (ii) 168.4 Q/ha. (based on 9 d. f. made up of Treatments x Years interaction) (iii) Main effect of V alone is highly significant. (iv) Av. yield of cane in Q/ha.

	N ₀	N ₁	N ₂	N ₃	N ₄	Mean
V ₁	315	468	413	496	490	436
V ₂	416	603	517	602	621	552
Mean	365	535	465	549	556	494

C.D. for V marginal means=155.0 Q/ha.

Individual results

Treatment	V ₁	V ₂	Sig.	N ₀	N ₁	N ₂	N ₃	N ₄	Sig.	G.M.	S.E./plot
Year											
1961	308	362	N.S.	295	380	294	333	374	N.S.	335	81.0
1962	565	742	**	437	691	637	766	738	**	654	32.1
Pooled	436	552	N.S.	365	535	465	549	556	**	494	168.4

Crop :- Sugarcane.

Ref :- Pb. 60(47), 61(53), 62(67).

Site :- Sugarcane. Sub-Stn., Kheri.

Type :- 'MV'

Obj^ct :- To study the effect of different levels of N on the different varieties of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) G.M-Sugarcane-G.M. (b) G.M. (c) N.A. (ii) Sandy loam. (iii) 9/10.4.60; Last week of April, 61; 21.3.62. (iv) (a) 6 to 8 ploughings. (b) Flat sowing (c) 86487, 98842, 86487 two budded setts/ha. for 60, 61 and 62 respectively. (e) N.A. (v) Nil. (vi) As per treatments. (vii) Irrigated. (viii) 2weedings. (ix) N.A. (x) 1st week of Dec., 61; Last week of Feb., 62; 23.12.62.

2. TREATMENTS:

Main-plot treatments:

4 varieties : V₁=Col-29, V₂=Co S-515, V₃=Co-312 and V₄=CoJ-46.

Sub-plot treatments:

5 levels of N: N₀=0, N₁=56, N₂=112, N₃=168 and N₄=224 Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication and 5 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) 1/74.1 ha. (b) 1/98.8 ha. (v) N.A. (vi) Yes.

4. GENERAL

(i) Poor for 60 and 62 and Normal for 61 (ii) Nil. (iii) Yield of cane. (iv) 1960-62. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Nil. (vii) Error variances are homogeneous and Main-plot treatments × Years and Sub-plot treatments × Years interactions are present.

5. RESULTS:

Pooled results

(i) 333.5 Q/ha. (ii) (a) 564.3 Q/ha. (based on 6 d.f. made up of Treatments × Years interaction) (b) 82.4 Q/ha. (based on 24 d.f. made up of Treatments × Years interaction.) (iii) Main effect of N alone is highly significant. (iv) Av. yield of cane in Q/ha.

	N ₀	N ₁	N ₂	N ₃	N ₄	Mean
V ₁	170.3	240.6	245.6	293.6	316.6	253.4
V ₂	300.6	362.6	406.3	437.6	471.6	395.8
V ₃	241.3	301.3	348.3	362.0	428.3	336.2
V ₄	268.6	319.0	371.6	379.6	405.0	348.8
Mean	245.2	305.9	343.0	368.2	405.4	333.5

C.D. for N marginal means=82.4 Q/ha.

Individual results

Treatment	V ₁	V ₂	V ₃	V ₄	Sig.	N ₀	N ₁	N ₂	N ₃	N ₄	Sig.	G.M.	S.E./ plot.		
													Main-plot	Sub-plot	
Year															
1960	229.2	328.3	200.4	400.6	*	235.6	274.5	278.3	317.2	342.4	**	289.6	194.8	59.4	
1961	367.7	433.0	333.5	493.2	*	322.5	389.7	413.4	445.0	463.7	**	406.9	132.4	63.8	
1962	163.2	425.9	474.8	152.8	**	177.3	253.3	337.9	342.3	410.1	**	304.2	82.3	55.4	
Pooled	253.4	395.8	336.2	348.8	N.S	245.2	305.9	343.0	368.2	405.4	**	333.5	564.3	82.4	

Crop Sugarcane.

Ref :- Pb. 65(83).

Site :- Sugarcane Sub-Stn., Kheri.

Type :- 'MV'.

Object :- To study the requirements of N to the different varieties of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) Sugarcane-Fallow-Sugar cane. (b) Fallow. (c) N.A. (ii) Sandy loam. (iii) 19.3.65. (iv) (a) 10 ploughings. (b) Flat sowing. (c) 75 to 88 Q/ha. (proportion to thickness of varieties.) (d) 60 cm. apart. (e) Nil. (v) 56 Kg/ha. of N at sowing. (vi) As per treatments. (vii) Irrigated. (viii) and (ix) N.A. (x) March, 66.

2. TREATMENTS :

Main-plot treatments.

4 varieties:- V₁=Co-1148, V₂=Co-1084, V₃=CoJ-46 and V₄=Co-894.

Sub-plot treatments :

6 levels of N:- N₀=Control, N₁=56 Kg/ha. at sowing +56 Kg/ha. at second irrigation, N₂=56 Kg/ha. at sowing +42 Kg/ha. at second irrigation +42 Kg/ha. at fourth irrigation, N₃=56 Kg/ha. at sowing +56 Kg/ha. at second irrigation +56 Kg/ha. at fourth irrigation, N₄=56 Kg/ha. at sowing +70 Kg/ha. at second irrigation +70 Kg/ha. at fourth irrigation and N₅=56 Kg/ha. at sowing +84 Kg/ha. at second irrigation +84 Kg/ha. at fourth irrigation.

3. DESIGN:

(i) Split-plot. (ii) (a) 4 main-plots/replication and 6 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/148 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Attack of black bug + Pysillo and Gurdaspur top borer with red root. 0.05% Mellothion was sprayed + 0.2% of B.H.C. sprayed and 10% B.H.C. (25 Kg/ha.) by mechanical method is applied with 1.25 Kg/ha. of Agallol. (iii) Yield of cane. (iv) (a) 1965-contd. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 708 Q/ha. (ii) (a) 234.3 Q/ha. (b) 122.2 Q/ha. (iii) Main effect of N alone is significant. (iv) Av. yield of cane in Q/ha.

	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅	Mean
V ₁	557	699	690	690	684	668	665
V ₂	657	709	803	899	784	821	779
V ₃	637	721	672	788	755	847	737
V ₄	594	608	699	703	664	633	650
Mean	611	684	716	770	722	742	708

C.D. for N marginal means = 87.0 Q/ha.

Crop :- Sugarcane.

Ref :- Pb. 63(207), 64(197), 65(75).

Site :- Agri. Res. Stn., Gurdaspur.

Type 'C'.

Object :- To study the effect of different methods of sowing and seed-rates on the yield of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Fallow. (c) Nil. (ii) Loamy soil for 63 and 64, sandy loam for 65. (iii) 7.3.63; 28.2.64; 16.3.65. (iv) (a) 4 ploughings and 4 subhags for 63 and 64; N.A. for 65. (b) to (d) As per treatments. (e) 1. (v) N.A. for 63 and 64; 37 Kg/ha. of each of N at sowing and at tillering for 65. (vi) N.A. for 63 and 64; Co-312 for 65. (vii) Irrigated. (viii) 4 to 5 hoeings for 63 and 64; N.A. for 65. (ix) 74cm.; 87cm.; N.A.(x) N.A.; N.A.; 3.2. 66.

2. TREATMENTS :

All combinations of (1) and (2)+one extra treatment.

(1) 2 methods of sowing at 90cm. apart : M₁=Flat sowing and M₂=Trench planting.

(2) 2 seed-rates : S₁=49400 and S₂=74100 setts/ha.

Extra treatment (E)=74100 setts/ha. sown at 60cm. apart by flat method.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) 22.56m. × 7.32m.; 21.95m. × 14.63m.; 21.95m. × 7.32m. (b) 19.81m. × 7.32m.; 1/34.6 ha.; 18.44m. × 7.32m. (v) 138cm. on either side; N.A.; 176 cm. on either side along length (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1963-65. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) and (vi) Nil. (vii) Error variances are homogeneous and Treatments × Years interaction is present.

5. RESULTS :

Pooled results.

(i) 769.6 Q/ha. (ii) 75.5 Q/ha. (based on 8 d.f. made up of Treatments × Years interaction) (iii) Extra vs. others alone is significant. (iv) Av. yield of cane in Q/ha.

E=825.4 Q/ha.

	S ₁	S ₂	Mean
M ₁	744.1	744.8	744.4
M ₂	736.2	798.0	767.1
Mean	740.1	771.4	755.7

C.D. for extra Vs. others=56.2 Q/ha.

Individual results.

Treatment	M ₁	M ₂	Sig.	S ₁	S ₂	Sig.	Control	Sig.	G.M.	S.E./plot
Years										
1963	725.0	725.6	N.S.	680.3	770.3	**	818.3	N.S.	725.3	52.8
1964	789.5	788.9	N.S.	804.1	774.3	N.S.	863.6	*	789.2	47.1
1965	718.9	786.9	**	736.1	769.7	**	794.5	*	752.9	31.1
Pooled	744.4	767.1	N.S.	740.1	771.4	N.S.	825.4	*	755.7	75.5

Crop :- Sugarcane.

Site :- Sugarcane Sub-Stn., Gurdaspur.

Ref :- Pb. 64(196).

Type :- 'MV'.

Object :- To see the ill effect of early harvesting on deep sown crop.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Sugarcane. (c) 50 Kg/ha. of N as C/A/N. (ii) Loamy. (iii) 7.3.63. (iv) (a) 4 ploughings, 4 suhagas (to plant crop). (b) to (d) As per treatments (e) 1. (v) 65 Kg/ha. of N as top dressing. (vi) N.A. (vii) Irrigated. (viii) 3 hoeings. (ix) 70cm. (x) 22.12.63 (plant crop), 26.12.64 (ratooncrop).

2. TREATMENTS :

Main-plot treatments :

All combinations of (1) and (2)+1 Extra treatment (E)

(1) 2 methods of sowing : M₁=Flat and M₂=Trench.(2) 2 seed-rates : S₁=49421 and S₂=74132 two budded setts/ha.(E) Extra treatment : M₁S₂ with spacing 60cm.

Sub-plot treatments :

2 cultural treatments: C₀=Unshaved and C₁=Shaved.

Date of sowing was 15.2.64.

3. DESIGN :

(i) Split-plot. (ii) 5 main-plots/replication; 2 sub-plots/main-plot. (b) N.A. (iii) 3. (iv) 22.55m. x 3.66m. (v) 15.40m. x 3.66m. (vi) 3.57m. at each end and one row on each side. (vii) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1964-only. (b) No. (c) Nil (v) Nil. (vi) N.A. (vii) Nil.

5. RESULTS :

(i) 412.3Q/ha. (ii) (a) 99.2 Q/ha. (b) 16.0 Q/ha. (iii) Main effect of C and interactions M x C and S x C are highly significant. (iv) Av. yield of cane in Q/ha.

Extra treatment=421.7Q/ha.

	C ₀	C ₁	M ₁	M ₂	Mean
S ₁	467.0	325.9	429.1	363.8	396.4
	446.6	400.3	443.9	406.0	423.4
Mean	456.8	363.1	435.0	384.9	409.9
M ₁	470.6	399.4			
M ₂	443.0	326.8			

C.D. for C marginal means=14.5 Q/ha.

C.D for C means at the same level of M or S=20.6 Q/ha.

C.D for M or S means at the same level of C=94.5 Q/ha.

Crop :- Sugarcane,**Ref :- Pb. 65(71).****Site :- Agri. Res. Stn., Gurdaspur.****Type :- 'C'.**

Object :- To study the effect of spacings and seed-rates on the yield of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 7.3.65. (iv) (a) 7 ploughings. (b) Flat sowing. (c) and (d) As per treatments. (e) Nil. (v) N.A. (vi) CoJ-46. (vii) Irrigated. (viii) and (ix) N.A. (x) 29.1.66.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 2 spacings :- S₁=60 and S₂=90cm.(2) 3 seed-rates :- R₁=37500, R₂=50000 and R₃=75000 two budded setts/ha.**3. DESIGN :**

(i) Fact. in R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) 7.32m. x 15.80m. (b) 7.32m. x 13.60m. (v) 1.10m. between rows. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1965—only. (b) No. (c) Nil. (v) to (vii) N.A.

RESULTS :

(i) 711.6 Q/ha. (ii) 41.5 Q/aa. (iii) None of the effects is significant. (iv) Av. yield of cane in Q/ha.

	R ₁	R ₂	R ₃	Mean
S ₁	699.8	734.6	747.4	727.0
S ₂	683.9	710.4	693.8	696.0
Mean	691.8	722.5	720.6	711.6

Crop :- Sugarcane.**Ref :- Pb. 63(26).****Site :- Sugarcane Res. Stn., Jullundur.****Type :- 'C'**

Object:—To study the effect of different methods of planting on the yield of Sugarcane.

1. BASAL CONDITIONS:

(i) N.A. (ii) Sandy loam. (iii) 31.3.63 to 1.4.63. (iv) and (v) N.A. (vi) CoJ-46. (vii) Irrigated. (viii) and (ix) N.A. (x) 6th Feb. to 8th Feb., 64.

2. TREATMENTS :6 methods of planting of Sugarcane: T_1 = Pit method (six three budded setts/pit), T_2 = Poona method with two rows of 90 two budded setts in each row, (sown in trenches 91cm. apart, each trench contains two rows of cane setts), T_3 = Trenches 91cm. apart (18cm. to 20cm. deep with 74100 two budded setts/ha), T_4 = Trenches (18cm. to 20cm. deep) with 49400 two budded setts/ha., T_5 = Furrows (flat sowing) 30cm. x 6cm. apart alternating each other with 74100 two budded setts/ha. and T_6 = Flat sowing 61cm. apart with 74100 two budded setts/ha. (Normal recommended practice).**3. DESIGN :**

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 3. (iv) (a) 7.32m. x 31.10m. (b) 7.32m. x 27.66m. (v) 1.72 m. on either side of the plot. (vi) Yes.

4. GENERAL:

(i) Good. (ii) Nil. (iii) Yield of cane. (iv) (a) and (b) No. (c) Nil. (v) Kheri. (vi) Nil. (vii) Pits/plot = 68 pits of 1.22m. diameter and 23cm. depth, trenches about 20cm. deep.

5. RESULTS :

(i) 80.0Q/ha. (ii) 45.9 Q/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of cane in Q/ha.

Treatment	T_1	T_2	T_3	T_4	T_5	T_6
Av. yield	649	843	874	773	896	767

C.D. = 83.5Q/ha.

Crop :- Sugarcane.**Ref :- Pb. 63(73), 64(61).****Site :- Sugarcane Sub-Stn., Kheri.****Type :- 'C'**

Object:—To study the effect of Normal and close sowing with different seed-rates on the yield of Sugarcane.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 6.3.63, 15.3.64. (iv) (a) N.A. (b) to (d) As per treatments. (e) N.A. (v) N.A. (vi) Co.-976 (Early); CoJ.-46 (Late). (vii) Irrigated. (viii) and (ix) N.A. (x) 15.12.63; 1.2.65.

2. TREATMENTS:

4 cultural treatments:—

 C_1 = Normal sowing at 61cm. apart in rows with seed-rate 74100 two budded setts/ha., C_2 = Normal sowing at 61 cm. apart in rows with seed-rate 98800 two budded setts/ha. C_3 = Close sowing at 30cm. apart between 2 rows 61cm. apart in subsequent 2 rows with seed-rate 74100 two budded setts/ha., C_4 = Close sowing at 30cm. apart between 2 rows 61cm. apart in subsequent 2 rows with seed-rate 98800 two budded setts/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 4. (iv) (a) 1/74.1 ha. (b) 1/98.8 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1963-64. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) and (vi) N.A. (vii) Error variances are homogeneous and Treatments \times Years interaction is absent.

5. RESULTS :

Pooled results :

(i) 730.5 Q/ha. (ii) 88.1 Q/ha. (based on 21 d.f. made up of Pooled error and Treatments \times Years interaction). (iii) Treatment differences are not significant. (iv) Av. yield of cane in Q/ha.

Treatment	C ₁	C ₂	C ₃	C ₄
Av. yield	750.7	730.2	703.4	737.7

Individual results :

Treatment	C ₁	C ₂	C ₃	C ₄	Sig.	G.M.	S.E./plot
Year 1963	564.9	560.2	558.5	627.7	N.S.	577.8	88.6
1964	936.5	900.2	848.3	847.8	N.S.	883.2	86.0
Pooled	750.7	730.2	703.4	737.7	N.S.	730.5	88.1

Crop :- Sugarcane.

Site :- Sugarcane Sub.-Stn., Kheri.

Ref :- Pb. 64(43), 65(80).

Type :- 'C'.

Object :- To study the effect of different methods of sowing on the yield of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 24.3.64; 22.2.65. (iv) (a) 8 to 10 ploughings. (b) to (d) As per treatments. (e) Nil. (v) N.A.; 28 Kg/ha. of P₂O₅ + 67 Kg/ha. of N as C/A/N. (vi) CoJ-46 (Late). (vii) Irrigated. (viii) and (ix) N.A. (x) 29.1.65; N.A.

2. TREATMENTS :

Same as in Expt. No. 63(26) conducted at Jullundur and presented on page no. 639.

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) 1/74.1 ha; N.A. (b) 1/98.4 ha.; 1/133 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) N.A.; Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1964-contd. (b) No. (c) Nil. (v) Jullundur. (vi) Nil. (vii) Since the expt. is continued beyond 65, therefore individual years results are presented under 5. Results.

5. RESULTS :

64(63)

(i) 520.0 Q/ha. (ii) 51.3 Q/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of cane in Q/ha.

Treatment	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	408.0	452.0	475.9	447.3	689.4	647.2

C.D. = 77.3 Q/ha

65(80)

(i) 553.4Q/ha. (ii) 142.0Q/ha (iii) Treatment differences are not significant. (iv) Av. yield of cane in Q/ha.

Treatment	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	564.3	535.0	588.8	422.5	501.3	708.7

Crop :- Sugarcane.**Ref :- Pb. 64(67), 65(76).****Site :- Sugarcane Res. Stn., Jullundur.****Type :- 'C'.****Object :-**To study the effect of different methods of sowing on the yield of Sugarcane.**1. BASAL CONDITIONS:**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 22.3.64; 9.3.65. (iv) (a) 10 ploughings. (b) to (d) As per treatments. (e) Nil. (v) N.A. (vi) CoJ-46; CoJ-46 (Late). (vii) Irrigated. (viii) N.A.; 3 hoeings. (ix) N.A. (x) 8.2.65; March, 66.

2. TREATMENTS:

4 cultural treatments :- (C₁) = Normal sowing at 60cm. apart with 75000 setts/ha., C₂ = Normal sowing at 90 cm. apart with 75000 setts/ha., C₃ = Trench sowing at 90cm. apart with 75000 setts/ha. and C₄ = Trench sowing at 90cm. apart polythene nursery sown at 40% Germination.

3. DESIGN:

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 4. (iv) (a) 1/74.1 ha.; N.A. (b) 1/197.6 ha.; 1/100 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A.; Attack of white ants and 1.24 Kg/ha. of Agallo₁ was sprayed against it. (iii) Yield of cane. (iv) 1964-contd. (b) No. (c) Nil (v) N.A. (vi) Nil. (vii) Since the expt. is contd. beyond 65, hence individual results are presented under 5. Results.

5. RESULTS:

64(67)

(i) 466.2 Q/ha. (ii) 99.1 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of cane in Q/ha.

Treatment	C ₁	C ₂	C ₃	C ₄
Av. yield	559.9	475.9	376.1	452.7

65(76)

(i) 494.0 Q/ha. (ii) 113.7 Q/ha. (iii) Treatment differences are not significant. (iv) Av yield of cane in Q/ha.

Treatment	C ₁	C ₂	C ₃	C ₄
Av. yield	508.0	474.0	512.0	481.0

Crop :- Sugarcane.**Ref :- Pb. 62(25).****Site :- Sugarcane Res. Stn., Jullundur.****Type :- 'CM'.****Object :-**To study the effect of N with and without stubble shaving and trash burning on the yield of Sugarcane.**1. BASAL CONDITIONS:**

(i) (a) N.A. (b) Sugarcane. (c) 168 Kg/ha. of N applied to plant crop. (ii) Sandy loam. (iii) N.A. (iv) (a) and (b) N.A. (c) 98800 two budded setts/ha. (d) and (e) N.A. (v) N.A. (vi) CoJ-46. (vii) Irrigated. (viii) and (ix) N.A. (x) 10.1.64.

2 TREATMENTS:

All combinations of (1), (2) and (3)

(1) 2 trash treatments : T₀ = N₀ trash burning and T₂ = Trash burning.

(2) 2 stubble treatments : S_0 =No stubble shaving, and S_1 =stubble shaving.

(3) 4 levels of N: $N_0=0$, $N_1=112$, $N_2=168$ and $N_3=224$ Kg/ha.

N was applied to the required plots in three split doses i.e. on 9.5.63, 21.5.63 and 24.6.63. Trash burning, and stubble shaving was done on 29.3.63; 8.4.63 and 17.4.63.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 16. (b) N.A. (iii) 3. (iv) (a) 4.27m. × 32.00m. (b) 4.27m. × 27.53m. (iv) 2.23 m. on either side. (vi) Yes.

4. GENERAL:

(i) Good. (ii) Endrine sprayed at 0.02% on 26.8.63 against Pysilla and whitefly on 7.9.63. (iii) Yield of cane. (iv) (a) and (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 674Q/ha. (ii) 39.4 Q/ha. (iii) Main effects of N and S are highly significant. (iv) Av. yield of cane in Q/ha.

	N_0	N_1	N_2	N_3	S_0	S_1	Mean
T_0	478	717	744	794	712	655	683
T_1	487	679	726	763	685	642	664
Mean	482	698	735	779	699	648	674
S_0	499	724	773	800			
S_1	465	673	698	758			

C.D. for N marginal means=32.8 Q/ha.

C.D for S marginal means=23.2 Q/ha.

Crop :- Sugarcane.

Ref :- Pb. 62(21), 63(19).

Site :- Sugarcane Res. Stn., Jullundur.

Type : 'CM'.

Object :—To study the effect of rotational crops and application of N on the yield of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) and (b) As per treatments. (c) N.A. (ii) Sandy loam. (iii) 22.3.62; 2/3.3.63. (iv) (a) 7 ploughings and 7 suhagas; N.A. (b) N.A. (c) 74100 two budded setts/ha; N.A. (d) and (e) N.A. (v) N.A. (vi) CoJ-46 (vii) Irrigated. (viii) 2 hocings and ridging; N.A. (ix) and (x) N.A.

2. TREATMENTS:

6 crop rotations : T_0 =Fallow-Sugarcane, T_1 =Fallow-Sugarcane, T_2 =Maize-Senji-Sugarcane, T_3 =Sann-hemp (G.M.) Sugarcane, T_4 =Chari for fodder-Sugarcane and T_5 =Guava for seed-Sugarcane.

112 Kg/ha. of N applied to each treatment except T_0 .

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) 1/44.5 ha. (b) 1/49.4 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Dusting with sulphur against red mite on 11.5.62; N.A. for others. (iii) Yield of cane. (iv) (a) 1962-63. (b) No. (c) Results of combined analysis are presented under 5. Results, (v) N.A. (vi) Nil. (vii) Error variances are homogeneous and Treatments \times Years interaction is absent.

5. RESULTS :

Pooled results :

(i) 720.5 Q/ha. (ii) 43.3 Q/ha. (based on 35 d.f. made up of Pooled error and Treatments \times Years interaction), (iii) Treatment differences are highly significant. (iv) Av. yield of cane ln Q/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅
Av. yield	587.0	756.5	744.0	764.5	676.0	795.0

C.D.=43.8 Q/ha.

Individual results :

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	Sig.	G.M.	S.E./plot
Year									
1962	616.0	767.0	767.0	771.0	694.0	793.0	**	735.0	51.5
1963	558.0	797.0	658.0	721.0	746.0	758.0	**	706.0	37.1
Pooled	587.0	756.5	744.0	764.5	676.0	795.0	**	720.5	43.3

Crop :- Sugarcane.

Ref:- Pb. 62(22), 63(25).

Site :- Sugarcane Res. Stn., Jullundur.

Type :- 'CM'

Object :- To study the effect of methods of sowing and manurings on the yield of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) Wheat-Cotton-Senji-Sugarcane. (b) Senji. (c) N.A. (ii) Sandy loam, (iii) 28.2.62, and 1.3.62; 15.3.63. (iv) (a) N.A. (b) As per treatments. (c) 74100 setts/ha. (d) As per treatments. (e) N.A. (v) As per treatments. (vi) CoJ-46. (vii) Irrigated. (viii) and (ix) N.A. (x) 14.3.63; 12.1.64 to 16.1.64.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 4 methods of sowing : S₁=61 cm. flat sowing, S₂=61cm. trench sowing., S₃=91cm. flat sowing and S₄=91cm. trench sowing.

(2) 2 levels of manuring : M₁=112.1Kg/ha. of N as C/A/N and M₂=112.1Kg/ha. of F.Y.M.+224.2Kg/ha. of N as C/A/N.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) 31.39m. \times 5.49m., N.A. (b) 27.66m. \times 5.49m.; 13.84m. \times 5.49m. (v) 186cm. on either side; N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of cane, (iv) (a) 1962-63. (b) No. (c) Results of combined analysis are presented under 5. Results, (v) N.A. (vi) Nil. (vii) Error variances are homogeneous and Treatments \times Years interaction is present.

5. RESULTS:

Pooled results

(i) 798 Q/ha. (ii) 136.1 Q/ha. (based on 7 d.f. made up of Treatments × Years in interaction) (iii) None of the effects is significant.

	S ₁	S ₂	S ₃	S ₄	Mean
M ₁	760	823	803	726	778
M ₂	799	860	833	780	818
Mean	779	841	818	753	798

Individual results :

Treatment	M ₁	M ₂	Sig.	S ₁	S ₂	S ₃	S ₄	Sig.	G.M.	S.E./plot
Year										
1962	788	846	*	801	805	831	832	N.S.	817	61.2
1963	767	790	N.S.	758	878	806	674	**	779	82.6
Pooled	778	818	N.S.	779	841	818	753	N.S.	798	136.1

Crop :- Sugarcane.

Ref :- Pb. 63(20).

Site : Sugarcane Res. Stn., Jullundur.

Type : 'CM'.

Object :—To study the effect of methods of sowing and manurings on the yield of Sugarcane (Ratoon trial).

1. BASAL CONDITIONS :

(i) Ratoon of 62(22). (ii) Sandy loam, (iii) 14/15.3.63. Ratoon of 62(22). (iv) (a) and (b) N.A. (c) 74100 two budded setts/ha. (d) and (e) N.A. (v) As per treatments. (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) 13.3.63 to 16.3.64.

2. TREATMENTS :

Same as in expt. no. 62(22), 63(25) presented on page No. 643.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) 31.39m. × 5.49m. (b) 27.66m. × 5.49m. (v) 186cm. on either side. (vi) Yes.

4. GENERAL :

(i) Good. (ii) N.A. (iii) Yield of cane. (iv) (a) 1963-only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 195Q/ha. (ii) 86.1 Q/ha. (iii) Main effect of M alone is significant. (iv) Av. yield of cane in Q/ha.

	S ₁	S ₂	S ₃	S ₄	Mean
M ₁	1058	914	951	997	980
M ₂	1046	969	1095	1088	1049
Mean	1052	942	1023	1042	1015

C.D. for M marginal means=63.2 Q/ha.

Crop :- Sugarcane (Kharif).

Ref :- Pb. 62(26).

Site :- Sugarcane Res. Stn., Jullundur.

Type :- 'IMV'.

Object :- To study the effects of different levels of N with different irrigational intervals on the different varieties of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 18.3.62. (iv) (a) to (e) N.A. (v) Nil. (vi) As per treatments. (vii) Irrigated. (viii) and (ix) N.A. (x) Mid of Dec., 62.

2. TREATMENTS:

Main-plot treatments :

3 varieties : V₁=CoJ-39, V₂=CoJ-46, and V₃=Co-976.

Sub-plot treatments :

3 intervals of irrigation : I₁=15, I₂=10 and I₃=5 days.

Sub-Sub-plot treatments :

3 levels of N : N₀=0, N₁=112 and N₂=224 Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication; 3 sub-plots/main-plot and 3 sub-sub-plots/sub-plot. (b) N.A. (iii) 3. (iv) (a) 1/87.0 ha. (b) 1/98.8 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Good. (ii) Nil. (iii) Yield of cane. (iv) (a) N.A. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 712 Q/ha. (ii) (a) 162.2 Q/ha. (b) 87.1 Q/ha. (c) 115.6 Q/ha. (iii) Main effect of V is significant and that of I and N are highly significant. (iv) Av. yield of cane in Q/ha.

	N ₀	N ₁	N ₂	I ₁	I ₂	I ₃	Mean
V ₁	571	768	848	666	754	766	729
V ₂	515	626	715	574	623	659	619
V ₃	658	798	908	718	770	876	788
Mean	581	731	824	653	716	767	712
I ₁	558	669	731				
I ₂	603	718	826				
I ₃	582	805	914				

C.D. for V marginal means=122.5 Q/ha.

C.D. for I marginal means=51.6 Q/ha.

C.D. for N marginal means=63.8 Q/ha.

Cop :- Sugarcane.

Ref :- Pb. 64(65).

Site :- Sugarcane Sub-Stn., Kheri.

Type :- 'IC'.

Object:—To study the effect of irrigations on the different trash coverings of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 3.4.64. (iv) (a) N.A. (b) to (d) As per treatments. (e) N.A. (v) N.A. (vi) CoJ-46. (vii) Irrigated. (viii) and (ix) N.A. (x) 16.1.65.

2. TREATMENTS :

Main-plot treatments:

2 intervals of irrigation: $I_1=10$ and $I_2=20$ days.

Sub-plot treatments :

8 cultural treatments :- $C_1=74100$ setts/ha. without trash cover, $C_2=49400$ setts/ha. with out trash cover, $C_3=74100$ setts/ha. 8cm. thick chopped trash cover, $C_4=49400$ setts/ha. with 8cm. thick chopped trash cover, $C_5=74100$ setts/ha. with 8 cm. thick unchopped trash cover, $C_6=49400$ setts/ha. with 8 cm. thick unchopped trash cover. $C_7=74100$ setts/ha. with 61 cm. thick apart (Normal sowing) and $C_8=74100$ setts/ha. 91 cm. apart (Normal sowing),Note:—In treatments C_1 to C_6 , shallow trench sowing at 91cm. apart, 15cm. deep and 22cm. covered by earth was done.

3. DESIGN :

(i) Split-plot. (ii) (a) 2 main-plots/replication, 8 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) 1/274 ha. (b) 1/198 ha. (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1964-only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 406.6 Q/ha. (ii) (a) 182.3 Q/ha. (b) 93.7 Q/ha. (iii) Main effects of I and C are significant. Interaction $I \times C$ is significant. (iv) Av. yield of cane in Q/ha.

	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	Mean
I_1	429.0	404.3	472.5	305.4	427.5	334.1	507.6	562.4	430.3
I_2	360.8	315.3	408.2	381.5	355.8	306.9	473.9	460.6	382.9
Mean	394.9	359.8	440.3	343.5	391.7	320.5	490.7	511.5	406.6

C.D. for I marginal means=145.1 Q/ha.

C.D. for C marginal means=95.4 Q/ha.

C.D. for C means at the same level of I=133.8 Q/ha.

C.D. for I means at the same level of of C=192.3 Q/ha.

T₃—Copper Sul. at 1.24 Kg/ha., T₄—Zinc Sul. at 2.47 Kg/ha., T₅—Ferrous Sul. at 6.18 Kg/ha. and T₆—Ammonium Molybdate at 0.62 Kg/ha.

Treatments applied as foliar spray.

3. DESIGN :

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 6. (iv) (a) 1/197.7 ha.; N.A.; 8.15m. × 3.00m. (b) 1/247.1 ha.; 6.40m. × 1.83m.; 7.20m. × 1.80m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Satisfactory. (ii) 0.02% Sol. of Endrine sprayed. (iii) Yield of kapas. (iv) (a) 1963-contd. (b) No. (c) Nil. (v) N.A. (vi) Nil. (vii) Since the expt. is contd. beyond 65, individual years results are presented below.

5. RESULTS

63 (38)

(i) 901 Kg/ha. (ii) 173.0 Kg/ha. (iii) Treatment differences are not significant (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	856	888	972	987	931	849	825

64 (40)

(i) 718 Kg/ha. (ii) 173.7 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	626	639	674	742	977	597	770

65 (57)

(i) 971 Kg/ha. (ii) 129.0 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	889	931	885	965	1206	859	1061

Crop :- Cotton (Kharif).

Ref :- Pb. 63 (39), 64(41), 65(58).

Site :- Cotton Res. Stn., Abohar.

Type :- 'M'.

Object :- To study the effect of soil application of micronutrients on the yield of Cotton.

1. BASAL CONDITIONS :

(ii) (a) to (c) N.A. (ii) Sandy loam. 18.4.63; 6.5.64; 17.4.65. (iv) (a) 3 ploughings. (b) to (d) N.A. (e) — (v) 74.1 Kg/ha. of N as A/S; Nil; 50Kg/ha. of P₂O₅ as Super+50 Kg/ha. of K₂O. (vi) 320-F. (vii) Irrigated. (viii) Interculture, hoeing and weeding. (ix) N.A. (x) 3 pickings in Nov. and Dec. : 12.11.65 and 12.12.65.

2. TREATMENTS :

7 micronutrient treatments : T₀—Control, T₁—11.2 Kg/ha. of Borax, T₂—22.4 Kg/ha. of Manganese Sul., T₃—11.2 Kg/ha. of Copper Sul., T₄—22.4 Kg/ha. of Zinc Sul., T₅—22.4 Kg/ha. of Ferrous Sul. and T₆—1.12 Kg/ha. of Ammonium molybdate.

Treatments were applied to soil before irrigation.

3. DESIGN:

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 6. (iv) (a) 10.97m. × 4.27m.; N.A. 8.10m. × 3.00m. (b) 10.06m. × 3.05m.; 6.40m. × 1.83m.; 7.20m. × 1.80m. (v) 45cm. × 61cm.; N.A.; 45cm. × 60cm. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil, for 63 and 64. Jassids attack and 2 aerial spray of 0.02% Sol of Endrine. (iii) Yield of kapas (iv) (a) 1963—Contd. (b) No. (c) Nil. (v) Gurdaspur. (vi) Nil. (vii) In 1964 the land was too sandy and very little manure was given. (viii) Since the expt. is contd. beyond 65, individual years results are presented under 5. Results.

5. RESULTS:

63 (39)

(i) 1133 Kg/ha. (ii) 226.0 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	1120	976	1266	1165	1180	1162	1061

64 (41)

(i) 509 Kg/ha. (ii) 204.2 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	468	356	436	562	665	513	560

65 (58)

(i) 1244 Kg/ha. (ii) 246.0 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	1156	1337	1215	1080	1429	1309	1200

Crop :- Cotton. (Kharif).

Ref :- Pb. 63(54), 64(44), 65(56).

Site :- Cotton Res. Stn., Abohar.

Type :- 'M'.

Object :—To find out the best method of fertiliser placement for Cotton.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 23.5.63. 7.5.64; 17.5.65. (iv) (a) 3 to 5 ploughings. (b) to (e) N.A. (v) Nil. (vi) F-320. (vii) Irrigated. (viii) Hoeing and interculturing. (ix) N.A. (x) End of Nov., 63; 9.11.64 and 2.12.64; 13.11.65 and 12.12.65.

2. TREATMENTS

10 methods of application of fertilizers: T₀=Control, T₁=A week before sowing 12cm. deep, T₂=By S.C.f. drill in the same line, the seed in the one bowl and fertilizers in the other, T₃=By S.C.f. drill to drop the fertilizers 4cm. deeper than the seed, T₄=Fertilizers 10cm. deep and 5cm. away from seed line, T₅=By broadcast before last ploughing at sowing, T₆=By broadcast at final thinning, T₇=By broadcast at flowering, T₈=By top dressing at final thinning and T₉=By top dressing at flowering.

Fertilizers applied at 60 Kg/ha. of N+40 Kg/ha. of P₂O₅.

3. DESIGN:

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) 1/197 ha.; N.A.; 8.10 m.×3.00m. (b) 1/247 ha.; 6.40m.×1.83m.; 7.20m.×1.80m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Aerial spray of 0.02% sol. of Endrine. (iii) Yield of kapas (iv) (a) 1963-contd. (b) No. (c) Nil. (v) Jullundur and Ludhiana. (vi) Nil. (vii) Since the expt. is contd. beyond 65, individual years results are presented under 5. Results.

Crop :- Sugarcane.

Ref :- Pb. 64(66),65(82).

Site :- Sugarcane Sub-Stn., Kheri.

Type :- 'D'.

Object:—To study the effect of methods of sowing with the application of Agallol on the yield of Sugarcane.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 8.3.64; 24.2.65 (iv) (a) 8 to 10 ploughings. (b) As per treatments. (c) 86450 setts/ha.; 87500 setts/ha. (d) N.A. (e) Nil. (v) N.A. (vi) CoL-29. (vii) Irrigated. (viii) and (ix) N.A. (x) 3.1.65; N.A.

2. TREATMENTS:

Main-plot treatments:

2 Agallol applications:—A₀=Untreated setts and A₁=Setts treated with Agallol and sown.

Sub-plot treatments:

7 cultural treatments:—C₁=2 budded setts normal sowing, C₂=3 budded setts normal sowing, C₃=3 budded setts-2 buds up and 1 down, C₄=3 budded setts 1 bud up and 2 down, C₅=3 budded setts side way, C₆=2 budded setts 1 up and 1 down and C₇=2 budded setts side-way.

3. DESIGN:

(i) Split-plot. (ii) (a) 2 main-plots/replication, 7 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) 1/148 ha.; N.A. (b) 1/198 ha.; 1/538 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of cane. (vi) (a) 1964-contd. (b) No. (c) Nil. (v) Gurdaspur. (vi) Nil. (vii) Since the expt. is contd. beyond 65, hence individual years results are presented under 5. Results.

5. RESULTS:

64(66)

(i) 387.1 Q/ha. (ii) (a) 117.0 Q/ha. (b) 79.8 Q/ha. (iii) Main effect of C alone is significant. (iv) Av. yield of cane in Q/ha.

	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	Mean
A ₀	335.6	388.0	412.7	462.6	366.2	317.3	320.2	371.8
A ₁	366.2	431.9	443.8	440.8	436.9	358.3	338.5	402.3
Mean	350.9	410.0	428.2	451.7	401.5	337.8	329.4	387.1

C.D. for C marginal means=81.2 Q/ha.

65(82)

(i) 395.7 Q/ha. (ii) (a) 184.9 Q/ha. (b) 148.1 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of cane in Q/ha.

	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	Mean
A ₀	329.5	433.1	362.1	490.9	309.4	348.4	417.0	384.3
A ₁	329.5	336.3	661.7	349.7	437.1	312.0	423.6	407.1
Mean	329.5	384.7	511.9	420.3	373.3	330.2	420.3	395.7

Crop :- Cotton (Kharif).

Ref :- Pb. 62(45).

District :- Cotton Res. Stn., Abohar.

Type :- 'M'.

Object :-To find the optimum time of application of N on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 3.5.62. (iv) (a) 4 to 5 ploughings. (b) to (e) N.A. (v) Nil. (vi) 320-F. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) Nov. and Dec., 62.

2. TREATMENTS :

All combinations of (1) and (2)+Control (two plots).

(1) 2 levels of N: $N_1=56$ and $N_2=112$ Kg/ha.

(2) 6 times of application of N:— T_1 =Full dose at sowing, T_2 =Full dose at thinning, T_3 =Full dose at flowering, T_4 = $\frac{1}{2}$ dose at sowing and $\frac{1}{2}$ dose at thinning, T_5 = $\frac{1}{2}$ dose at sowing+ $\frac{1}{2}$ dose at flowering and T_6 = $\frac{1}{2}$ dose at thinning+ $\frac{1}{2}$ dose at flowering.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 14. (b) N.A. (iii) 3. (iv) (a) 6'10m. \times 3'05m. (b) 5'47m. \times 1'83m. (v) 30cm. \times 61cm. (vi) Yes.

4. GENERAL :

(i) Satis factory. (ii) Nil. (iii) Yield of kapas. (iv) (a) 1962-only. (b) No. (c) Nil. (v) (a) and (b) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 911 Kg/ha. (ii) 345.8 Kg/ha. (iii) Interaction $T \times N$ is highly significant. (iv) Av. yield of kapas in Kg/ha.

Control=869 Kg/ha.

	T_1	T_2	T_3	T_4	T_5	T_6	Mean
N_1	1000	372	435	934	1183	940	811
N_2	399	1332	1162	748	1415	1096	1025
Mean	700	852	798	841	1299	1018	918

C.D. for the body of table=410.6 Kg/ha.

Crop :- Cotton (Kharif).

Ref :-Pb :- 63(38), 64(40), 65(57).

Site :-Cotton Res. Stn., Abohar.

Type :- 'M'.

Object :-To study the effect of spray of micronutrients on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 18.4.63; 6.5.64; 17.4.65. (iv) (a) 3 ploughings. (b) N.A. (c) 28 Kg/ha. (d) N.A. (e) — (v) Nil. (vi) F-320. (vii) Irrigated. (viii) Hoeing and weeding. (ix) N.A. (x) 3 pickings in Nov. and Dec.

2. TREATMENTS :

7 micronutrient treatments:— T_0 =Control, T_1 =Borax at 0.62 Kg/ha., T_2 =Manganese Sul. at 2.47 Kg/ha.

Crop :- Sugarcane.**Ref :- Pb. 61(82).****Site :- Sugarcane Sub-Stn., Gurdaspur.****Type :- 'ICV'.**

Object :- To study the behaviour of two important varieties grown under liberal and restricted levels of irrigation during pre-monsoon period i.e. from May to June.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Senji. (c) Nil (ii) Loamy soil. (iii) 31.3.61. (iv) (a) 4 ploughings, 4 suhagas. (b) N.A. (c) 88974 two budded setts/ha. (d) N.A. (e) 1. (v) Nil. (vi) As per treatments. (vii) Irrigated. (viii) 1 hoeing, (ix) 122 cm. (x) 17.3.62.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 2 varieties :- $V_1 = \text{Co-312}$ and $V_2 = \text{Co-453}$.

(2) 4 Irrigational intervals :- $I_1 = 7$ days without trash mulch, $I_2 = 7$ days with mulch, $I_3 = 21$ days with mulch and $I_4 = 35$ days with mulch.

112 Kg/ha. of N was applied in two equal doses at sowing time and July by top dressing.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 8, (b) N.A. (iii) 4. (iv) (a) 21'95m. x 2'44m, (b) 1/198 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1960-only (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 692.1 Q/ha. (ii) 44.2 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of cane in Q/ha.

	I_1	I_2	I_3	I_4	Mean
V_1	695.9	720.3	650.3	689.9	689.1
V_2	661.8	730.0	701.4	687.6	695.2
Mean	678.8	725.1	675.8	688.7	692.1

Crop :- Sugarcane.**Ref :- Pb. 64(195).****Site :- Sugarcane Sub-Stn., Gurdaspur.****Type :- 'D'.**

Object :- To study the effect of different methods of sowing with Agallol on the yield of Sugarcane.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) Senji. (c) N.A. (ii) Loamy. (iii) 16.3.64. (iv) (a) 4 ploughings, 4 suhagas. (b) to (d) N.A. (e) 1. (v) 785 Kg/ha. of N as C/A/N applied in 2 equal doses on 23.5.64 and 6.7.64. (vi) N.A. (vii) Irrigated. (viii) 6 hoeings. (ix) 87cm, (x) 22.1.65.

2. TREATMENTS :

Main-plot treatments :

2 seed-treatments : $A_0 = \text{Setts untreated}$ and $A_1 = \text{Treated with Agallol}$. were planted.

Sub-plot treatments :

7 cultural treatments : $C_1 = 2$ budded setts normally planted, $C_2 = 3$ budded setts normally planted, $C_3 = 3$ budded setts, 2 planted upward and 1 downward, $C_4 = 3$ budded setts, 1 planted upward and 2 downward, $C_5 = 3$ budded setts planted side ways, $C_6 = 2$ budded setts planted 1 upward and 1 downward and $C_7 = 2$ budded setts planted side ways.

3. DESIGN :

(i) Split-plot. (ii) (a) 2 main-plots/replication, 7 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) 1.83m. x 9.14m (b) 1.83m. x 8.50m. (v) 32cm. on either side of the plot, (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) 1964—only. (b) No. (c) Nil. (v) Kheri. (vi) N.A. (vii) Nil.

5. RESULTS :

(i) 912.3 Q/ha. (ii) (a) 288.1 Q/ha., (b) 104.3 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of cane in Q/ha.

	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	Mean
A ₀	751.9	899.7	1052.3	902.9	968.8	872.4	878.8	903.8
A ₁	885.2	885.2	935.0	975.2	910.9	938.2	915.8	920.8
Mean	818.6	892.4	993.6	939.1	939.8	905.3	897.3	912.3

Crop :- Sugarcane.

Ref. :- Pb. 64(62).

Site :- Sugarcane Sub-Stn., Kheri.

Type :- 'D'.

Object :- To study the effect of different chemicals on the germination of Sugarcane.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 30.3.64. (iv) (a) 6 to 8 ploughings. (b) N.A. (c) 98 setts/row. (d) 61cm. apart. (e) N.A. (v) N.A. (vi) CoJ-46. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 10.1.65.

2. TREATMENTS:

8 chemical treatments : T₀=Control, T₁=7.6 Kg/ha. (3% mercury) of Aexason, T₂=3.8 Kg/ha. (3% mercury) of Aexason, T₃=3.8 Kg/ha. (6% mercury) of Aexason, T₄=1.9 Kg/ha. (6% mercury) of Tofsan, T₅=3.8 Kg/ha. (6% mercury) of Aresan, T₆=1.9 Kg/ha. (6% mercury) of Aresan and T₇=3.8 Kg/ha. (3% mercury) of Agallol.

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) 1/148 ha. (b) 1/198 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of cane. (iv) (a) and (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 480.8 Q/ha. (ii) 86.5 Q/ha. (iii) Treatment differences are not significant.. (iv) Av. yield of cane in Q/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇
Av. yield	501.6	444.8	421.1	494.7	479.9	521.9	499.6	482.8

5. RESULTS :

63 (54)

(i) 423 Kg/ha. (ii) 125.0 Kg/ha. (iii) Treatment differences are significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	463	331	294	392	636	404	425	349	488	446

C.D. = 181.3 Kg/ha.

64 (44)

(i) 473 Kg/ha. (ii) 145.2 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	534	528	351	508	487	538	438	431	331	587

65 (56)

(i) 1149 Kg/ha. (ii) 233.8 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	654	1196	745	1346	1466	1177	1229	1082	1318	1281

C.D. = 339.2 Kg/ha.

Crop :- Cotton (Kharif).

Ref. :- Pb 63(55), 65(52).

Site : Cotton Res. Stn., Abohar.

Type :- 'M'.

Object :—To work out the critical level of N, P and K in plant system at different fertility levels and to work out the optimum ratio among three manures.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 25.4.63; 14.4.65. (iv) (a) 3 to 5 ploughings. (b) to (e) N.A. (v) 124Q/ha. of F.Y.M. (vi) F-320 (vii) Irrigated. (viii) 2 thinnings and interculturings; 2 hoeings. (ix) N.A. (x) Nov. and Dec., 63; 7.11.65 and 13.12.65.

2. TREATMENTS :

All combinations of (1), (2) and (3)

(i) 3 levels of N as C/A/N : N₀=0, N₁=60 and N₂=120 Kg/ha.

(2) 2 levels of P₂O₅ as Super: P₀=0 and P₁=60 Kg/ha.

(3) 2 levels of K₂O as Mur. pot : K₀=0 and K₁=60 Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) 4.88m. × 10.97m. (b) 1.83m. × 10.97m. (v) 1.52m. on either side. (vi) Yes.

4. GENERAL :

(i) Good. (ii) Nil. (iii) Yield of kapas. (iv) (a) 1963-contd. (64 failed). (b) No. (c) Nil. (v) N.A. (vi) Nil. (vii) Since the expt. is contd. beyond 65, individual years results are presented below.

5. RESULTS :

63 (55)

(i) 717 Kg/ha. (ii) 229.0 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	Mean
K ₀	569	787	862	723	756	739
K ₁	708	703	673	661	728	695
Mean	638	745	767	692	742	717
P ₀	677	676	723			
P ₁	600	814	812			

65 (52)

(i) 1254 Kg/ha. (ii) 236.0 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of kapas in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	Mean
K ₀	878	1344	1555	1228	1290	1259
K ₁	762	1378	1610	1185	1315	1250
Mean	820	1361	1582	1207	1302	1254
P ₀	766	1291	1562			
P ₁	873	1431	1602			

C.D. for N marginal means = 118.1 Kg/ha.

Crop :- Cotton (Kharif).

Ref :- Pb. 62(215).

Site :- Agri. Res, Stn., Gurdaspur.

Type :- 'M'

Object :- To study the effect of different times of application of N on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 18.4.62. (iv) (a) 5 ploughings. (b) to (e) N.A. (v) N.A. (vi) R.-231. (vii) Irrigated. (viii) 2 weedings. (ix) N.A. (x) 15.9.62. to 25.10.62.

2. TREATMENTS:

All combinations of (1) and (2)+control (2 plots)

(1) 2 levels of N as C/A/N : N₁=56 and N₂=112 Kg/ha.

(2) 6 times of application : T₁=Full dose at sowing, T₂=Full dose at thinning., T₃=Full dose at flowering, T₄= $\frac{1}{2}$ dose at sowing+ $\frac{1}{2}$ dose at thinning. T₅= $\frac{1}{2}$ at sowing + $\frac{1}{2}$ dose at flowering and T₆= $\frac{1}{2}$ dose at thinning + $\frac{1}{2}$ dose at flowering.

3. DESIGN :

(i) Fact. in R. B. D. (ii) (a) 14. (b) N.A. (iii) 2. (iv) (a) N.A. (b) 1/494.2 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of kapas. (iv) (a) and (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 647 Kg/ha. (ii) 111.2 Kg/ha. (iii) Main effect of T alone is highly significant. (iv) Av. yield of kapas in Kg/ha.

Control=542 Kg/ha.

	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	Mean
N ₁	427	623	635	798	825	578	648
N ₂	423	623	670	840	922	608	681
Mean	425	623	652	819	874	593	664

C.D. for T marginal means=168.6 Kg/ha.

Croe :- Cotton.

Ref :- Pb. 62 (217).

Site :- Agri. Res. Stn., Gurdaspur.

Type :- 'M'.

Object :- To study the effect of different levels of N on the yield of Cotton.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) Cotton. (c) N.A. (ii) Heavy loam. (iii) 21.4.62. (iv) (a) 6 ploughings. (b) to (e) N.A. (v) N.A. (vi) R-231. (vii) Irrigated. (viii) 4 weedings. (ix) N.A. (x) 20.9.62 to 17.12.62.

2. TREATMENTS:

3 levels of N as C/A/N : N₀=0, N₁=62 and N₂=123 Kg/ha.

3. DESIGN:

(i) R.B.D. (ii) (a) 3. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/213 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of kapas. (iv) (a) and (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 767 Kg/ha. (ii) 114.0 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha

Treatment	N ₀	N ₁	N ₂
Av. yield	688	817	795

Crop :- Cotton (*Kharif*).

Ref :- Pb. 62 (212), 63(171), 64(164).

Site :- Agri. Res. Stn., Gurdaspur.

Type :- 'M'.

Object :—To study the effect of different levels of N, P and K alone and in combination on the yield of Cotton.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) Cotton. (c) N.A. (ii) Loamy soil for 62; heavy loam for others. (iii) 8.5.62; 29.4.63; 13.4.64. (iv) (a) 5 ploughings. (b) to (e) N.A. (v) Nil. (vi) R-231. (vii) Irrigated. (viii) 4 weedings. (ix) N.A. (x) 13.10.62 to 7.12.62; 19.9.63 to 17.12.63; 22.9.64. to 27.11.64.

2. TREATMENTS:

All combinations of (1), (2) and (3)

(1) 3 levels of N : $N_0=0, N_1=60$ and $N_2=120$ Kg/ha.

(2) 2 levels of P_2O_5 : $P_0=0$ and $P_1=60$ Kg/ha.

(3) 2 levels of K_2O : $K_0=0$ and $K_1=60$ Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 8 for 62; 4 for others. (iv) N.A.; 1/123 ha.; 11.89m. \times 5.49m. (b) 1/494 ha.; 1/247 ha., 10.67m. \times 3.05m. (v) N.A. for 62 and 63; 61cm. \times 122cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) 10% B.H.C. against toka was sprayed. (iii) Yield of kapas. (iv) (a) 1962 to 64. (b) No. (c) Nil. (v) N.A. (vi) Nil. (vii) Since the error variances are heterogeneous and varying no. of replications individual years results are presented under 5. Results.

5. RESULTS :

62 (212)

(i) 423 Kg/ha. (ii) 79.8 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of kapas in Kg/ha.

	N_0	N_1	N_2	K_0	K_1	Mean
P_0	368	446	482	435	429	432
P_1	342	460	440	397	431	414
Mean	355	453	461	416	430	423
K_0	361	424	463			
K_1	349	482	459			

C.D. for N marginal means = 39.8 Kg/ha.

63 (171)

(i) 658 Kg/ha. (ii) 109.9 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of kapas in Kg/ha.

	N_0	N_1	N_2	K_0	K_1	Mean
P_0	535	696	752	659	663	661
P_1	487	706	772	617	693	655
Mean	511	701	762	638	678	658
K_0	509	685	720			
K_1	513	717	804			

C.D. for N marginal means = 79.1 Kg/ha.

64 (164)

(i) 218 Kg/ha. (ii) 58.7 Kg/ha, (iii) Main effect of K alone is highly significant, (iv) Av. yield of kapas in Kg/ha,

	N ₀	N ₁	N ₂	K ₀	K ₁	Mean
P ₀	242	234	196	178	261	224
	188	240	208	203	221	212
Mean	216	237	202	159	241	218
K ₀	185	210	190			
K ₁	245	264	214			

C.D. for K marginal means=34.5 Kg/ha.

Crop :- Cotton (Kharif).

Ref :- Pb. 63(168), 64(161).

Site :- Agri. Res. Stn., Gurdaspur.

Type :- 'M'.

Object :- To study the effect of different micronutrients on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Cotton. (c) N.A. (ii) Sandy loam. (iii) 23.4.63; 6.5.64. (iv) (a) 6 to 7 ploughings. (b) to (e) N.A. (v) 62 Kg/ha. of N at sowing; 92.6 Kg/ha. of N as C/A/N. (vi) R-231. (vii) Irrigated. (viii) 4. weedings, (ix) N.A. (x) 20.9.63 to 17.12.63; 15.9.64. to 26.10.64.

2. TREATMENTS

Same as in expt. no. 63(39), 64 (41), 65(58) conducted at Abohar on page No.651.

3. DESIGN :

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 6. (iv) (a) 12'80m.×3'05m. (b) 11'58m.×1'83m. (v) 61cm.×61cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) 10% B.H.C. sprayed against tika attacked by jassids, Endrine sprayed (iii) Yield of kapas. (iv) (a) 1963-64. (b) No. (c) Results of combined analysis are given under 5. Results (v) Abohar. (vi) Nil. (vii) Error variances are homogeneous and Treatments×Years interaction is absent.

5. RESULTS :

Pooled results

(i) 572 Kg/ha. (ii) 101.5 Kg/ha. (based on 66 d.f. made up of Treatments×Years interaction and Pooled error) (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	580	576	562	578	568	584	556

Individual results

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	Sig.	G.M.	S.E./plot
Year 1963	744	731	702	727	724	724	771	N.S.	732	104.9
1964	417	421	421	429	413	445	342	N.S.	413	100.6
Pooled	580	576	562	578	568	584	556	N.S.	572	101.5

Crop :- Cotton (*Kharif*).

Ref :- Pb. 63(173), 64(160),

Site :- Agri. Res. Stn., Gurdaspur .

Type :- 'M'.

Object :- To study the effect of different methods of fertilizer placement on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Cotton. (c) N.A. (ii) Sandy loam. (iii) 21.4.63; 29.4. 64. (iv) (a) 6 to 7 ploughings. (b) to (e) N.A. (v) N.A. (vi) R-231. (vii) Irrigated (viii) 4 weedings. (ix) N.A. (x) 20.9.63 to 17.12.63, 15.9.64 to 11.11.64.

2. TREATMENTS :

Same as in expt. no. 63(54), 64(44), 65(56) conducted at Abohar on page No. 652.

3. DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) 1/197 ha.; 11.89m. x 3.66m. (b) 1/247 ha.; 10.76m. x 2.44m. (v) N.A.; 61cm. x 16cm. (vi) Yes.

4. GENERAL:

(i) Normal (ii) 10% B.H.C. sprayed against tika; Attacked by jassids and endrine sprayed. (iii) Yield of kapas. (iv) (a) 1963-contd (crop failed in 65.) (b) No. (c) Nil. (v) Abohar. (vi) Nil. (vii) Since the expt. is contd. beyond 65, individual years results are presented under 5. Results.

5. RESULTS:

63(173)

(i) 428 Kg/ha. (ii) 74.1 Kg/ha. (iii) Treatment differences are significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	426	447	371	355	374	490	537	433	476	369

C.D.—107.5 Kg/ha.

64(160)

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	519	461	360	519	384	529	660	519	454	488

Crop :- Cotton (Kharif).**Ref :- Pb. 62(213).****Site :- Agri. Res. Stn., Jullundur.****Type :- 'M'.****Object :-**To study the effect of different levels of N, P and K on the yield of Cotton.**1. BASAL CONDITIONS:**

(i) (a) N.A. (b) Cotton. (c) N.A. (ii) Clay loam. (iii) 10.4.62. (iv) 5 ploughings. (b) to (e) N.A. (v) N.A. (vi) F-320. (vii) Irrigated. (viii) 3 weedings. (ix) N.A. (x) 25.10.62 to 10.12.62.

2. TREATMENTS:

All combinations of (1), (2) and (3)

(1) 3 levels of N : $N_0=0$ $N_1=60$, and $N_2=120$ Kg/ha.(2) 2 levels of P_2O_5 : $P_0=0$ and $P_1=60$ Kg/ha.(3) 2 levels of K_2O : $K_0=0$ and $K_1=60$ Kg/ha.

Manures were applied at the time of sowing with the last cultural operation.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 8. (iv) (a) N.A. (b) 1/398 ha. (v) N.A. (vi) Yes.

4. GENERAL

(i) Normal. (ii) Attacked by jassids; endrine sprayed. (iii) Yield of kapas. (iv) (a) and (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 852 Kg/ha. (ii) 154.0 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of kapas in Kg/ha.

	N_0	N_1	N_2	K_0	K_1	Mean
P_0	929	780	812	834	847	840
P_1	949	869	772	862	865	863
Mean	939	824	792	848	856	852
K_0	960	798	786			
K_1	918	851	798			

C.D. for N marginal means = 76.7 Kg/ha.

Crop :- Cotton. (Kharif).**Ref :- Pb. 62(216).****Site :- Agri. Res. Stn., Jullundur,****Type :- 'M'.****Object :-**To study the effect of different doses of N on the yield of Cotton.**1. BASAL CONDITIONS:**

(i) (a) N.A. (b) Cotton. (c) N.A. (ii) Clay loam. (iii) 18.4.62. (iv) (a) 5 ploughings. (b) to (e) N.A. (v) Nil. (vi) F-320. (vii) Irrigated. (viii) 3 weedings. (ix) N.A. (x) 30.10.62 to 17.12.62.

2. TREATMENTS :

3 levels of N as C/A/N : $N_0=0$, $N_1=50$. and $N_2=100$ Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 3. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/429 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Attacked by jassids. endrine sprayed (iii) Yield of kapas. (iv) (a) and (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 1121 Kg/ha. (ii) 137.4 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	N_0	N_1	N_2
Av. yield	1098	1173	1092

Crop :- Cotton. (Kharif).

Ref :- Pb. 62(226).

Site :- Agri. Res., Stn, Jullundur.

Type :- 'M'.

Object :- To study the effect of different sources of N on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 25.4.62. (iv) (a) 5 ploughings. (b) to (e) N.A. (v) N.A. (vi) F-320. (vii) Irrigated. (viii) 5 weedings. (ix) N.A. (x) 18.10.62 to 7.11.62.

2. TREATMENTS :

4 sources of 44.8 Kg/ha. of N : S_0 =Control, S_1 =F.Y.M., S_2 =A/S and S_3 =Amm. phos.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) Refer 4. General (vii) (iv) (a) N.A. (b) 1/12.4 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of kapas. (iv) (a) 1960-62. (b) No. (c) Nil. (v) and (vi) Nil. (vii) This expt. has been continued for 3 years vs. 1960-61, 1961-62, 1962-63 and each year has been considered as a replication for analysis.

5. RESULTS :

(i) 579 Kg/ha. (ii) 192 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	S_0	S_1	S_2	S_3
Av. yield	437	582	580	717

C.D.=38.4 Kg/ha.

Crop :- Cotton. (Kharif).**Ref :- Pb. 63(1).****Site :- Agri. Res. Stn., Jullundur.****Type :- 'M'****Object :—To study the effect of G.M. and P on the yield of Cotton.****1. BASAL CONDITIONS:**

(i) and (ii) N.A. (iii) 12.5.63. (iv) (a) and (b) N.A. (c) 21 Kg/ha. (d) and (e) N.A. (v) N.A. (vi) F-320. (vii) Irrigated. (viii) and (ix) No. (x) 15.10.63 to 18.11.63.

2. TREATMENTS:3 manurial treatments : N_0 =Control, N_1 =G.M.+44.8 Kg/ha. of P_2O_5 and N_2 =G.M.**3. DESIGN**

(i) R.B.D. (ii) (a) 3. (b) N.A. (iii) 2. (iv) (a) N.A. (b) 1/19.8 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Satisfactory. (ii) N.A. (iii) Yield of kapas. (iv) (a) and (b) No. (c) Nil. (v) Nil. (vi) No. (vii) Nil.

5. RESULTS:

(i) 295 Kg/ha. (ii) 76.4 Kg/ha (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	N_0	N_1	N_2
Av. yield	315	328	242.

Crop :- Cotton. (Kharif).**Ref :- Pb.65(26).****Site :- Agri. Res. Stn., Jullundur.****Type :- 'M'.****Object :—To find out the best method of fertilizer placement on the yield of Cotton.****1. BASAL CONDITIONS :**

(i) (a) Nil. (b) Barley. (c) No. (ii) Sandy loam. (iii) 1.6.65. (iv) (a) 4 ploughings. (b) to (e) No. (v) Nil. (vi) F-320. (vii) Irrigated. (viii) and (ix) N.A. (x) 3 pickings from 14.10.65 to 28.12.65.

2. TREATMENTS:10 methods of application of fertilizers : T_0 =Control, T_1 =A week before sowing, 12cm. deep, T_2 =seed and fertilizer on same line and level, T_3 =Fertilizer in the same line but 4 cm. deeper than seed, T_4 =Fertilizer 10cm. deep and 5 cm. away from seed line, T_5 =Broad cast before last ploughing at sowing, T_6 =Broad cast at final thinning, T_7 =Broad casted at flowering, T_8 =As top dressing at final thinning, and T_9 =As top dressing at flowering.Fertiliser applied at 60Kg/ha of N + 40Kg/ha. of P_2O_5 **3. DESIGN:**

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) 8.23m. x 4.88m. (b) 20 Sq.m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Endrine sprayed against jassid Aphid attack. (iv) Yield of kapas. (a) 1965-contd. (b) No. (c) Nil. (v) Hissar. Abohar. Ludhiana. (vi) and (vii) Nil.

5. RESULTS :

(i) 354Kg/ha. (ii) 270 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	262	289	430	436	309	366	407	297	402	335

Crop :- Cotton. (Kharif).

Ref :- Pb. 65(29).

Site :- Agri. Res. Stn., Jullundur.

Type :- 'M'.

Object :- To find out the optimum levels of N, P and K for the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Senji. (c) No. (ii) Sandy loam. (iii) 24.5.65. (iv) (a) 5 ploughings. (b) to (e) N.A. (v) N.A. (vi) F-320. (vii) Irrigated. (viii) 3 hoeings (ix) N.A. (x) Pickings from. 16.10.65. to 29.11.65

2. TREATMENTS :

All combinations of (i), (ii) and (iii)

(i) 3 levels of N : N₀=0, N₁=60 and N₂=120 Kg/ha.

(ii) 2 levels of P₂O₅ : P₀=0 and P₁=50Kg/ha.

(iii) 2 levels of K₂O : K₀=0 and K₁=50Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/333.3 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Sprayings of Endrine against jassids and Aphid. attack (iii) Yield of cotton. (iv) (a) 1965-contd. (b) No. (c) Nil. (v) Hissar and Ludhiana. (vi) and (vii) Nil.

5. RESULTS:

(i) 268 Kg/ha. (ii) 101.3 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

	P ₀	P ₁	K ₀	K ₁	Mean
N ₀	355	272	283	344	313
N ₁	264	263	253	274	263
N ₂	205	252	237	220	228
Mean	275	262	258	279	268
K ₀	244	271			
K ₁	306	253			

Crop :- Cotton. (Kharif).

Ref :- Pb. 65(3).

Site :- Cotton Res. Stn., Jullundur.

Type :- 'M'.

Object :-To determine the effect of soil application of micronutrients.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Wheat. (c) N.A. (ii) Sandy loam. (iii) 10.5.65. (iv) (a) 3 ploughings. (b) to (e) N.A. (v) 40 Kg/ha. of N as urea. (vi) F-320. (vii) Irrigated. (viii) 3 hoeings. (ix) N.A. (x) 2 pickings on 19.10.65 to 30.11.65.

2. TREATMENTS :

7 micronutrient treatments : T₀=Control, T₁=Borax at 11.2 Kg/ha., T₂=Manganese sul.at 22.4 Kg/ha., T₃=Copper sul. at 11.2 Kg/ha., T₄=Copper sul. at 22.4 Kg/ha., T₅=Zinc sul. at 22.4 Kg/ha. and T₆=Amm. molybdate at 1.12 Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 6. (iv) (a) 7.92m.×5.94m. (b) 6.00m.×4.17m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Endrine sprayed against jassids attack. (iv) (a) 1965-only. (b) No. (c) Nil. (v) Jullundur, Abohar, Ludhiana. (vi) and (vii) N.A.

5. RESULTS:

(i) 319 Kg/ha. (ii) 258.8 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	313	310	340	294	343	310	322

Crop :- Cotton (Kharif).

Ref :- Pb. 65(30),

Site :- Cotton Res. Stn., Jullundur.

Type :- 'M'.

Object :-To determine the effect of foliar spray of micronutrients on the yield of Cotton.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) Senji. (c) N.A. (ii) Sandy loam. (iii) 25.5.65. (iv) (a) 5 ploughings. (b) to (e) N.A. (v) 50 Kg/ha. of N as Urea. (vi) F-320. (vii) Irrigated. (viii) 2 weedings and 2 hoeings. (ix) N.A. (x) 3 pickings on 8.10.65, 2.11.65 and 29.11.65.

2. TREATMENTS:

7 micronutrient treatments : T₀=Control, T₁=Boron as Borax at 62Kg/ha., T₂=Manganese sul. at 2.47 Kg/ha., T₃=Copper sul. at 1.24 Kg/ha., T₄=Zinc sul. at 2.47 Kg/ha., T₅=Ferrous sul. at 6.18 Kg/ha. and T₆=Amm. molybdate at 0.62 Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 6. (iv) (a) 10.67m.×5.49m. (b) 9.40m.×4.25m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Endrine sprayed against jassid attack. (iii) Yield of kapas. (iv) (a) 1965-only. (b) No. (c) Nil. (v) Jullundur, Hissar, Abohar and Ludhiana. (vi) and (vii) N.A.

5. RESULTS :

(i) 427 Kg/ha. (ii) 63.1 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	396	444	427	430	450	401	442

Crop :- Cotton. (Kharif).

Ref :- Pb. 63(93), 64(82).

Site :- Punjab Agri. University, Ludhiana.

Type :- 'M'.

Object :- To find out the best method of fertiliser placement for Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) Mid of May, 63; 23, 5.64. (iv) (a) 4 ploughings. (b) to (e) N.A. (v) N.A. (vi) F.-320. (vii) Irrigated, (viii) 2 hoeings, 1 thinning. (ix) N.A. (x) 24.9.63 and 2.11.63; Nov., 64.

2. TREATMENTS :

Same as in expt. no. 63 (54), 64 (44), 65 (56) conducted at Abohar on page. No. 652.

3. DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) N.A., 7.32m. x 5.49m. (b) 1/370 ha.; 6.10m. x 4.75m. (v) N.A.; 61cm. x 46cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Endrine sprayed against jassids attack. (iii) Yield of kapas. (iv) (a) 1963-contd. (crop failed in 65), (b) No. (c) Nil. (v) Abohar. (vi) Nil. (vii) Since the expt. is contd. beyond 65, individual years results are presented under 5. Results.

5. RESULTS :

63(73)

(i) 741 Kg/ha. (ii) 142.8 Kg/ha. (iii) Treatment differences are significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇
Av. yield	796	692	724	526	625	815	734	880
	T ₈	T ₉						
	771	843						

C.D.=207.2 Kg/ha.

64(82)

(i) 101 Kg/ha. (ii) 81.7 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	91	200	36	96	126	105	77	75	100	100

Crop :- Cotton (Kharif).**Ref :- Pb. 63(95), 64(73), 65(19).****Site :- Punjab Agri. University, Ludhiana.****Type :- 'M'.****Object :- To determine the effect of foliar spray of micronutrients on the yield of Cotton.****1. BASAL CONDITIONS :**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 15.5.63; 15.5.64; 20.5.65. (iv) (a) 3 to 5 ploughings. (b) to (e) N.A. (v) N.A. (vi) F-320. (vii) Irrigated. (viii) 3 hoeings, 1 weeding. (ix) N.A. (x) 15.11.63 and 27.12.63 2.11.64 to 10.12.64; 14.10.65, 24.10.65 and 15.11.65.

2. TREATMENTS :

Same as in expt. no. 63(38), 64(40), 65(57) conducted at Abchar on page no.650.

3. DESIGN :

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 6. (iv) (a) 9.14m. x 4.27m.; 9.14m. x 4.27m.; 8.00m. x 4.00m. (b) 7.39 m. x 3.05m.; 8.23m. x 3.05m.; 6.80m. x 3.90m. (v) 87cm. x 61cm.; 46cm. x 61cm. 60cm. x 50cm. (vi) Yes,

4. GENERAL :

(i) Normal. (ii) Jassids attack; Endrine sprayed. (iii) Yield of kapas. (iv) (a) 1963-contd. (b) No. (c) Nil. (v) Abohar and Jullundur. (vi) N.A. (vii) Since the expt. is contd. beyond 65, individual years results are presented under 5. Results.

5. RESULTS :

63(95)

(i) 148 Kg/ha. (ii) 79.3 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	178	145	176	122	153	155	110

64(73)

(i) 120 Kg/ha. (ii) 53.0 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	100	118	103	119	122	131	144

65(19)

(i) 505 Kg/ha. (ii) 171.5 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	479	541	459	502	556	514	481

Crop Cotton (Kharif).**Ref :- Pb. 63(96), 64(72), 65(22).****Site :- Punjab Agri. University, Ludhiana.****Type :- 'M'.****Object :- To determine the effect of soil application of micro nutrients on the yield of Cotton.****1. BASAL CONDITIONS:**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 15.5.63; 15.5.64; 20.5.65. (iv) (a) 3 to 5 ploughings. (b) to (e) N.A. (v) N.A. (vi) F-320. (vii) Irrigated (viii) 2 to 3 hoeings; 1 weeding. (ix) N.A. (x) 15.11.63 and 27.12.63; 2.11.64 and 10.12.64; 3 pickings on 14.10.65, 24.10.65 and 15.11.65.

2. TREATMENTS

Same as in expt n. 63 (39), 64 (41), 65 (58) conducted at Abohar on page.No. 651.

3. DESIGN :

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 6. (iv) (a) 9'14m. x 4'27m. ; 9'14m. x 4'27m. ; 8'00m. x 4'00m. (b) 7'39 m. x 3'05 m. ; 8'23m. x 3'05m ; 6'80m. x 3'90m. (v) 87 cm. x 61 cm. ; 61 cm. x 45 cm. ; N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Endrine sprayed against Jassids attack. (iii) Yield of kapas. (iv) (a) 1963-contd. (b) No. (c) Nil. (v) Abohar, Jullundur. (vi) Nil. (vii) Since the expt. is contd. beyond 65, individual years results are presented under 5. Results.

5. RESULTS :

63(96)

(i) 267 Kg/ha. (ii) 95.0 Kg/ha. (iii) Treatment differences are not significant (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	259	231	383	276	246	240	235

64(72)

(i) 106 Kg/ha. (ii) 66.2 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	58	103	153	72	99	85	173

65(22)

(i) 398 Kg/ha. (ii) 148.3 Kg/ha. (iii) Treatment differences are not significant (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	343	544	369	486	411	345	368

Crop :- Cotton (*Kharif*).

Ref :- Pb. 63(97), 64(71), 65(18).

Site :- Punjab Agri. University, Ludhiana.

Type :- 'M'.

Object :- To study the effect of different levels of N, P and K on the yield of Cotton.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 29.4.63 ; 2.5.64 ; 15.5.65. (iv) (a) 3 to 5 ploughings. (b) to (e) N.A. (v) N.A. (vi) F-320. (vii) Irrigated. (viii) 2 to 4 hoeings. (ix) N.A. (x) 2 pickings on 18.11.63 and 6.1.64 ; 2 pickings on 11.11.64 and 10.12.64 ; Pickings from 20.9.65 to 13.11.65.

2. TREATMENTS.:

All combinations of (1), (2) and (3).

(1) 3 levels of N as C/A/N : N₀=0, N₁=60 and N₂=120Kg/ha.

(2) 2 levels of P₂O₅ as Super : P₀=0 and P₁=60 Kg/ha.

(3) 2 levels of K₂O as Mur. pot : K₀=0 and K₁=60 Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) 12.19m. × 4.57m. ; 12.19m. × 4.88m. ; 12.00m. × 4.80m. (b) 10.97m. × 3.20m. ; 10.97m. × 3.66m. ; 10.80m. × 3.60m. (v) 61cm. × 69cm ; 61cm. × 61cm. ; 60cm. × 60cm. (vi) Yes.

4. GENERAL :

(i) Poor. (ii) Jassids attack; Endrine sprayed. (iii) Yield of kapas. (iv) (a) 1963-contd. (b) No. (c) Nil. (v) Abohar, Jullundur. (vi) Nil. (vii) Since the expt. is contd. beyond 65, results of individual years are presented under 5. Results.

5. RESULTS :

63(97)

(i) 598 Kg/ha. (ii) 94.0 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of kapas in Kg/ha.

	N ₀	N ₁	N ₂	K ₀	K ₁	Mean
P ₀	492	656	674	624	590	607
P ₁	474	685	607	546	631	589
Mean	483	670	640	585	610	598
K ₀	513	656	587			
K ₁	453	684	694			

C.D. for N marginal means = 67.6 Kg/ha.

64(71)

(i) 334 Kg/ha. (ii) 106.3 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

	N ₀	N ₁	N ₂	K ₀	K ₁	Mean
P ₀	287	341	359	323	336	329
P ₁	306	359	414	336	383	360
Mean	296	350	386	329	359	344
K ₀	270	358	360			
K ₁	323	342	413			

65(18)

(i) 580 Kg/ha. (ii) and (iii) N.A. (iv) Av. yield of kapas in Kg/ha.

	N ₀	N ₁	N ₂	K ₀	K ₁	Mean
P ₀	593	553	566	580	561	571
P ₁	497	683	587	552	627	589
Mean	545	618	576	566	594	580
K ₀	588	582	528			
K ₁	502	654	625			

Crop :- Cotton (Kharif).**Ref :- Pb. 65(16).****Site:- Punjab Agri. University, Ludhiana.****Type :- 'M'.**

Object :—To study the effect of beta Naphthoacetic acid on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Wheat. (c) N.A. (ii) Sandy loam. (iii) 15.4.65. (iv) (a) 3 ploughings. (b) to (e) N.A. (v) N.A. (vi) F.-320. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) 3 pickings on 5.10.65. ; 19.10.65 and 21.11.65.

2. TREATMENTS :

Main-plot treatments :

4 concentrations : $C_0=0$, $C_1=5$, $C_2=10$ and $C_3=15$ PPM.

Sub-plot treatments :

3 times of spraying : $T_1=1$, $T_2=2$ and $T_3=3$ weeks after flowering.**3. DESIGN :**

(i) Split-plot. (ii) (a) 4 main-plots/replication, 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) 5'00m. x 10'00m. (b) 3'80m. x 9'10m. (v) 60cm. x 45cm. (vi) Yes.

4. GENERAL :

(i) Normal, (ii) Endrine sprayed as precaution. (iii) Yield of kapas. (iv) (a) 1964-contd. (64 N.A.). (b) No (c) Nil. (v) Hissar., Abohar and Jullundur. (vi) and (vii) Nil.

5. RESULTS :

(i) 269 Kg/ha. (ii) (a) 113 Kg/ha. (b) 131 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

	C_0	C_1	C_2	C_3	Mean
T_1	350	195	159	359	266
T_2	212	269	267	286	258
T_3	300	283	287	266	284
Mean	287	249	238	304	269

Crop:- Cotton (Kharif).**Ref :- Pb. 63(170).****Site:- M.A.E. Centre, Nasirpur.****Type :- 'M'.**

Object :—To study the effect of micronutrients on the yield of Cotton.

1. BASAL CONDITIONS :

(i) N.A. (ii) Sandy loam. (iii) 10.5.63. (iv) (a) 5 to 6 ploughings. (b) to (e) N.A. (v) Nil. (vi) N.A. (vii) Irrigated. (viii) 3 weedings. (ix) N.A. (x) 25.11.63 to 27.12.63.

2. TREATMENTS:

7 micronutrient treatments : T_0 =Control, T_1 =Borax, T_2 =Manganese, T_3 =Copper, T_4 =Zinc, T_5 =Iron and T_6 =Molybdenum.

3. DESIGN:

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 6. (iv) 4.88m. x 4.88m. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Crop sprayed after 60-70 days of planting. (iii) Yield of kapas. (iv) (a) and (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 1502 Kg/ha. (ii) 128.7 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6
Av. yield	1541	1479	1430	1472	1580	1570	1440

Crop :- Cotton (Kharif).

Ref : Pb. 63(177).

Site :- M.A.E. Centre, Nasirpur.

Type 'M'.

Object :- To find out the best method of fertilizer placement for Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loamy soil. (iii) 11.5.63. (iv) (a) 5 to 6 ploughings. (b) to (c) N.A. (v) N.A. (vi) Nil. (vii) Irrigated. (viii) 3 weedings. (ix) N.A. (x) 26.11.63 to 27.12.63.

2. TREATMENTS:

Same as in expt. no. 63(54), 64(34), 65(56) conducted at Abohar on page. No. 652.

3. DESIGN:

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 4.27m. x 4.27m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of kapas. (iv) (a) and (b) No. (c) Nil. (v) Abohar and Ludhiana. (vi) and (vii) Nil.

5. RESULTS :

(i) 1580 Kg/ha. (ii) 226.3 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9
Av. yield	1648	1503	1648	1730	1723	1600	1593	1545	1545	1270

Crop :- Cotton (Kharif).

Ref :- .Pb. 60 to 64(M.A.E.).

Site :-M.A.E. Centre, Nasirpur.

Type :- 'M'.

Object :—Type II :—To study the effect of different levels of N, P, K and F.Y.M. on the yield of Cotton. (Three phases :-cumulative, direct and residual).

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam, Alluvial soil; N.A. Indus alluvium for others. (iii) N.A.; 26.4.61; N.A. 29.4.63; and 9.5.64. (iv) (a) 4-5 ploughings. (b) By cotton drill. (c) 23 Kg/ha, (d) 76cm. x 30cm. (e) Nil. (v) Nil. (vi) 320-F. (vii) Irrigated. (viii) 3 hoeings. (ix) N.A. (x) N.A.; 3 pickings on 12.10.61, 13.11.61 and 15.12.61; N.A.; 15.12.63 and 15.12.64.

2. TREATMENTS:

All combinations of (1),(2), (3) and (4)

(1) 3 levels of N as C/A/N : $N_0=0$, $N_1=22.4$ and $N_2=44.8$ Kg/ha.

(2) 3 levels of P_2O_5 as Super : $P_0=0$, $P_1=22.4$ and $P_2=44.4$ Kg/ha.

(3) 3 levels of K_2O as mur. pot : $K_0=0$, $K_1=22.4$ and $K_2=44.8$ Kg/ha.

(4) 3 levels of F.Y.M. : $F_0=0$, $F_1=56.0$ and $F_2=112.0$ Q/ha.

3. DESIGN :

(i) 3^4 Fact. confd. (ii) (a) 9 plots/block and 9 blocks/replication. (b) N.A. (iii) 1. (iv) and (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of kapas. (iv) (a) 1960—N.A. (b) Yes for cumulative phase only. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

1960

(i) 1224 Kg/ha. (ii) 189.1 Kg/ha. (iii) Main effects of N and F are highly significant. (iv) Av. yield of kapas in Kg/ha.

	N_0	N_1	N_2	P_0	P_1	P_2	K_0	K_1	K_2	Mean
F_0	978	1061	1365	1116	1088	1201	1162	1097	1146	1135
F_1	1088	1171	1374	1347	1125	1161	1144	1264	1225	1211
F_2	1134	1337	1503	1273	1393	1309	1245	1356	1374	1325
Mean	1067	1190	1414	1245	1202	1224	1184	1239	1248	1224
K_0	1061	1144	1347	1208	1144	1290				
K_1	1042	1153	1522	1254	1300	1163				
K_2	1098	1273	1373	1273	1162	1309				
P_0	1134	1171	1430							
P_1	996	1236	1374							
P_2	1071	1163	1438							

C.D. for N or F marginal means—100.8 Kg/ha.

1961

Phase I (Cumulative effect)

(i) 1071 Kg/ha. (ii) 153.6 Kg/ha. (iii) Main effects of N and P are highly significant. Interaction F×N is highly significant. (iv) Av. yield of kapas in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	858	941	1208	1079	978	949	968	1061	977	1002
F ₁	950	1125	1337	1236	1054	1124	1162	1088	1161	1137
F ₂	950	1171	1097	1144	1070	1005	1097	1024	1098	1073
Mean	919	1079	1214	1153	1033	1026	1076	1058	1079	1071
K ₀	913	1107	1208	1190	1079	959				
K ₁	867	1088	1219	1134	996	1044				
K ₂	978	1042	1216	1135	1025	1076				
P ₀	1070	1134	1255							
P ₁	848	1061	1190							
P ₂	839	1042	1197							

C.D. for the body of F×N table=141.9Kg/ha.

Phase II (Direct effect)

(i) 1060 Kg/ha. (ii) 160.4 Kg/ha. (iii) Main effect of N is highly significant. Main effects of F and P are significant. (iv) Av. yield of kapas in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	830	1033	1134	1079	1014	904	1014	950	1033	999
F ₁	913	1107	1144	1153	1005	1007	1042	1097	1026	1055
F ₂	996	1162	1217	1116	1153	1106	1134	1061	1180	1125
Mean	913	1101	1165	1116	1057	1006	1063	1036	1080	1060
K ₀	885	1144	1160	1116	1088	985				
K ₁	848	1051	1209	1107	1005	996				
K ₂	1006	1108	1126	1125	1078	1037				
P ₀	978	1153	1217							
P ₁	931	1070	1170							
P ₂	830	1080	1108							

C.D. for N, For F marginal means=85.6 Kg/ha.

Phase III (Residual effect)

(i) 882 Kg/ha. (ii) 136.6 Kg/ha. (iii) None of the effects is significant (iv) Av. yield of kapas in Kg/ha.

				P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	mean
F ₀	839	830	867	821	895	819	858	821	856	845
F ₁	885	913	922	950	913	858	885	996	840	907
F ₂	904	858	922	931	913	841	959	858	868	895
Mean	876	867	904	901	907	839	901	892	855	882
K ₀	931	867	965	904	913	886				
K ₁	821	941	914	941	904	830				
K ₂	877	793	894	858	904	802				
P ₀	895	895	913							
P ₁	848	895	978							
P ₂	885	811	821							

1962

Cumulative Phase

(i) 924 Kg/ha. (ii) 216.9 Kg/ha. (iii) Main effects of F and N are highly significant. Interaction F × P is significant. (iv) Av. yield of kapas in Kg/ha.

	N ₀		N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	562	833	1042	891	775	711	786	851	799	812
F ₁	620	961	1044	1081	781	825	853	933	838	875
F ₂	895	1085	1271	934	1103	1241	1004	1053	1194	1084
Mean	692	960	1119	948	886	937	881	946	944	924
K ₀	731	853	1059	831	804	1008				
K ₁	702	997	1139	1051	964	822				
K ₂	644	1029	1159	962	891	980				
P ₀	655	945	1244							
P ₁	720	916	1022							
P ₂	702	1018	1091							

C.D. for F or N marginal means = 115.7 Kg/ha.
C.D. for the body of F × P table = 200.4 Kg/ha.

Residual phase

(i) 699 Kg/ha. (ii) 172.6 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	640	596	755	701	706	584	669	659	663	644
F ₁	700	692	652	644	699	699	705	724	614	681
F ₂	743	642	871	824	737	694	717	770	769	752
Mean	694	643	759	723	714	659	697	718	862	699
K ₀	693	613	785	684	714	692				
K ₁	704	661	788	782	758	613				
K ₂	685	655	705	703	671	673				
P ₀	749	671	749							
P ₁	690	682	770							
P ₂	643	577	757							

Direct phase

(i) 899 Kg/ha. (ii) 198.4 Kg/ha. (iii) Main effects of F and N are highly significant. (iv) Av. yield of kapas in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	656	864	956	867	809	799	755	843	878	825
F ₁	631	956	994	945	758	877	843	934	804	860
F ₂	746	1068	1221	972	952	1113	945	1022	1068	1012
Mean	678	963	1057	928	840	930	848	933	917	899
K ₀	663	928	953	853	788	903				
K ₁	725	944	1130	1008	884	906				
K ₂	645	1017	1089	923	847	981				
P ₀	778	919	1087							
P ₁	590	1018	912							
P ₂	665	952	1173							

C.D. for F or N marginal means = 105.8 Kg/ha.

1963

Direct phase

(i) 921 Kg/ha. (ii) 195.8 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of kapas in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	763	1040	965	899	984	885	910	922	936	923
F ₁	774	1035	987	933	921	942	917	937	943	932
F ₂	805	1000	922	955	927	845	1047	852	828	909
Mean	781	1025	958	929	944	891	958	904	902	921
K ₀	849	1035	989	948	985	940				
K ₁	773	968	971	915	906	890				
K ₂	720	1073	914	923	941	842				
P ₀	716	1109	962							
P ₁	792	1028	1013							
P ₂	834	938	900							

C.D. for N marginal means = 104.4 Kg/ha.

Cumulative phase

(i) 961 Kg/ha. (ii) 113.8 Kg/ha. (iii) Main effect of N alone is significant. (iv) Av. yield of kapas in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	798	945	1014	970	837	950	873	937	948	919
F ₁	875	1014	1094	1002	992	989	1006	960	1017	994
F ₂	804	1122	980	984	943	980	920	960	1026	969
Mean	826	1027	1029	985	924	973	933	952	997	961
K ₀	764	1028	1006	941	906	951				
K ₁	849	974	1034	1051	853	989				
K ₂	864	1079	1047	999	1013	979				
P ₀	874	1050	1032							
P ₁	741	1033	998							
P ₂	863	998	1058							

C.D. for N marginal means = 61.0 Kg/ha.

Residual effect

(i) 830 Kg/ha. (ii) 167.6 Kg/ha. (iii) None of the effects is significant. (vi) Av. yield of kapas in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	808	844	772	856	820	748	781	804	840	808
F ₁	900	768	800	830	852	786	866	804	798	823
F ₂	803	895	879	896	775	906	873	837	867	859
Mean	837	836	817	861	816	813	840	815	835	830
K ₀	827	864	828	844	862	814				
K ₁	868	770	807	888	792	766				
K ₂	815	874	816	851	794	860				
P ₀	848	900	834							
P ₁	844	795	809							
P ₂	819	812	808							

1964

Cumulative phase

(i) 968 Kg/ha. (ii) 135.6 Kg/ha. (iii) Main effects of F, N and interaction F×N, F×P are highly significant. (iv) Av. yield of kapas in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	577	884	1090	862	775	912	872	875	803	850
F ₁	882	1033	991	1067	948	892	945	955	1007	969
F ₂	965	1122	1167	1014	1089	1151	1006	1163	1085	1085
Mean	808	1013	1083	981	937	985	941	998	965	968
K ₀	781	962	1080	940	903	979				
K ₁	842	1080	1072	1059	998	937				
K ₂	801	997	1097	944	911	1039				
P ₀	831	976	1137							
P ₁	798	1012	1002							
P ₂	795	1051	1109							

C.D. for N or F marginal means=72.3Kg/ha.

C.D. for the body of F×N or F×P table=125.3 Kg/ha.

Direct phase

(i) 895 Kg/ha. (ii) 152.5 Kg/ha. (iii) Main effects of F and N are highly significant. (iv) Av. yield of kapas in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	625	800	888	768	820	725	691	837	785	771
F ₁	806	987	1006	1036	846	917	897	943	959	933
F ₂	898	973	1075	968	1020	959	920	1022	1004	982
Mean	776	920	990	924	895	867	836	934	916	895
K ₀	778	851	878	900	827	782				
K ₁	816	953	1033	976	969	857				
K ₂	734	956	1058	896	890	961				
P ₀	794	909	1069							
P ₁	755	958	972							
P ₂	779	894	928							

C.D. for N or F marginal means = 81.3 Kg/ha.

Residual phase

(i) 753 Kg/ha. (ii) 144.0 Kg/ha. (iii) Main effect of F alone is highly significant. (iv) Av yield of kapas in Kg/ha.

	N ₀	N ₁	N ₂	P ₀	P ₁	P ₂	K ₀	K ₁	K ₂	Mean
F ₀	561	676	790	642	635	751	655	671	702	676
F ₁	728	714	715	741	712	705	685	729	743	719
F ₂	844	875	875	858	822	914	814	897	884	865
Mean	711	755	794	747	723	790	718	766	776	753
K ₀	677	751	726	706	641	806				
K ₁	728	743	826	750	804	743				
K ₂	728	771	830	784	724	821				
P ₀	703	730	808							
P ₁	703	738	728							
P ₂	727	797	846							

C.D. for F marginal means = 76.8 Kg/ha.

Crop :- Cotton (Kharif).

Ref :- Pb. 61(M.A.E.).

Site :- M.A.E. Centre, Nasirpur,

Type :- 'M'.

Object : Type Ix :- To compare nitrophosphate at different levels and different methods of application.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) Maize fodder in Kharif and Senji in Rabi 1960. (c) N.A. (ii) Alluvial. (iii) Last week of April. (iv) (a)- (b) With cotton drill. (c) 13.4 Kg/ha. (d) 76cm. x 30cm. (e) - (v) Nil. (vi) F-320. (vii) Irrigated. (viii) 3 hoeings with Tarphali and kasaula. (ix) N.A. (x) Pickings from November and December.

2. TREATMENTS:

All combinations of (1), (2), (3) and (4) + 4 extra treatments in each block.

(1) 2 levels of F.Y.M.: $F_0=0$ and $F_1=5600$ Kg/ha.

(2) 3 types of phosphates: P_1 =Single Super. P_2 =OddA(20-20-0) and P_3 =E C(16-14-0).

(3) 3 levels of fertilizers: $L_1=12$ Kg/ha. of N + 10.5 Kg/ha. of P_2O_5 $L_2=2 L_1$ and $L_3=4 L_1$.

(4) 3 methods of application: M_1 =Broadcast before final cultivation, $M_2=6.3$ cm. below seed and M_3 =Band placement.

Extra treatments: $-N_0=0$, $N_1=12$, $N_2=24$, and $N_3=48$ Kg/ha. of N.

3. DESIGN :

(i) Fact. in R.B.D, (ii) (a) 13 plots/block and 6 blocks/replication (3 blocks receiving F_0 treatment and other 3 blocks receiving F_1 treatment.) (b) N.A. (iii) 1. (iv) (a) 3.28m. x 7.66m. (b) 2.82m. x 7.18m. (v) 23cm. x 24cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of kapas. (iv) (a) 1961-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 1222 Kg/ha. (ii) 166.9 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

	N_0		N_2		N_3	Mean
F_0	1190	1061	1245	1070		1141
F_1	1171	1254	1134	1217		1194
Mean	1180	1157	1189	1143		1167

	P_1	P_2	P_3	L_1	L_2	L_3	M_1	M_2	M_3	Mean
F_0	1236	1236	1208	1190	1282	1209	1273	1217	1191	1227
F_1	1245	1282	1273	1236	1273	1292	1347	1263	1191	1267
Mean	1241	1259	1241	1213	1278	1250	1310	1240	1191	1247
M_1	1310	1310	1310	1236	1337	1357				
M_2	1282	1245	1193	1199	1245	1276				
M_3	1131	1222	1220	1204	1252	1117				
L_1	1208	1263	1168							
L_2	1245	1254	1335							
L_3	1270	1260	1220							

Crop : Cotton (Kharif).

**Ref :- Pb. 60(S.F.T.) for Ferozepur, Jullundur;
Ludhiana, Patiala and Sangrur. and 61 (S.F.T.)
for Ferozepur, Jullundur and Ludhiana.**

District :- Ferozepur, Jullundur, Patiala, Sangrur and Ludhiana. Type :- 'M'.

Object :—Type A : To study the response of Cotton to different levels of N, P and K applied individually and in combination.

1. BASAL CONDITIONS :

(i) N.A. (ii) Alluvial. (iii) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure).

N=44.8 Kg/ha. of N,

P=22.4 Kg/ha. of P_2O_5 ,

K=22.4 Kg/ha. of K_2O ,

NP=44.8 Kg/ha. of N+22.4 Kg/ha of P_2O_5 ,

NK=44.8 Kg/ha. of N+22.4 Kg/ha. of K_2O ,

PK=22.4 Kg/ha. of P_2O_5 +22.4 Kg/ha. of K_2O and

NPK=44.8 Kg/ha. of N+22.4 Kg/ha. of P_2O_5 +22.4 Kg/ha. of K_2O .

3. DESIGN :

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle/thana is changed once in two years with in the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on Kharif cereal, 8 on a Rabi cereal, 8 on Cash crop, 4 on an oilseed crop and 3 on a leguminous crop. Half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. The three trials on legumes are of type C. Residual effects of phosphate application are studied on type C trials in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98.8ha. (b) 1/197.7ha. (iv) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of kapas. (iv) to (vii) N.A.

5. RESULTS :

Av. response in Kg/ha.

60 (S.F.T.)

District.	No. of trials	Control yield in Kg/ha.	N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Ferozepur	12	700	140	60	60	17.0	-30	0	-10	10	8.0
Jullundur	4	380	40	10	20	35.0	0	-50	10	10	23.0
Ludhiana	7	1140	80	60	20	30.0	-10	-10	-40	60	20.0
Patiala	5	580	100	60	10	20.0	20	20	40	40	13.0
Sangrur	11	570	100	110	60	17.0	10	20	40	10	25.0

61 (S.F.T)

District	No. of trials	Control yield in Kg/ha.	N	P	K	S.E.	NP	NK	PK	NPK	S.E.
Ferozepur	11	720	180	60	50	28.0	-20	-40	-20	—	17.0
Ludhiana	4	680	170	60	20	16.0	0	0	0	20	20.0
Sangrur	11	650	80	60	70	20.0	-10	20	-30	50	14.0

Crop :- Cotton (Kharif).**Ref :- Pb. 60(S.F.T).****District :- Ferozepur and Sangrur****Type :- 'M'.**

Object--:- TypeJB : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS:

7 manurial treatments:

O=Control (no manure)

N₁=28 Kg/ha. of N as A/S.,N₂=56 Kg/ha. of N as A/S.,N₁'=28 Kg/ha. of N as Urea.,N₂'=56 Kg/ha. of N as Urea.,N₁"=28 Kg/ha. of N as C/A/N. andN₂"=56 Kg/ha. of N as C/A/N.**3. DESIGN:**

Same as in type A conducted under irrigated condition on Cotton crop on page No. 678.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of kapas. (iv) (a)1960—only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			N ₁	N ₂	N ₁ '	N ₂ '	N ₁ "	N ₂ "	
Ferozepur	4	450	120	170	120	140	130	180	65.0
Sangrur	9	330	-60	100	40	170	30	110	80.0

Crop :- Cotton. (Kharif).**Ref :- Pb. 60(S.F.T.).****District :- Jullundur, Ferozepur, Patiala and Ludhiana.****Type :- 'M'.**

Object :-Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (no manure),

N₁=28Kg/ha. of N as A/S.,N₂=56Kg/ha. of N as A/S.,N₁'=28Kg/ha. of N as Urea,N₂'=56Kg/ha. of N as Urea,N₁"=28Kg/ha. of N as A/S/N andN₂"=56Kg/ha. of N as A/S/N

3. DESIGN:

Same as in type A conducted under irrigated condition on Cotton crop on page. No. 673.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of kapas (iv) (a) 1960-only (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

District	No. of trials	Av. response in Kg/ha.							S.E.
		Control yield in Kg/ha.	N ₁	N ₂	N ₁ '	N ₂ '	N ₁ ''	N ₂ ''	
Hoshiarpur	5	790	530	170	110	320	100	770	68.0
Ferozpur	14	780	170	210	160	200	120	220	22.0
Patiala	7	340	70	120	60	100	70	120	18.0
Ludhiana	8	1270	130	230	20	110	180	240	51.0

Crop :- Cotton (Kharif).

Ref :- Pb. 61(S.F.T.)

Site :- Ferozpur and Jullundur.

Type :- 'M'

Object :- Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Alluvial. (iii) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS:

7 manurial treatments :

O=Control (no manure),

N₁=44.8 Kg/ha. of N as A/S,

N₂=89.6 Kg/ha. of N as A/S,

N₁'=44.8 Kg/ha. of N as Urea,

N₂'=89.6 Kg/ha. of N as Urea,

N₁''=44.8 Kg/ha. of N as A/S/N and

N₂''=89.6 Kg/ha. of N as A/S/N.

3. DESIGN :

Same as in type A conducted under irrigated condition on Cotton crop on page No. 678.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of kapas. (iv) (a) 1961-only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

District	No. of trials	Av. response in Kg/ha.							S.E.
		Control yield in Kg/ha.	N ₁	N ₂	N ₁ '	N ₂ '	N ₁ ''	N ₂ ''	
Ferozpur	10	910	150	280	170	250	190	270	36.0
Jullundur	4	1050	70	210	-30	150	40	150	149.0

Crop :- Cotton (Kharif).
Site :- Jullundur.

Ref :- Pb. 61(S.F.T.).
Type :- 'M'.

Object :- Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS

(i) (a) to (c) N.A. (ii) Alluvial. (iii) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

7 manurial treatments :

O=Control (no manure),

$N_1=44.8$ Kg/ha. of N as A/S,

$N_2=89.6$ Kg/ha. of N as A/S,

$N_1'=44.8$ Kg/ha. of as Urea,

$N_2'=89.6$ Kg/ha. of N as Urea.,

$N_1''=44.8$ Kg/ha. of N as C/A/N and

$N_2''=89.6$ Kg/ha. of N as C/A/N

3. DESIGN

Same as in type A conducted under irrigated condition on Cotton crop on page No. 678.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of kapas. (iv) (a) 1961-only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS

District.	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			N_1	N_2	N_1'	N_2'	N_1''	N_2''	
Jullundur	11	670	40	80	440	580	480	730	43.0

Crop :- Cotton (Kharif).

**District :- Patiala, Sangrur,
 Jullundur, Ludhiana and Ferozepur.**

**Ref :- Pb. 63,64 and 65(S.F.T.) for Patiala,
 Sangrur, 62,65(S.F.T.) for Jullundur;
 62(S.F.T.) for Ludhiana and 64,65(S.F.T.)
 for Ferozepur.**

Type :- 'M'.

Object:-Type A₁ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS:

8 manurial treatments

O=Control (no manure),

$N_1=60$ Kg/ha. of N,

$N_2=120$ Kg/ha. of N,

$P_1=35$ Kg/ha of P_2O_5 .

$N_1P_1=60$ Kg/ha. of N+35 Kg/ha. of P_2O_5 .

$N_2P_1=120$ Kg/ha. of N+35 Kg/ha. of P_2O_5 .

$N_1P_2=120$ Kg/ha. of N+70 Kg/ha. of P_2O_5 . and

$N_2P_2K_1=120$ Kg/ha. of N+70 Kg/ha. of P_2O_5 + 35 Kg/ha. of K_2O .

3. DESIGN:

(i) and (ii) A selected district is divided into four agriculturally homogeneous zones based on climate, soil and cropping pattern etc. In each zone one block is selected at random. A block normally consists of a group of 50-100 villages. In each block 36 experiments are conducted in a year of which 11 are of type A_1 , 11 of type A_2 , 11 of type A_3 and 3 are of type C. The eleven experiments each under type A_1, A_2 and A_3 are distributed as 3 on a Kharif cereal, 3 on a Rabi cereal, 3 on a Cash crop and 2 on an Oilseed crop. All the three type-C experiments are conducted on legume crop. For the purpose of conducting the A_1, A_2 and A_3 experiments 11 villages are randomly selected in each block and in each village 3 experiments one each of type A_1, A_2 and A_3 are laid out. For conducting these experiments, three villages are randomly selected in each block. (iii) (a) 1/100 ha. (b) 1/200 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of kapas. (iv) (a) 1962 to 66 for Patiala and Sangrur (63 N.A.) 1962-65 for Jullundur, 1962 for Ludhiana and 1962 to 66 for Ferozepur (62,63 N.A.) (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

Patiala

62 (S.F.T.)

Treatment	N_1	N_2	P_1	N_1P_1	N_2P_1	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of yield in Kg/ha.	123	152	82	130	175	188	201	21.1

Control yield=511 Kg/ha., No. of trials=5

64 (S.F.T.)

Treatment	N_1	N_2	P_1	N_1P_1	N_2P_1	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of yield in Kg/ha.	289	316	220	319	415	408	457	61.4

Control yield=1067 Kg/ha., No. of trials=3

65 (S.F.T.)

Treatment	N_1	N_2	P_1	N_1P_1	N_2P_1	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of yield in Kg/ha.	307*	333	224	367	438	433	535	46.8

Control yield=1115 Kg/ha., No. of trials=5

Sangrur

64 (S.F.T.)

Treatment	N_1	N_2	P_1	N_1P_1	N_2P_1	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of yield in Kg/ha.	150	330	-13	143	275	295	345	104.9

Control yield=572 Kg/ha., No. of trials=3

65 (S.F.T.)

Treatment	N_1	N_2	P_1	N_1P_1	N_2P_1	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of yield in Kg/ha.	436	546	168	563	713	820	1060	69.1

Control yield=841 Kg/ha., No. of trials=4

65 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N₂P₂	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	201	305	434	248	345	416	479	200.3

Control yield=997 Kg/ha.; No. of trials=6

Jullundur

62 (S. F. T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S. E.
Av. response of yield in Kg/ha.	86	105	19	86	133	220	205	18.3

Control yield=245 Kg/ha., No. of trials=2

65(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S. E.
Av. response of yield in Kg/ha.	-421	-382	-306	-358	-275	-217	-458	101.4

Control yield=1491 Kg/ha; No. of trials=3

Ludhiana

62(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	74	94	64	-2	83	20	120	50.2

Control yield=403 Kg/ha; No. of trials=5

Ferozepur

64(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	327	477	156	493	542	571	667	47.2

Control yield=863 Kg/ha; No. of trials=3

65(S.F.T.)

Treatment	N ₁	N ₂	P ₂	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	-92	27	-162	1	76	157	179	150.1

Control yield=1199 Kg/ha; No. of trials=14

Crop :- Cotton (Kharif).

Ref :- Pb.62(S.F.T.).

Site :- Ludhiana.

Type :- 'M'.

Object :- Type A₁ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

 $N_1=35$ Kg/ha. of N, $N_2=70$ Kg/ha. of N, $P_1=25$ Kg/ha. of P_2O_5 , $N_1P_1=35$ Kg/ha. of N+25 Kg/ha. of P_2O_5 , $N_2P_1=70$ Kg/ha. of N+25 Kg/ha. of P_2O_5 , $N_2P_2=70$ Kg/ha. of N+50 Kg/ha. of P_2O_5 and $N_2P_2K_1=70$ Kg/ha. of N+50 Kg/ha. of P_2O_5 +25 Kg/ha. of K_2O .

3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Cotton crop on page No. 682.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of kapas. (iv) (a) 1962-only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Ludhiana

62(S.F.T.)

Treatment	N_1	N_2	P_1	N_1P_1	N_2P_1	N_2P_2	$N_2P_2K_1$	S.E.
Av. response of yield in Kg/ha.	135	256	147	277	373	504	483	34.5

Control yield=931 Kg/ha.; No. of trials=2

Crop:- Cotton (Kharif).**Ref:- Pb. 62,64, 65(S.F.T) for Ferozepur, Patiala and Sangrur and 62,65(S.F.T.) for Ludhiana.****District :-Ferozepur, Patiala, Sangrur and Ludhiana.****Type :- 'M.'**Object :— Type A₂ : To study the response curves of important cereal, cash, and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS:

8 manurial treatments :

O=Control (no manure),

 $N_1=60$ Kg/ha. of N, $P_1=35$ Kg/ha. of P_2O_5 , $P_2=70$ Kg/ha. of P_2O_5 , $N_1P_1=60$ Kg/ha. of N+35 Kg/ha. of P_2O_5 , $N_1P_2=60$ Kg/ha. of N+70 Kg/ha. of P_2O_5 , $N_2P_2=120$ Kg/ha. of N+70 Kg/ha. of P_2O_5 and $N_2P_2K_2=120$ Kg/ha. of N+70 Kg/ha. of P_2O_5 +70 Kg/ha. of K_2O .

3. DESIGN :

Same as in Type A₁ conducted under irrigated condition on Cotton crop on page No, 682.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of kapas. (iv) (a) 196 2 to 66 for Ferozepur, Patiala, Sangrur (63 N.A.); 1962 to 66 for Ludhiana (63, 64 N.A.) (v) to (vii) N.A.

5. RESULTS :

Ferozepur

62 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	30	22	30	11	37	91	51	19.0

Control yield=342 Kg/ha. ; No. of trials=2

64 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	346	113	146	423	525	631	658	60.9

Control yield=792 Kg/ha.; No. of trials=3

65(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	176	65	140	255	289	361	407	19.7

Control yield=880 Kg/ha. ; No. of trials=14

Patiala

62(S.F.T)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	156	163	199	177	179	195	243	40.0

Control yield=584 Kg/ha.; No. of trials=5

64 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	283	161	289	326	349	405	451	55.4

Control yield=965 Kg/ha. ; No. of trials=3

65 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	320	189	182	274	358	245	374	78.8

Control yield=1457 Kg/ha. ; No. of trials=5

Sangrur

62 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	128	22	101	200	245	358	481	73.2

Control yield=604 Kg/ha. ; No. of trials=2

64 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	767	322	497	1011	1107	1225	1584	73.9

Control yield=1186 Kg/ha.; No. of trials=3

65 (S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	204	53	153	220	318	380	436	53.1

Control yield=1062 Kg/ha.; No. of trials=6

Luhiana

63(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	83	153	40	5	143	211	105	96.1

Control yield=358 Kg/ha., No. of trials=6

64(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	-304	-164	-29	-143	-291	-274	-518	150.6

Control yield=1532 Kg/ha.; No. of trials=3

Crop :- Cotton (Kharif).**District :- Patiala,****Ferozepur and Sangrur.****Ref. :- Pb. 62, 64, 65(S.F.T.) for Patiala, 64, 65(S.F.T.) for Ferozepur and 64, 65(S.F.T.) for Sangrur.****Type :- 'M'.**Object :—Type A₃ : To study the response curves of important cereal, cash and oil seed crops applied to K singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (No manure)

N₁=60 Kg/ha. of N,K₁=35 Kg/ha. of K₂O,K₂=70 Kg/ha. of K₂O,N₁K₁=60 Kg/ha. of N+35 Kg/ha. of K₂O,N₁K₂=60 Kg/ha. of N+70 Kg/ha. of K₂O,N₂K₂=120 Kg/ha. of N+70 Kg/ha. of K₂O andN₁P₁K₁=60 Kg/ha. of N+35 Kg/ha. of P₂O₅+35Kg/ha. of K₂O,

3. DESIGN

Same as in type A₁ conducted under irrigated condition on Cotton crop on Page No. 682.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of kapas. (iv) (a) 1962 to 66 for Patiala (63N.A.), 1962 to 66 for Ferozepur (62 and 63N.A.) and 1962 to 66 for Sangrur (62 and 63N.A.) (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Patiala

62(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	141	138	153	144	119	183	189	87.5

Control yield=612 Kg/ha. ; No. of trials=3

64(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	168	113	256	207	227	370	311	121.1

Control yield=1027 Kg/ha. ; No. of trials=2

65(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	309	102	225	279	376	355	333	103.2

Control yield=1260 Kg/ha. ; No. of trials=5

Ferozepur

64(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	380	39	122	361	419	598	478	47.6

Control yield= 875Kg/ha. ; No. of trials=3

65(S.F.T.)

Treatment	N ₂	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	118	27	97	218	258	324	297	16.1

Control yield=992 Kg/ha. ; No. of trials=12

Sangrur

64(S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₂	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	410	233	304	502	596	678	785	127.5

Control yield=733 Kg/ha. ; No. of trials=4

65 (S.F.T.)

Treatment	N ₁	K ₁	K ₂	N ₁ K ₁	N ₁ K ₂	N ₂ K ₁	N ₁ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	233	39	162	337	492	528	504	66.6

Control yield=904 Kg/ha. ; No. of trials=6

Crop :- Cotton. (Kharif).

Ref :- Pb. 63(54).

Site : Cotton Res. Stn, Abohar.

Type :- 'C'.

Object ;--To find out the best method of fertilizers placement for Cotton.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Senji-Fodder. (c) N.A. (ii) Sandy loam. (iii) 23.5.63. (iv) (a) One ploughing. (b) to (e) N.A. (v) Nil. (vi) F-320. (vii) irrigated. (viii) and (ix) N.A. (x) End of Nov., 63.

2. TREATMENTS:

10 cultural treatments: T₀=Control, T₁=By plough sole method to drop the fertilizer 12cm. deep with the help of wooden plough about a week before sowing, T₂=By seed-cum fertilizer drill to drop the fertilizer in the same line. The seed will be sown in one bowl and fertilizer in the other bowl, T₃=By seed-cum-fertilizers drill to drop the fertilizers 4cm. deeper than the seed drill fertilizers will be applied in the bowl and the seed sown in the same line by attaching a shovel behind the drill, T₄=By seed-cum fertilizers drill. the seed will be sown in one bowl and fertilizers in another bowl but with arrangement to make the fertilizers drop 5cm. deep and 5cm. away from the seed line as band on one side only. This will be done by attaching the shovels, T₅=As basal dose before the last ploughing operation at sowing, T₆=As basal dose at final thinning, T₇=As basal dose at flowering, T₈=As top dressing along with cotton rows at final thinning and T₉=As top dressing along with cotton row at flowering.

Levels of fertilizer is (62 Kg/ha. of N +37 Kg/ha. of P₂O₅).

3. DESIGN

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) 1/197 ha. (b) 1/247 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of kapas. (iv) (a) 1963-contd. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 423 Kg/ha. (ii) 125 Kg/ha. (iii) Treatment differences are significant. (iv) Av. yield of cotton in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av.yield	463	331	294	392	636	404	425	349	488	446

C.D.=181 Kg/ha.

Crop :- Cotton.

Ref :- Pb. 63(56), 64(43), 65(51)

Site :- Cotton Res., Sta., Abohar

Type :- 'C'.

Object :- To study the effect of deep ploughing and interculture on the yield of Cotton.

1. BASAL CONDITIONS:

(i) (a) Wheat-Cotton. (b) Wheat. (c) N.A. (H) Sandy loam. (iii) 25.5.73; 4.6.64; 28.5.65. (iv) (a) 2 to 5 ploughings. (b) to (c) N.A. (v) 25 Kg/ha. of N+25 Kg/ha. of P₂O₅. (vi) F-320. (vii) Irrigated. (viii) As per treatments. (ix) N.A. (x) Nov. and Dec., 63; Nov. and Dec., 64; 12.11.65 and 12.12.65.

2. TREATMENTS:

Main-plot treatments :-

3 ploughing treatments: T₁=Normal ploughing, T₂=Deep ploughing (22cm. every year after wheat and cotton harvest) and T₃=Deep ploughing (22cm. once in two years after wheat harvest only)

Sub-plot treatments:

3 interculturing treatments: C₁=1, C₂=2 and C₃=3 intercultures.

3. DESIGN:

(i) Split-plot. (ii) (a) 3 main-plots/replication; 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) 1/197-7 ha. for 63; 14'63m. x 3'66m. for others. (b) 1/247'1 ha. for 63, 13'72m. x 2'44m. for others. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Spraying. with D.D.T. and B.H.C. (iii) Yield of kapas. (iv) (a) 1963 -contd. (b) and (c) Nil. (v) Gurdaspur, Jullundur. (vi) Nil. (vii) Since the expt. is contd. beyond 65, individual years results are presented under 5. Results.

5. RESULTS:

63(56)

(i) 1278 Kg/ha. (ii) (a) 326.2 Kg/ha. (b) 143.3 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

	T ₁	T ₂	T ₃	Mean
C ₁	1125	1416	1404	1315
C ₂	1085	1376	1351	1271
C ₃	1083	1361	1300	1248
Mean	1098	1384	1352	1278

64(43)

(i) 706 Kg/ha. (ii) (a) 59.8 Kg/ha. (b) 149.5 Kg/ha. (iii) Main effect of T alone is highly significant. (iv) Av. yield of kapas in Kg/ha.

	T ₁	T ₂	T ₃	Mean
C ₁	617	830	744	730
C ₂	561	785	800	715
C ₃	546	790	680	672
Mean	575	802	741	706

C.D. for T marginal means=59.7 Kg/ha.

65(51)

(i) 963 Kg/ha. (ii) (a) 162.1 Kg/ha. (b) 136.1 Kg/ha. (iii) Main effect of T alone is highly significant (iv) Av. yield of kapas in Kg/ha.

	T ₁	T ₂	T ₃	Mean
C ₁	714	1052	956	907
C ₂	715	1266	1049	1010
C ₃	735	1113	1064	971
Mean	721	1144	1023	963

C.D. for T marginal means = 161.9 Kg/ha.

Crop :- Cotton,

Ref :- Pb. 63(172), 64(166), 65(62).

Site :- Agri. Res. Stn., Gurdaspur.

Type :- 'C'.

Object :- To study the effect of deep ploughing and interculture on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) Wheat—Cotton. (b) Wheat. (c) N.A. (ii) Sandy loam. (iii) 13.4.63; 10.5.64; last week of April, 65. (iv) (a) 3 to 7 ploughings. (b) to (e) N.A. (v) Nil. (vi) R-231. (vii) Irrigated. (viii) As per treatments. (ix) N.A. (x) 29.10.63 to 7.12.63; 1.10.64 to 22.10.64; 16.10.65; 28.10.65 and 15.11.65.

2. TREATMENTS :

Same as in expt. no. 63(56), 64(43), 65(51) conducted at Abohar on page No. 689.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication; 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) 1/197 ha.; 11.58m. × 4.27m.; 11.89m. × 4.27m. (b) 1/247 ha.; 10.36m. × 3.05m.; 11.28m. × 3.05m. (v) N.A.; 61cm. × 61cm; 30cm. × 61cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of kapas. (iv) (a) 1963-contd. (b) No. (c) Nil. (v) Abohar. (vi) Nil. (vii) Since the expt. is contd. beyond 65, individual years results are presented under 5. Results.

5. RESULTS

63(172)

(i) 448 Kg/ha. (ii) (a) 140.1 Kg/ha. (b) 72.9 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

	T ₁	T ₂	T ₃	Mean
C ₁	497	458	425	460
C ₂	457	440	439	445
C ₃	439	477	406	441
Mean	464	458	423	448

64(166)

(i) 238 Kg/ha. (ii) (a) 90.9 Kg/ha. (b) 47.8 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

	T ₁	T ₂	T ₃	Mean
C ₁	233	241	289	254
C ₂	198	237	233	223
C ₃	226	202	281	236
Mean	219	227	268	238

65(62)

(i) 161 Kg/ha. (ii) (a) 163.0 Kg/ha. (b) 56.2 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

	T ₁	T ₂	T ₃	Mean
C ₁	188	71	164	141
C ₂	183	125	201	170
C ₃	194	127	199	173
Mean	188	103	188	161

Crop :- Cotton (Kharif).

Ref :- Pb. 63(266), 64(168).

Site :- Cotton. Res. Stn., Gurdaspur.

Type :- 'C'.

Object :- To study the effect of pruning at different stages of crop growth on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Heavy loam. (iii) 13.4.63; 13.4.64. (iv) 5 to 7 ploughings. (b) to (e) N.A. (v) N.A. (vi) R-231. (vii) Irrigated. (viii) 4 weedings. (ix) N.A. (x) 25.9.63 to 3.12.63; 13.9.64 to 22.10.64.

2. TREATMENTS :

10 dates of pruning : T₀=Control, T₁=25 th July, T₂=25 th Aug., T₃=5 th Sept., T₄=26 th July+15 th Aug., T₅=25 th July+5 th Sept, T₆=15 th Aug.+5 th Sept., T₇=25 th July+15 th Aug.+5 th Sept, T₈=5 th Aug. and T₉=25 th Aug.

3. DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 6. (iv) (a) 11.89m. × 2.44m.; 4.88m. × 3.05m. (b) 10.67m. × 2.44m.; 3.66m. × 2.29m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) B.H.C. sprayed.; Attacked by jassids, D.D.T., B.H.C. and Endrine sprayed. (iii) Yield of kapas. (iv) (a) 1963-contd. (crop failed in 65) (b) No. (c) Nil. (v) and (vi) Nil. (vii) Since the expt. is contd. beyond 65, individual years results are presented under. 5. Results.

5. RESULTS :

63(266)

(i) 390 Kg/ha. (ii) 116.0 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av yield	316	353	343	383	358	432	351	376	526	460

64(168)

(i) 737 Kg/ha. (ii) 155.5 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	871	748	763	823	624	665	717	713	654	793

Crop :- Cotton (Kharif).

Ref :- Pb. 64(9), 65(288).

Site : Cotton Res. Stn., Jullundur.

Type : 'C'.

Object :-To study the effect of pruning at different stages of crop growth on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) Nil. (ii) Sandy loam. (iii) 22.4.64; 25.5.65. (iv) (a) 4 to 5 ploughings. (b) Dibbling. (c) 20 Kg/ha. (d) 61cm. x 38cm. (e)--- (v) N.A. (vi) F-320. (vii) Irrigated. (viii) 2 weedings; 3 hoeings. (ix) N.A. (x) 30.10.64; 18.11.64 to 15.12.64; 14.10.65, 3.12.65 and 28.12.65.

2. TREATMENTS :

Same as in expt. no. 63 (266), 64(268) conducted at Gurdaspur on page. No. 691.

3. DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 6. (iv) 4'88m. x 3'05m.; 10'06m. x 2'44m. (b) 3'66m. x 2'29m. ;N.A (v) 61cm. x 38cm.; N.A. (vi) Yes.

4. GENERAL :

(i) Satisfactory. (ii) Attack of jassids, Endrine and B.H.C. sprayed. (iii) Yield of kapas. (iv) (a) 1964 - contd. (b) No. (c) Nil. (v) Gurdaspur. (vi) N.A. (vii) Since the expt. is contd. beyond 65, individual years results are given under 5. Results.

5. RESULTS :

64(9)

(i) 538 Kg/ha. (ii) 146.3 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	646	530	558	632	441	471	544	514	451	593

65(28)

(i) 351 Kg/ha. (ii) 177.3 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	332	442	229	434	506	316	284	269	341	356

Crop :- Cotton (Kharif).**Ref :- Pb. 65(25).****Site :- Agri. Res. Sta., Jullundur.****Type :- 'C'.****Object :—To study the effect of deep ploughings and inter culture.****1. BASAL CONDITIONS:**

(i) (a) N.A. (b) Senji for fodder. (c) N.A. (ii) Sandy loam. (iii) 3.5.65. (iv) (a) 5 ploughings. (b) to (e) N.A. (v) 60 Kg/ha. of N+40 Kg/ha. of P_2O_5 . (vi) F-320. (vii) Irrigated. (viii) As. per treatments (ix) N.A. (ix) Pickings on 7.10.65; 1.11.65 and 27.12.65.

2. TREATMENTS:

Same as in expt. no. 63(56), 64(43), 65(51) conducted at Abohar on page. No.689.

3. DESIGN:

(i) Split-plot. (ii) (a) 3 main-plots/replication; 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) No. (b) 1/400 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Endrine sprayed. (iii) Yield of kapas. (iv) (a) 1965-only. (b) No. (c) Nil. (v) (a) Abohar, and Gurdaspur. (b) Nil. (vi) and (vii) Nil.

5. RESULTS:

(i) 715 Kg/ha. (ii) (a) 161.2 Kg/ha. (b) 71.6 Kg/ha. (iii) Main effect of C alone is highly significant. (iv) Av. yield of kapas in Kg/ha.

	T ₁	T ₂	T ₃	Mean
C ₁	674	702	550	642
C ₂	745	714	683	714
C ₃	812	838	713	788
Mean	744	751	649	715

C.D. for C marginal means=61.4 Kg/ha.

Crop :- Cotton (Kharif).**Ref :- Pb. 64(76),****Site :- Punjab Agri. University, Ludhiana.****Type :- 'C'.****Object :—To study the effect of deep ploughing and intercultures on the yield of Cotton.****1. BASAL CONDITIONS:**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 16.5.64. (iv) (a) As per treatments. (b) to (e) N.A. (v) 62 Kg/ha. of N+37 Kg/ha. of P_2O_5 . (vi) N.A. (vii) Irrigated. (viii) One thinning. (ix) N.A. (x) 2.11.64 to 9.12.64.

2. TREATMENTS:

Same as in expt. no. 63(56), 64(43). 65(51) conducted at Abohar on page. No. 689.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication; 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) 4'88m. × 4'88m. (b) 3'66m. × 4'27m. (v) 61cm. × 30cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Attack of jassids and white fly Endrine sprayed twice. (iii) Yield of kapas. (iv) (a) 1964-only (b) No. (c) Nil. (v) Abohar, Gurdaspur. (vi) and (vii) Nil.

5. RESULTS :

(i) 272 Kg/ha. (ii) (a) 187.1 Kg/ha. (b) 105.1 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

	T ₁	T ₂	T ₃	Mean
C ₁	319	211	253	261
C ₂	269	237	311	272
C ₃	296	290	263	283
Mean	295	246	276	272

Crop :- Cotton (*Kharif*).

Ref :- Pb. 64(78), 65(20).

Site :- Punjab. Agri. University ; Ludhiana.

Type :- 'C'.

Object :- To study the effect of pruning at different stages of crop growth on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) Middle of May, 64; 3 rd week of May, 65. (iv) (a) 4-5 ploughings (b) to (e) N.A. (vi) F-320. (vii) Irrigated. (viii) 3 weedings. (ix) N.A. (x) 30.10.64. and 15.12.64; middle of Oct. to last week of Dec.

2. TREATMENTS :

10 dates of pruning : D₀=No pruning; D₁=25 th July, D₂=15 th Aug., D₃=5 th Sept., D₄=25 th July + 15th Aug., D₅=25 th July + 5 th Sept., D₆=15 th Aug. + 5 th Sept., D₇=25 th July + 15 th Aug. + 5 th sept., D₈=5 th Aug. and D₉=25 th Aug.

3. DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 6. (iv) (a) 4'88m. × 3'05m.; N.A. (b) 3'66m. × 2'29m.; 1/417 ha. (v) 61cm. × 38cm.; N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Endrine sprayed against jassids attack (iii) Yield of kapas. (iv) (a) 1964-contd. (b) No. (c) Nil. (v) Abohar. (vi) Nil. (vii) Since the expt. is contd. beyond 65, individual years results are presented under 5. Results.

5. RESULTS :

64(78)

(i) 737 Kg/ha. (ii) 155.5 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha,

Treatment	D ₀	D ₁	D ₂	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	D ₉
Av. yield	87	748	763	824	624	665	717	713	654	793

65(20)

(i) 194 Kg/ha. (ii) 247.7 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	D ₀	D ₁	D ₂	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	D ₉
Av. yield	298	127	188	178	257	186	111	116	193	284

Crop :- Cotton (Kharif).

Ref :- Pb. 63(180).

Site :- Agri. Farm, Nasirpur.

Type :- 'C'.

Object :- To study the effect of different dates of pruning on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loamy soil. (iii) 11.5.63. (iv) (a) 5 ploughings. (b) to (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) 4 weedings. (ix) N.A. (x) 10.10.63 to 6.11.63.

2. TREATMENTS :

Same as in expt. No. 64(78), 65 (20) on page. No. 694.

3. DESIGN :

(i) R.B.D (ii) (a) 10. (b) N.A. (iii) 6. (iv) (a) and (b) 4.27m. x 4.88m. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) 10% B.H.C. sprayed against Fikka. (iii) Yield of kapas. (iv) (a) 1963-only. (b) No. (c) Nil. (v) Abohar, Ludhiana. (vi) and (vii) Nil.

5. RESULTS :

(i) 1287 Kg/ha. (ii) 182.1 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment.	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Av. yield	1450	1273	1233	1341	1149	1301	1305	1273	1321	1221

Crop :- Cotton (Kharif).

Ref :- Pb. 62(46),

Site :- Cotton Res. Stn., Abohar

Type :- 'CM'.

Object :- To study the effect of different dates of sowing and spacing with different levels of N on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) As per treatments. (iv) (a) 3 to 4 ploughings. (b) and (c) N.A. (d) As per treatments. (e) N.A. (v) Nil. (vi) F-320. (vii) Irrigated. (viii) 3 hoeings. (ix) N.A. (x) during Dec., 62.,

2. TREATMENTS :

Main-plot treatments :

All combinations of (1) and (2)

(1) 4 dates of sowing : $D_1=30.3.62$, $D_2=20.4.62$, $D_3=9.5.62$ and $D_4=6.6.62$.(2) 3 spacings between rows : $S_1=46$, $S_2=61$ and $S_3=76$ cm.

Sub-plot treatments :

3 levels of N : $N_0=0$, $N_1=56$ and $N_2=112$ Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 12 main-plots/replication; 3 sub-plots/main-plot (b) N.A. (iii) 3. (iv) (a) 8'23m. x 3'35m. (b) 8'23m. x 2'29m. (v) 53cm. on either side. (vi) Yes.

4. GENERAL :

(i) Satisfactory. (ii) Nil. (iii) Yield of kapas. (iv) (a) 1962-only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 567 Kg/ha. (ii) (a) 260.3 Kg/ha. (b) 138.2 Kg/ha. (iii) Main effects of D, S and N are highly significant. (iv) Av. yield of kapas in Kg/ha.

	D_1	D_2	D_3	D_4	S_1	S_2	S_3	Mean
N_0	601	455	216	524	515	454	377	449
N_1	730	567	348	611	610	691	391	564
N_2	846	669	440	796	741	760	562	688
Mean	726	564	335	644	622	635	443	567
S_1	707	702	373	708				
S_2	837	603	378	721				
S_3	633	386	253	502				

C.D. for D marginal means=146.9 Kg/ha.

C. D. for S marginal means=127.2 Kg/ha.

C.D. for N marginal means=65.6 Kg/ha.

Crop :- Cotton (*Kharif*).

Ref :- Pb. 63(58).

Site :- Cotton Res. Stn., Abohar.

Type :- 'CM'.

Object :- To study the suitable crops that can be grown in rotation with Cotton under adequate manuring.

1. BASAL CONDITIONS :

(i) Asper treatments. (ii) Sandy loam. (iii) 16.5.63. (iv) (a) 4-5 ploughings. (b) to (e) N.A. (v) Nil. (vi) F-320. (vii) Irrigated. (viii) Thinning on 22.6.63. (ix) N.A. (x) Nov. and Dec., 63

2. TREATMENTS :

All combinations of (1) and (2).

(1) 6 previous crops rotations of cotton: T_1 =Cotton after Wheat-Guara-Torla, T_2 =Cotton after Chari-Gaura, T_3 =Cotton after Gaura-Wheat, T_4 =Cotton after Gaura, T_5 =Cotton after Pea and T_6 =Cotton (No previous crop.)

(2) 3 levels of N :— $N_0=0$, $N_1=28$ and $N_2=56$ Kg/ha. of N.

3. DESIGN :

(i) R.B.D. (ii) (a) 18. (b) N.A. (iii) 4. (iv) (a) 1/197.7 ha. (b) 1/247.1 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) 1/2 litre endrine sprayed on 21.9.63. (iii) Yield of kapas. (iv) (a) 1963-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 1264 Kg/ha. (ii) 256.6 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of kapas in Kg/ha.

	T_1	T_2	T_3	T_4	T_5	T_6	Mean
N_0	840	927	883	1082	964	796	915
N_1	1248	1431	1269	1496	1206	1339	1332
N_2	1562	1489	1517	1674	1575	1454	1545
Mean	1217	1282	1223	1417	1248	1196	1264

C.D. for N marginal means = 148.9 Kg/ha.

Crop :- Cotton (Kharif).

Ref :- Pb. 63(59),

Site :- Cotton Res. Stn., Abohar.

Type :- 'CM'.

Object :- To study the effect of intercropping on the yield of Cotton.

1. BASAL CONDITIONS :

(i)(a) N.A. (b) Cotton. (c) N.A. (ii) Sandy loam. (iii) 6.5.63. (iv) (a) 4 to 5 ploughings. (b) and (c) N.A. (d) As per treatments. (e) N.A. (v) 24.7 Kg/ha. of N applied as basal dose. (vi) F-320 (cotton), Pb-13 (Bhindi), Pb-10 (cow pea). (vii) Irrigated. (viii) Two thinnings. (ix) N.A. (x) Nov. and Dec., 63.

2. TREATMENTS :

All combinations of (1) and (2)+2 extra treatments.

(1) 8 intercropping treatments :— T_1 =Cotton (normal spacing 61cm. x 46cm.), T_2 =Cotton (wide spacing 91cm. x 30cm.), T_3 = T_2 +one row of Bhindi as intercrop (for seed), T_4 = T_2 +two rows of Bhindi as intercrop (for seed), T_5 = T_2 +one row of cowpea as intercrop (for pods), T_6 = T_2 +two rows of cowpea as intercrop (for pods), T_7 = T_2 +two rows of guara as intercrop (for fodder) and T_8 = T_2 +two rows of Guara as intercrop (for G.M.)

(2) 2 levels of N at flowering : $N_1=28$ and $N_2=56$ Kg/ha. of N as top dressing

Extra treatments E_1 =Cotton with normal spacing and E_2 =Cotton with wide spacing.

Treatments T_3 to T_8 were applied 15 Kg/ha. of P_2O_5 at sowing.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 18. (b) N.A. (iii) 4. (iv) (a) 1/198 ha. (b) 1/247 ha. (v) N.A. (vi) Yes.

4. GENERAL :

- (i) Satisfactory. (ii) Nil. (iii) Yield of kapas. (iv) (a) 1963 to 65(modified every year) (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

- (i) 741 Kg/ha. (ii) 217.4 Kg/ha. (iii) Main effects of T and extra treatments ns others are highly significant. (iv) Av. yield of kapas in Kg/ha.

$E_1=1133$, Kg/ha. and $E_2=959$ Kg/ha.

	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	Mean
N ₁	1179	757	533	569	232	295	753	949	658
N ₂	1240	961	756	539	283	170	1194	838	748
Mean	1210	859	644	554	258	232	974	894	703

C.D. for T marginal means=218.5 Kg/ha.

C.D. for extra vs. others=163.9 Kg/ha.

Crop :- Cotton (Kharif).

Site :- Cotton Res. Stn ; Abohar

Ref :- 64(46).

Type :- 'CM'.

Object :- To study the effect of intercropping on the yield of Cotton.

1. BASAL CONDITIONS:

- (i) (a) N.A. (b) Cotton. (c) N.A. (ii) Sandy loam. (iii) 8.5.64. (iv) (a) 4 to 5 ploughings. (b) and (c) N.A. (d) As per treatments. (e) N.A. (v) 25 Kg/ha. of N as basal dose. (vi) F-320. (vii) Irrigated. (viii) 2 hoeings (ix) N.A. (x) Nov. and Dec., 64.

2. TREATMENTS :

All combinations of (1) and (2)+4 Extra treatments

(1) 8 intercropping treatments : T₁=Cotton with spacing 60cm.×45cm(Normal), T₂=Cotton with spacing 90cm.×30cm.(wide), T₃=T₂+one row of Bhindi Pb. 13. as intercrop (for seed), T₄=T₂+two rows of Bhindi Pb. 13as intercrop (for seed), T₅=T₂+one row of cowpea Braco as intercrop (for pod) T₆=T₂+two rows of cowpea Pb. 10 as intercrop (for G.M.), T₇=T₂+two rows of Guara as intercrop (for fodder) and T₈=T₂+two rows of Guara as intercrop (for G.M.)

(2) 2 levels of N : N₁=60 and N₂=120 Kg/ha. of N. at flowering stage.

Extra treatments : E₁=Cotton with normal spacing, E₂=Cotton with wide spacing, E₃=E₂+2 rows of cowpea Pb. 10 as intercrop (for G.M.) and E₄=E₂+2 rows of Guara as intercrop (for G.M.).

Treatments T₆ to T₈ were applied 40 Kg/ha. of P₂O₅.

3. DESIGN:

- (i) R.B.D. (ii) (a) 20. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 2.44m.×5.49m. for T₁ and 1.83m.×5.79m. for T₂ to T₈ (v) N.A. (vi) Yes.

4. GENERAL:

- (i) Normal. (ii) Nil. (iii) Yield of kapas. (iv) (a) 1963-65. (1963and 65N.A. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil

5. RESULTS :

- (i) 1119 Kg/ha. (ii) 323.7 Kg/ha. (iii) Main effects of T and N are highly significant. (iv) Av. yield of kapas in Kg/ha.

$E_1=816$, $E_2=1176$, $E_3=1078$ and $E_4=1258$ Kg/ha.

	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	Mean
N ₁	1380	1482	1166	803	326	748	722	751	922
N ₂	1691	1617	1552	1515	795	1341	1154	1621	1411
Mean	1536	1550	1359	1159	560	1044	938	1186	1166

C.D. for T marginal means=324.2 Kg/ha,
C.D. for N marginal means=162.1 Kg/ha.

Crop :- Cotton (Kharif).

Ref : Pb. 65(49).

Site :- Cotton Res. Stn., Abohar.

Type :- 'CM'.

Object :- To study the effect of inter cropping on the yield of Cotton,

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Cotton. (c) N.A. (ii) Sandy loam. (iii) 6.5.65. (iv) (a) 3 to 4 ploughings. (b) to (c) N.A. (v) Nil. (vi) F-320. (vii) Irrigated. (viii) 1 suhaga and 2 hoeings. (ix) N.A. (x) 16.11.65 to 10.12.65.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 8 cultural treatments : T₁=Cotton (Normal spacing 60cm. × 45cm.), T₂=Cotton (wide spacing 90cm. × 30 cm.), T₃=T₂+Bhindi one row for seeds, T₄=T₂+Bhindi 2 rows for seeds, T₅=T₂+Cowpea 1 row for grain, T₆=T₂+Cowpea (2 rows for G.M.), T₇=T₂+Guara (2 rows for fodder) and T₈=T₂+Guara (2 rows for G.M.)

(2) 2 levels of N : N₁=60, and N₂=120 Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 16. (b) N.A. (iii) 4. (iv) (a) 3.60m. × 6.30m. (b) 2.40m. × 5.40m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) 2 arial spray of .02% sol. of endrine. (iii) Yield of kapas. (iv) (a) 1963-65 (modified evrey year). (b) No. (c) Nil. (v) Jullundur. and Ludhiana. (vi) and (vii) Nil.

5. RESULTS :

(i) 949 Kg/ha. (ii) 144.0 Kg/ha. (iii) Main effects of T and N are highly significant. (iv) Av. yield of kapas in Kg/ha.

	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	Mean
N ₁	1144	1021	1077	631	341	1021	505	992	841
N ₂	1305	1440	1440	919	278	1038	809	1233	1058
Mean	1224	1230	1258	775	309	1029	657	1112	949

C.D. for T marginal means=145.2 Kg/ha.

C.D. for N marginal means=72.6 Kg/ha.

Crop :- Cotton.(*Kharif*).

Ref :- 63(169).

Site :- Agri. Res. Stn., Gurdaspur.

Type :- 'CM'.

Object :—To study the effect of crop rotation in combination with different doses of N on the yield of Cotton.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) Cotton. (c) N.A. (ii) Heavy loam. (iii) 16.5.63. (iv) (a) 5 ploughings. (b) to (e) N.A. (v) N.A. (vi) 231-R. (vii) Irrigated. (viii) 4 weedings. (ix) N.A. (x) 26.11.63 to 11.1.64.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 6 previous crop rotations to Cotton : T_1 =Cotton after Wheat-Guara (G.M.), T_2 =Cotton after Guara-Gram, T_3 =Cotton after G.M.—Wheat, T_4 =Cotton after Guara, T_5 =Cotton after Peas and T_6 =Cotton (no previous crop)

(2) 3 levels of N :- $N_0=0$, $N_1=28$, and $N_2=56$ Kg/ha.

3 DESIGN :

(i) Fact. in R.B.D. (ii) (a) 18. (b) N.A.(iii) 4. (iv) (a) and (b) N.A. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Endrine 20% sprayed against Jassids attack. (iii) Yield of kapas. (iv) 1963-only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 232 Kg/ha.(ii) 64.81 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

	T_1	T_2	T_3	T_4	T_5	T_6	Mean
N_0	280	197	239	232	244	241	239
N_1	211	226	209	251	244	202	224
N_2	260	220	265	205	216	236	234
Mean	250	214	238	229	235	226	232

Crop :- Cotton (*Kharif*);

Ref :- Pb. 63(178), 64(167).

Site :- Agri. Res. Stn., Gurdaspur.

Type :- 'CM'.

Object :—To study the effect of intercropping on the yield of Cotton.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) Senji-cotton. (c) N.A. (ii) Heavy loam; loamy. (iii) 18,4.63; 21/22.4.64. (iv) 4 to 6 ploughings (b) and (c) N.A. (d) As per treatments. (e) N.A. (v) Senji as G.M.; 259 Kg/ha. of C/A/N. (vi) R-231. (vii) Irrigated. (viii) 4 weedings. (ix) N.A. (x) 1.10.63 to 7.12.63; 13.9.64; to 27.10.64.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 8 cultural treatments: T_1 =Cotton with normal spacing 61cm.×46cm., T_2 =Cotton wide spacing of 91 cm. ×30cm., T_3 =Cotton wide + Bhindi (for fruit), T_4 =Cotton wide + two rows of Bhindi (for fruit), T_5 =Cotton cowpea one row for grain, T_6 =Cotton wide + two rows of cowpea for G.M., T_7 =Cotton wide + Guara two rows for G.M. and T_8 =Cotton wide + Guara two rows for fodder.

(2) 2 levels of N as C/A/N: $N_1=28$ and $N_2=56$ Kg/ha.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 16. (b) N.A. (iii) 4. (iv) (a) 1/198ha.; 11.89m.×3.66m. (b) 1/247 ha.; 10.67m.×3.66m. (v) N.A.; 61cm. on either side. (vi) Yes.

4. GENERAL :

(i) Normal, Poor. (ii) 10% B.H.C. against tikka; Jassids attack controlled by endrine (iv) (a) 1963-64. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Nil. (vii) Error variances are heterogeneous and Treatments×Years interaction is present.

5. RESULTS :

Pooled results.

(i) 248 Kg/ha. (ii) 245.3 Kg/ha. (based on 15 d.f. made up of Treatments×Years interaction) (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	Mean
N_1	347	246	311	303	100	90	288	259	243
N_2	314	288	303	292	80	109	317	317	252
Mean	330	267	307	297	90	99	302	288	248

Individual results

Treatments Years	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	Sig.	N_1	N_2	Sig.	G.M.	S.E./plot.
1963	586	464	528	434	124	134	520	514	**	405	436	N.S.	421	104.3
1964	75	70	86	101	56	65	86	62	**	81	69	N.S.	75	95.4
Pooled	330	267	307	297	90	99	302	288	N.S.	243	252	N.S.	248	245.3

Crop :- Cotton (*Kharif*).

Ref :- Pb. 65(27).

Site :- Cotton Res. Stn., Jullundur.

Type :- 'GM'.

Object :- To study the effect of intercropping on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 16.5.65. (iv) (a) 3 ploughings (b) to (e) N.A. (v) N.A. (vi) F-320. (vii) Irrigated. (viii) and (ix) N.A. (x) 21.10.65 to 2.12.65.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 8 cultural treatments: T_1 =Cotton normal spacing 60cm. \times 45cm., T_2 =Cotton with spacing 90cm. \times 30cm., T_3 = T_2 +Bhindi (one row) as intercrop, T_4 = T_2 +Bhindi (2 rows) as intercrop, T_5 = T_2 +Cowpea (1 row) as intercrop, T_6 = T_2 +Cowpea (2 rows for G.M.) as intercrop, T_7 = T_2 +Guara (2 rows for fodder) as intercrop and T_8 = T_2 +Guara (2 rows for G.M.) as intercrop.

(2) 2 levels of N: N_1 =60 and N_2 =120 Kg/ha.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 16. (b) N.A. (iii) 4. (iv) (a) 7.32m. \times 3.81m. (b) 1/500 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) 2 endrine spray against Jassids aphids attack. (iii) Yield of kapas. (iv) (a) 1963-65. (b) No. (c) Nil. (v) Abohar and Ludhiana. (vi) and (vii) Nil.

5. RESULTS :

(i) 683 Kg/ha. (ii) 133.4 Kg/ha. (iii) Main effect of T alone is highly significant. (iv) Av. yield of kapas in Kg/ha.

	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	Mean
N_1	799	662	699	705	741	537	692	546	673
N_2	876	814	739	698	689	491	612	632	694
Mean	837	738	719	702	715	514	652	589	683

C.D. for T marginal means=134.5 Kg/ha.

Crop :- Cotton (Kharif).

Ref:- Pb.63(92).

Site :- Punjab Agri. University, Ludhiana.

Type :- 'CM'.

Object :- To study the effect of intercropping on the yield of Cotton.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) May, 63. (iv) (a) 3 ploughings. (b) and (c) N.A. (d) As per treatments. (e) N.A. (v) 25 Kg/ha. of N at sowing. (vi) F-320 (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) Pickings from 20.11.63. to 9.1.64.

2. TREATMENTS:

All combinations of (1) and (2)+2 extra treatments.

6 intercropping treatments: T_1 =Cotton with normal spacing (60cm. \times 45cm.), T_2 =Cotton with wide spacing (90cm. \times 30cm.), T_3 = T_2 +One row of Bhindi as intercrop, T_4 = T_2 + two rows of Bhindi as intercrop, T_5 = T_2 +two rows of Guara (for fodder) as intercrop and T_6 = T_2 +two rows of Guara (for G.M.) as intercrop.

(2) 2 levels of N: N_1 =60 and N_2 =120 Kg/ha. of N at flowering.

Extra treatments: E_1 =Cotton with normal spacing and E_2 =Cotton with wide spacing.

T_5 and T_6 were applied 40 Kg/ha of P_2O_5 .

3. DESIGN:

(i) R.B.D. (ii) (a) 14. (b) N.A. (iii) 4. (iv) (a) 5.49m. \times 6.71m. (b) 4.27m. \times 5.26m. (v) 61cm. \times 72cm. (vi) Yes.

4. GENERAL :

(i) Poor. (ii) Severe attack of jassid, foliolid sprayed. (iii) Yield of kapas. (iv) (a) 1963-65 (Treatments modified). (b) No. (c) Nil. (v) Abohar. (vi) and (vii) Nil.

5. RESULTS :

(i) 164 Kg/ha. (ii) 93.8 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

$E_1=188$ and $E_2=70$ Kg/ha.

	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	Mean
N ₁	282	128	144	186	118	184	174
N ₂	202	96	182	218	165	133	166
Mean	242	112	163	202	142	158	170

Crop :- Cotton (Kharif).

Ref :- Pb. 65(34).

Site :- Punjab Agri. University, Ludhiana.

Type :- 'CM'.

Object :-To study the effect of intercropping on the yield of Cotton.

1. BASAL CONDITIONS :

(i) N.A. (ii) Sandy loam. (iii) Mid. of May, 65. (iv) (a) 3 ploughings. (b) and (c) N.A. (d) As per treatments. (e) N.A. (v) N.A. (vi) F-320. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) 25.10.65. and 5.12.65.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 8 cultural treatments: T₁=Cotton with normal spacing (60cm. × 45cm.), T₂=Cotton with wide spacing 90cm. × 30cm., T₃=T₂+Bhindi(one row) as intercrop, T₄=T₂+Bhindi (2rows) as inter crop, T₅=T₂+ Cowpea one row for G.M.) as inter crop, T₆=T₂+cowpea(2 rows for G.M.) as intercrop, T₇=T₂+Guara (2 rows for fodder)as intercrop and T₈=T₂+Guara (2 rows for G.M.) as intercrop.

(2) 2 levels of N : N₁=60, and N₂=120 Kg/ha.

25 Kg of N at sowing and rest after flowering.

3. DESIGN :

(i) R.B.D. (ii) (a) 16. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/280 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Sprayings of endrine against jassid. (iii) Yield of kapas. (iv) (a) 1963-65 (treatments modified) (b) No. (c) Nil. (v) (a) Abohar. Jullundur. (vi) Nil. (vii) Due to severe attack of jassids in 1964. Yield was very low and experiment was treated as vitiated.

5. RESULTS :

(i) 196 Kg/ha. (ii) 75.0 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	Mean
N ₁	189	240	167	157	171	190	204	262	197
N ₂	202	176	172	192	200	219	190	209	195
Mean	195	208	169	175	186	204	197	235	196

Crop :- Cotton (Kharif).

Ref :- Pb. 64(45), 65(61),

Site :- Cotton Res. Stn., Abohar.

Type :- 'IM'.

Object :- To determine the irrigation requirements of Cotton and its interaction with manuring.

1. BASAL CONDITIONS ;

(i) (a) N.A. (b) Raya. (c) N.A. (ii) Sandy loam. (iii) 8.5.64; 28.4.65. (iv) (a) 3 to 5 ploughings. (b) to (c) N.A. (v) 40 Kg/ha. of P_2O_5 + 40Kg/ha. of K_2O . (vi) F-320. (vii) Irrigated. (viii) and (ix) N.A. (x) 1.11.64 and 1.12.64; 11.11.65. and 10.12.65.

2. TREATMENTS :

Main-plot treatments :-

8 irrigational treatments : W_0 = Local method of irrigation , $W_1 = t_1 t_1$, $W_2 = t_2 t_1$, $W_3 = t_3 t_2$, $W_4 = t_2 t_3$, $W_5 = t_3 t_1$, $W_6 = t_1 t_2$ and $W_7 = t_2 t_3$ Where $t_1 = 25\%$, $t_2 = 50\%$ and $t_3 = 75\%$ indicate the levels of the soil moisture consumed at irrigation. In any treatment the first letter with its suffix indicates the level of soil moisture consumed at the time of irrigation before flowering and the 2nd letter indicates after flowering and fruiting period.

Sub-plot treatments :

3 levels of N : $N_0 = 0$, $N_1 = 60$ and $N_2 = 120$ Kg/ha.

3. DESIGN:

(i) Split-plot. (ii) (a) 8 main-plots/replication, 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) 7.10m. x 4.88m.; 13.05m. x 3.00m. (b) 6.40m. x 1.83m.; 12.15m. x 1.80m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Aerial spray of endrine against jassids attack. (iii) Yield of kapas. (iv) (a) 1964-contd. (b) No. (c) Nil. (v) N.A. (vi) Nil. (vii) Since the expt. is contd. beyond 65, individual years results are presented under 5. Results.

5. RESULTS:

64(45)

(i) 779 Kg/ha. (ii) (a) 209.6 Kg/ha. (b) 172.0 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of kapas in Kg/ha.

	W_0	W_1	W_2	W_3	W_4	W_5	W_6	W_7	Mean
N_0	483	555	515	510	579	643	679	551	564
N_1	771	643	920	709	754	876	826	747	787
N_2	993	974	1021	914	940	1153	1006	929	991
Mean	749	724	819	711	758	891	837	742	779

C.D. for N marginal means = 86.6 Kg/ha.

65(61)

(i) 861 Kg/ha. (ii) (a) 205.7 Kg/ha. (b) 114.3 Kg/ha. (iii) Main effect of W is significant. Main effect of N is highly significant (iv) Av. yield of kapas in Kg/ha.

	W_0	W_1	W_2	W_3	W_4	W_5	W_6	W_7	Mean
N_0	747	740	666	701	547	609	627	620	657
N_1	932	1125	983	1041	751	904	817	740	912
N_2	981	1305	1089	1104	834	1061	849	882	1013
Mean	887	1057	913	949	711	858	764	747	861

C.D. for W marginal means = 174.7 Kg/ha.

C.D. for N marginal means = 57.6 Kg/ha.

Crop :- Cotton (Kharif).
Site :- Cotton Res. Stn., Abohar.

Ref :- Pb. 63(57),
Type :- 'D'.

Object :- To study the effect of beta naphthoxyacetic acid (NOA) spraying on crop growth and yield of Cotton.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy Loam. (iii) 25.4.63. (iv) (a) 4 to 5 ploughings. (b) to (e) N.A. (v) Nil. (vi) 320-F. (vii) Irrigated. (viii) Thinning. (ix) N.A. (x) Nov. and Dec., 63.

2. TREATMENTS :

All combinations of (1), (2) and (3)+Control.

(1) 3 concentrations of NOA : $C_1=5$, $C_2=10$ and $C_3=15$ ppm.

(2) 2 wetting agents : $W_0=$ Without water and $W_1=$ With water.

(3) 3 times of spray : $T_1=$ One week after opening of 1st flower, $T_2=$ 2 weeks after opening of 1st flower and $T_3=$ 3 weeks after opening of 1st flower.

3. DESIGN :

(i) R.B.D. (ii) (a) 20 (2 control plots in each replication) (b) N.A. (iii) 4. (iv) (a) 1/198 ha. (b) 1/247 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Satisfactory. (ii) Spray with 1% solution of NOA in Alcohol on 24.8.63, Endrine spray on 23.9.63. (iii) Yield of kapas. (iv) (a) 1963-only (b) No. (c) Nil. (v) Gurdaspur. (vi) and (vii) Nil.

5. RESULTS :

(i) 323 Kg/ha. (ii) 64.1 Kg/ha. (iii) Main effect of C alone is significant. (iv) Av. yield of kapas in Kg/ha.

	C_1	C_2	C_3	T_1	T_2	T_3	Mean
W_0	339	308	314	313	333	316	320
W_1	368	289	319	311	327	333	325
Mean	353	299	317	312	330	327	323
T_1	344	284	308				
T_2	356	322	312				
T_3	360	291	330				

C.D. for C marginal means=37.0 Kg/ha.

Crop :- Cotton (Kharif).

Ref:-Pb. 63(53), 64(37), 65(55),

Site :- Cotton Res, Stn., Abohar.

Type :- 'D'.

Object :- To determine suitable method of controlling weeds and its effects on the yield of Cotton.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 26.4.63 ; 2.6.64 ; 4.5.65. (iv) (a) 3 to 4 ploughings. (b) to (e) N.A. (v) N.A. (vi) F.-320. (vii) Irrigated. (viii) Hoeings and thinning. (ix) N.A. (x) Nov. and Dec., 63 ; 11.11.64 and 6.12.64 ; 10.11.65 and 10.12.65.

2. TREATMENTS :

10 weedicidal treatments : W_0 =Unweeded, W_1 =Local method of weeding, first hoeing with Kasaula followed by two hoeings with Lyallpur hoe, W_2 =Eptam (Ethyl-NN-Dipropyl-thiolcarbamat) at 2.2 Kg/ha., W_3 =Eptam at 4.5Kg/ha., W_4 =CMU (chlorometry) at 0.5 Kg/ha., W_5 =CMU at 1.0 Kg/ha., W_6 =PCP (Penta-chlorophenol) E.C. 12%, at 24.7 Kg/ha., W_7 =PCP, E.C. 12% at 49.4Kg/ha., W_8 =Dowpon (2,2-Dichloro propionic Acid) at 5 Kg/ha. and W_9 =Dowpon at 9.9 Kg/ha.

Treatment W_1, W_2 were applied at pre-planting stage and W_4 to W_9 at pre-emergence stage.

3. DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 6. (iv) (a) 1/198 ha. ; N.A. ; 8.10m. × 3.00m. (b) 1/247 ha. ; N.A. 7.20m. × 1.80m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Poor for 63 ; N.A. for others. (ii) D.D.T and B.H.C sprayed ; Nil ; Endrine sprayed against Jassids. (iii) Yield of kapas (iv) (a) 1963-contd. (b) No (c) Nil, (v) Gurdaspur, Jullundur. (vi) Nil. (vii) Since the expt. is contd. beyond 65, individual years results are presented under 5. Results.

5. RESULTS:

63(53)

(i) 97 Kg/ha. (ii) 60.5 Kg/ha. (iii) Treatment differences are highly significant (iv) Av. yield of kapas in Kg/ha.

Treatment	W_0	W_1	W_2	W_3	W_4	W_5	W_6	W_7	W_8	W_9
Av. yield	77	498	49	32	53	69	63	47	33	47

C.D.=70.4 Kg/ha.

64(37)

(i) 105 Kg/ha. (ii) 32.5 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	W_0	W_1	W_2	W_3	W_4	W_5	W_6	W_7	W_8	W_9
Av. yield	133	204	74	87	106	86	85	86	102	89

C.D.=37.8 Kg/ha.

65(55)

(i) 600 Kg/ha. (ii) 229.9 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	W_0	W_1	W_2	W_3	W_4	W_5	W_6	W_7	W_8	W_9
Av. yield	505	1365	502	566	625	618	615	630	257	314

C.D.=267.6 Kg/ha.

Crop :- Cotton (Kharif).

Site :- Cotton Res. Stn., Abohar.

Ref :- Pb. 64(107).

Type :- 'D'.

Object :- To study the effect of soaking cotton seed in different concentrations of some plant regulators on growth and yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Gram. (c) N.A. (ii) Sandy loam. (iii) 13.5.64. (iv) (a) One ploughing with desi plough. (b) to (e) N.A. (v) Nil. (vi) 320-F. (vii) Irrigated. (viii) Dry hoenig. (ix) N.A. (x) Nov/Dec., 64.

2. TREATMENTS :

All combinations of (1), (2), (3) and (4)

(1) 3 plant regulators: P_1 =N.A.A.-(naphthalene acetic acid), P_2 =IAA indole 3 acetic and P_3 =I BA-indole-3-butyric acid.

(2) 3 concentrations of plant regulators : $C_1=10$, $C_2=20$ and $C_3=30$ ppm.

(3) 3 spacings : $S_1=60 \times 15$, $S_2=60 \times 30$ and $S_3=60 \times 45$ sq cm.

(4) 3 levels of N : $N_1=60$, $N_2=120$, and $N_3=180$ Kg/ha.

3. DESIGN:

(i) 3^4 partial confd. (ii) (a) 9 plots/block; 9 blocks/replication. (b) N.A. (iii) 1. (iv) (a) N.A. (b) 1.83m. x 0.61m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of kapas. (iv) (a) 1964-only. (b) No. (c) Nil. (v) Jullundur (vi) and (vii) N.A.

5. RESULTS:

(i) 639 Kg/ha. (ii) 191.7 Kg/ha. (iii) Main effects of N, S and P are highly significant. (iv) Av. yield of kapas in Kg/ha.

	S_1	S_2	S_3	N_1	N_2	N_3	C_1	C_2	C_3	Mean
P_1	484	412	349	246	432	566	446	405	394	415
P_2	985	770	675	568	834	1028	749	775	906	810
P_3	883	675	516	557	652	865	566	784	725	692
Mean	784	619	513	457	639	820	587	655	675	639
C_1	697	643	421	400	627	734				
C_2	817	544	603	473	639	852				
C_3	838	670	516	498	652	874				
N_1	593	439	340							
N_2	786	639	494							
N_3	974	779	706							

C.D. for N, S or P marginal means=105.4 Kg/ha.

Crop :- Cotton (Kharif).

Ref.-Pb. 64(133).

site :- Cotton Res. Stn., Abohar.

Type:-D'.

Object :-To determine ideal plant population. for obtaining high cotton yield under conditions of high fertilizer and restricted plant growth.

1. BASAL CONDITIONS:

(i) (a) Nil. (b) Guara for seed. (c) N.A. (ii) Sandy loam. (iii) 5.5.64. (iv) (a) to (c) N.A. (d) and (e) As per treatments. (v) Basal dressnig of 40 Kg/ha. each of P_2O_5 and K_2O (vi) 320-F. (vii) Irrigated. (viii) 1 weeding and one hoeing. (ix) N.A. (x) Picking on 7.11.64 and 26.11.64.

2. TREATMENTS :

All combinations of (1), (2), (3) and (4).

(1) 3 spacings :— $S_1=60\text{cm.} \times 30\text{cm.}$, $S_2=60\text{cm.} \times 45\text{cm.}$ and $S_3=60\text{cm.} \times 60\text{cm.}$

(2) 3 plant populations :— $P_1=1$, $P_2=2$, $P_3=3$ plants/hill.

(3) 3 levels of N :— $N_0=0$, $N_1=75$ and $N_2=150$ Kg/ha.

(4) 3 levels of N.A.A :— $H_0=0$, $H_1=20$ and $H_2=40$ ppm.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 81 (b) N.A. (iii) 1 (iv) (a) N.A. (b) $6'40\text{m.} \times 1'83\text{m.}$ (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of kapas. (iv) (a) and (b) No, (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 1085 Kg/ha. (ii) 237.2 Kg/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of kapas in Kg/ha.

	N_0	N_1	N_2	H_0	H_1	H_2	P_0	P_1	P_2	Mean
S_1	891	1166	1157	1121	993	1100	1037	996	1181	1071
S_2	969	1059	1376	1141	1118	1146	1077	1144	1184	1135
S_3	803	1110	1235	1021	1117	1004	1042	1042	1063	1049
Mean	888	1112	1256	1094	1076	1085	1052	1061	1143	1085
P_0	928	1067	1162	1032	1047	1078				
P_1	860	1068	1254	1045	1093	1043				
P_2	875	1200	1353	1205	1088	1134				
H_0	893	1133	1256							
H_1	861	1156	1211							
H_2	909	1045	1301							

C.D. for N marginal means=136.8 Kg/ha.

Crop :- Cotton.

Ref :- Pb. 64(39), 65(54).

Site :- Cotton Res. Stn., Abohar.

Type :- 'D'.

Object :- To study the effect of Napthoxy acetic acid spray on growth and yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Gram, cotton. (c) N.A. (ii) Sandy loam. (iii) 6.5.64 ; 1.5.65. (iv) (a) 3 ploughings (b) to (e) N.A. (v) Nil. (vi) F-320. (vii) Irrigated. (viii) 1 hoeing and weeding. (ix) N.A. (x) 13.11.64 and 8.12.64 ; 13.11.65 and 12.12.65.

2. TREATMENTS :

All combinations of (1) and (2).

(1) 4 concentrations of NoA: $C_0=0$, $C_1=5$, $C_2=10$ and $C_3=15$ p.p.m.

(2) 3 times of spray : $T_1=1$, $T_2=2$, and $T_3=3$ weeks after flowering.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) N.A. : 5'85m. x 3'00m. (b) 6'40m. x 1'83m. ; 4'95m. x 1'80m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Satis factory. (ii) Aerial spray of Endrine. (iii) Yield of kapas. (iv) (a) 1964-contd. (b) No. (c) Nil. (v) Jullundur. (vi) Nil. (vii) Since the expt. is contd. beyond 65, individual years results are presented under 5. Results.

5. RESULTS:

64(39)

(i) 741 Kg/ha. (ii) 183.5 Kg/ha. (iii) None of the effects is significant (iv) Av. yield of kapas in Kg/ha.

	C ₀	C ₁	C ₂	C ₃	Mean
T ₁	700	878	850	666	774
T ₂	660	658	692	750	690
T ₃	692	865	649	829	759
Mean	684	800	730	748	741

65(54)

(i) 1919 Kg/ha. (ii) 519 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

	C ₀	C ₁	C ₂	C ₃	Mean
T ₁	1936	2029	1692	1627	1821
T ₂	2034	2287	1821	2093	2059
T ₃	2107	1692	1902	1804	1876
Mean	2028	2003	1805	1841	1919

Crop :- Cotton (Kharif).

Ref :- Pb. 63(176).

Site :- Agri. Res. Stn., Gurdaspur.

Type :- 'D'.

Object :- To study the effect of Napthaoxy acetic acid spraying on the yield of Cotton.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) Fallow. (c) Nil. (ii) Heavy loam. (iii) 16.5.63. (iv) (a) 7 ploughings. (b) to (e) N.A. (v) N.A. (vi) 231-R. (vii) Irrigated. (viii) 4 weedings. (ix) N.A. (x) 26.9.63 to 3.12.63.

2. TREATMENTS :

Same as in expt. no. 63(57) conducted at Abohar on page. No. 705.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 20(2 control plots in each replication). (b) N.A. (iii) 4. (iv) and (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) 10% B.H.C. against Tikka was sprayed. (iii) Yield of kapas. (iv) (a) 1963-only. (b) No. (c) Nil. (v) Abohar. (vi) and (vii) Nil.

5. RESULTS:

(i) 401 Kg/ha. (ii) 87.9 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

Control=361 Kg/ha.

	C ₁	C ₂	C ₃	T ₁	T ₂	T ₃	Mean
W ₀	431	391	399	405	395	420	407
W ₁	376	440	398	413	431	372	405
Mean	404	415	398	409	413	396	406
T ₁	393	403	430				
T ₂	398	470	370				
T ₃	420	373	395				

Crop :- Cotton (*Kharif*).

Ref :- Pb. 63(179), 64(162).

Site :- Govt. Agri. Stn., Gurdaspur.

Type :- 'D'.

Object :—To study the method of controlling weeds and its effect on the yield of Cotton.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) Senji; Cotton. (c) N.A. (ii) Heavy loam; Sandy loam. (iii) 13.4.63; 6.5.64. (iv) (a) 4 to 6 ploughings. (b) to (e) N.A. (v) Senji (G.M.); 35.5 Kg/ha. of C/A/N. (vi) R-231. (vii) Irrigated. (viii) 3 to 4 weedings. (ix) N.A. (x) 27.9.63 to 16.12.63; 10.10.64 to 6.11.64.

2. TREATMENTS:

Same as in expt. no. 63(53), 64(37), 65(55) conducted at Abohar on page No. 705.

3. DESIGN:

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 6. (iv) (a) 1/197ha., 9.60m. × 4.27m. (b) 1/247 ha., 8.38m. × 3.05m. (v) N.A., 61cm. × 61cm. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) B.H.C. 10% at 10Kg against Toka for 63(179), Attack of jassids and pink boll worm was controlled by endrine spraying. (iii) Yield of kapas. (iv) 1963-64. (b) and (c) No. (v) N.A. (vi) Nil. (vii) Error variances are heterogeneous and Treatments × Years interaction is present.

5. RESULTS:

Pooled results.

(i) 172 Kg/ha. (ii) 154.6 Kg/ha. [based on 9 d.f. made up of Treatments × Years interaction]. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	W ₀	W ₁	W ₂	W ₃	W ₄	W ₅	W ₆	W ₇	W ₈	W ₉
Av. yield	170	274	151	82	186	199	191	150	184	132

Individual Results

Treatment year	W ₀	W ₁	W ₂	W ₃	W ₄	W ₅	W ₆	W ₇	W ₈	W ₉	Sig.	G.M.	S.E/plot
1963	245	461	217	110	248	268	242	182	278	195	**	245	93.9
1964	96	88	85	55	125	130	141	119	90	70	**	100	38.4
Pooled	170	274	151	82	186	199	191	150	184	132	N.S.	172	154.6

Crop :- Cotton (Kharif).

Ref :- Pb. 64(165).

Site :- Agri. Res. Stn., Gurdaspur.

Type :- 'D'.

Object :- To study the effect of spray of N.A.A(Napthalene acetic acid) on the yield of Cotton.

1. BASAL CONDITIONS:

(i) (a) N.A. (b) Cotton. (c) N.A. (ii) Loamy soil. (iii) 18.4.64. (iv) (a) 5 ploughings. (b) to (e) N.A. (v) Nil. (vi) R-231. (vii) Irrigated. (viii) Khurpa, Kasaula, and trifla for interculturing. (ix) N.A. (x) 13.9.64 to 22.10.64.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 4 levels of N.A.A : C₀=0, C₁=5, C₂=10, C₃=15 ppm.

(2) 3 times of spray : T₁=1, T₂=2 and T₃=3 weeks after the opening of 1st flower.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) 11.89m. × 3.05m. (b) 10.79m. × 3.05m. (v) 61cm. on either side. (vi) Yes.

4. GENERAL :

(i) Poor. (ii) Attack of jassid, endrine sprayed. (iii) Yield of kapas. (iv) (a) 1964-only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 246 Kg/ha. (ii) 77.2 Kg/ha. (iii) None of effects is significant. (iv) Av. yield of kapas in Kg/ha.

	C ₀	C ₁	C ₂	C ₃	Mean
T ₁	223	327	261	327	284
T ₂	235	204	288	188	229
T ₃	254	242	211	192	225
Mean	237	258	253	236	246

Crop :- Cotton (Kharif).

Ref :- Pb. 64(159), 65(32).

Site :- Cotton Res. Stn., Jullundur.

Type :- 'D'.

Object :- To determine suitable method of controlling weeds and its effects on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 2.6.64; 8.5.65. (iv) (a) 4 to 5 ploughings. (b) to (e) N.A. (v) Nil. (vi) F-320. (vii) Irrigated. (viii) 2-3 hoeings and weeding. (ix) N.A. (x) 4.11.64 to 11.2.64; 15.10.65, 3.11.65 to 14.12.65.

2. TREATMENTS :

Same as in expt. no 63(53), 64(37), 65(55) conducted at Abohar on page No. 705.

3. DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 6. (iv) (a) 10'06m. x 5'49m. (b) 9'14m. x 4'27m. (v) 46cm. x 61cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Attacked by Jassids; endrine sprayed. (iii) Yield of kapas. (iv) (a) 1964-contd. (b) No. (c) Nil. (v) Abohar, Gurdaspur. (vi) Nil. (vii) Since the expt. is contd. beyond 65, individual years results are presented under 5. Results.

5. RESULTS :

64(159)

(i) 357 Kg/ha. (ii) 82.3 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	W ₀	W ₁	W ₂	W ₃	W ₄	W ₅	W ₆	W ₇	W ₈	W ₉
Av. yield	363	340	365	359	395	432	362	355	319	281

65(32)

(i) 306 Kg/ha. (ii) 119.1 Kg/ha. (iii) Treatment differences are significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	W ₀	W ₁	W ₂	W ₃	W ₄	W ₅	W ₆	W ₇	W ₈	W ₉
Av. yield	342	471	315	313	315	373	356	202	229	148

C.D.=138.6 Kg/ha.

Crop :- Cotton (Kharif).

Ref :- Pb. 65(23).

Site :- Cotton Res. Stn., Jullundur.

Type :- 'D'.

Object :- To study the effect of beta Naphthoxyacetic acid spray on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Wheat. (c) N.A. (ii) Sandy loam. (iii) 31.5.65. (iv) (a) 5 ploughings. (b) to (e) N.A. (v) N.A. (vi) F-320. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) 25.10.65 to 14.12.65.

2. TREATMENTS:

Main-plot treatments :

4 concentrations of NOA : C₀=0, C₁=5, C₂=10 and C₃=15 ppm.

Sub-plot treatments :-

3 levels of spray : T₁=1, T₂=2 and T₃=3 weeks after flowering.

3. DESIGN :

(i) Split-plot. (ii) 4 main-plots/replication; 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) 8.53m. x 4.88 m. (b) 1/500 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of kapas. (iv) (a) 1965-only. (b) No. (c) Nil. (v) (a) Abohar and Ludhiana. (b) Nil. (vi) and (vii) Nil.

5. RESULTS :

(i) 384 Kg/ha. (ii) (a) 112 Kg/ha. (b) 205 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

	C ₀	C ₁	C ₂	C ₃	Mean
T ₁	368	450	424	454	424
T ₂	416	278	334	374	350
T ₃	422	356	348	380	376
Mean	422	362	368	402	384

Crop :- Cotton (Kharif).

Ref :- Pb. 63(94),

Site :- Punjab Agri. University, Ludhiana.

Type :- 'D'.

Object :- To study the effect of beta Naphoxyacetic acid (NOA) on the yield of Cotton.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) May, 63. (iv) (a) 4 ploughings. (b) to (e) N.A. (v) N.A. (vi) F-320. (vii) Irrigated. (viii) 3 hoeings. (ix) N.A. (x) Pickings from 2.11.63 to 26.12.63.

2. TREATMENTS:

All combinations of (1), (2) and (3)

(1) 3 concentrations of NOA : C₁=5, C₂=10 and C₃=15 ppm.

(2) 2 wetting agents : W₀=Without water and W₁=With water.

(3) 3 timings of spray : T₁=1, T₂=2 and T₃=3 after opening of 1st flower.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 18. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/444 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of kapas in Kg/ha. (iv) (a) and (b) No. (c) Nil. (v) No. (vi) and (vii) Nil.

5. RESULTS :

(i) 611 Kg/ha. (ii) 214.9 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

	T ₁	T ₂	T ₃	C ₁	C ₂	C ₃	Mean
W ₀	662	588	566	546	675	595	605
W ₁	633	635	579	700	615	533	616
Mean	647	612	572	623	645	564	611
C ₁	665	624	581				
C ₂	664	695	577				
C ₃	613	516	558				

Crop :- Cotton (Kharif).

Ref:-Pb. 63(91), 64(79).

Site :- Punjab Agri. University, Ludhiana.

Type :- 'D'.

Object :- To determine suitable method of controlling weeds and its effect on the yield of Cotton.

1. BASAL CONDITIONS

(i) (a) to (c) N.A. (ii) Sandy loam, (iii) Mid. of May, 63; N.A. (iv) (a) 3 ploughings, 4 ploughings and 2 suhagas. (b) to (e) N.A. (v) N.A. (vi) F-320. (vii) Irrigated. (viii) 2 hoeings, weedings. (ix) N.A. (x) 20.9.63, 7.11.63; 4.11.64; 1.12.64.

2. TREATMENTS :

10 weedicidal treatments : W₀=Control, W₁=Local method of weeding, W₂=Eptam at 2 Kg/ha., W₃=Eptam at 4 Kg/ha., W₄=CMU at $\frac{1}{2}$ Kg/ha., W₅=CMU at 1Kg/ha., W₆=PCA at 25 Kg/ha. W₇=PCA at 50 Kg/ha., W₈=Dowpon at 5 Kg/ha. and W₉=Dowpon at 10 Kg/ha.

3. DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 6. (iv) (a) N.A., 10*60m. x 5*49m. (b) 1/249 ha.; 9*14m. x 4*27m. (v) N.A.; 46cm. x 61cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) 10% solution of Endrine sprayed. (iii) Yield of kapas. (iv) (a) 1963-64. (b) No. (c) Nil. (v) Abohar. (vi) Nil. (vii) Error variances are homogeneous and Treatments x Years interaction is present.

5. RESULTS :

Pooled results.

(i) 289 Kg/ha. (ii) 143.3 Kg/ha. (9 d.f. made up of Treatments x Years interaction). (iii) Treatment differences are not significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	W ₀	W ₁	W ₂	W ₃	W ₄	W ₅	W ₆	W ₇	W ₈	W ₉
Av. yield	276	374	254	272	305	354	272	279	277	230

Individual results :

Treatment	W ₀	W ₁	W ₂	W ₃	W ₄	W ₅	W ₆	W ₇	W ₈	W ₉	Sig.	G.M.	S.E./plot
Year 1963	190	410	143	185	215	277	183	203	237	178	**	222	69.1
1964	363	339	365	359	395	432	362	355	318	281	N.S.	357	82.6
Pooled	276	374	254	272	305	354	272	279	277	230	N.S.	289	143.3

Crop :- Cotton (Kharif).

Ref:- Pb. 64(74).

Site :- Punjab Agri. University, Ludhiana.

Type :- 'D'.

Object :- To determine the optimum time of spray and concentrations of alpha-naphthalene acetic acid (NAA) for the yield of Cotton.

1. BASAL CONDITIONS :

(i) N.A. (ii) Sandy loam. (iii) 18.5.64. (iv) (a) 3 ploughings. (b) and (c) N.A. (d) As per treatments. (e) N.A. (v) N.A. (vi) F-320. (vii) Irrigated. (viii) 1 hoeing. (ix) N.A. (x) 5.11.64 to 9.12.64.

2. TREATMENTS :

All combinations of (1), (2), (3) and (4)

(1) 3 concentrations of NAA : $C_1=5$, $C_2=10$ and $C_3=20$ ppm.

(2) 3 times of application : $T_1=15.6.61$, $T_2=T_1+30.6.64$ and $T_3=T_2+15.7.64$.

(3) 3 times of irrigation : $I_1=40$, $I_2=50$ and $I_3=60$ days after sowing.

(4) 3 spacings : $S_1=60\text{cm.} \times 15\text{cm.}$, $S_2=60\text{cm.} \times 30\text{cm.}$ and $S_3=60\text{cm.} \times 45\text{cm.}$

3. DESIGN :

(i) 3⁴ confd. (ii) (a) 9 plots/block, 9 blocks/replication. (b) N.A. (iii) 1. (iv) (a) 6'10m. \times 7'62m. (b) 1/280 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Attack of Jassid and whitefly 2 spraying of endrine. (iii) Yield of kapas. (vi) (a) 1964-only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) N.A.

5. RESULTS :

(i) 126 Kg/ha. (ii) 98.5 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

	C_1	C_2	C_3	T_1	T_2	T_3	I_1	I_2	I_3	Mean
S_1	120	191	140	162	137	162	113	151	186	150
S_2	106	92	146	115	88	141	114	118	111	114
S_3	133	88	120	98	111	131	89	144	107	113
Mean	119	124	135	125	112	145	105	138	135	126

Other tables are not available.

Crop :- Cotton. (Kharif).

Ref :- Pb. 64(75).

Site :- Punjab Agri. University, Ludhiana.

Type :- 'D'.

Object :- To study the effect of beta Naphoxyacetic acid (NOA) on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 5.5.64. (iv) (a) 3 ploughings, (b) to (e) N.A. (v) 25 C.L./ha. of F.Y.M. (vi) F-320. (vii) Irrigated. (viii) 2 thinnings. (ix) N.A. (x) Pickings on 9.11.64 and 9.12.64.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 4 concentrations of NOA : $C_0=0$, $C_1=5$, $C_2=10$, and $C_3=15$ ppm.

(2) 3 times of applications of NOA : $T_1=1$, $T_2=2$ and $T_3=3$ weeks after the opening of the first flower.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) 12.20m. \times 4.88m. (b) 10.98m. \times 3.66m. (v) 61 cm. \times 61cm. (vi) Yes.

4. GENERAL :

(i) Poor yield. (ii) Attack of Jassid and white fly. endrine sprayed. (iii) Yield of kapas. (iv) (a) to (c) No. (v) to (vii) Nil.

5. RESULTS :

(i) 448 Kg/ha. (ii) 99.7 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

	C_0	C_1	C_2	C_3	Mean
T_1	485	329	461	453	432
T_2	491	395	326	492	426
T_3	492	454	543	451	485
Mean	489	393	443	465	448

Crop :- Cotton (Kharif).

Ref. :- Pb. 64(70).

Site :- Punjab Agri. University, Ludhiana.

Type :- 'D'.

Object :- To determine the optimum plant population for Cotton yield under high fertilizer doses and regulating the crop growth.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 23/24.4.64. (iv) (a) 4 ploughings. (b) and (c) N.A. (d) As per treatments. (v) 37Kg/ha. of $P_2O_5+K_2O+10$ C.L. of F.Y.M. (vi) F-320. (vii) Irrigated. (viii) 2 thinnings. and 3 hoeings. (ix) N.A. (x) 12.11.64 to 10.12.64.

2. TREATMENTS :

Same as in expt. No. 64(133) conducted at Abohar and presented on Page No. 708, except 3 levels of N as C/A/N: $N_0=0$, $N_1=125$ and $N_2=250$ Kg/ha.

3. DESIGN :

(i) 3^4 confd. (ii) (a) 9 plots/block ; 9 blocks/replication. (b) N.A. (iii) 1. (iv) (a) 6.10m. \times 6.70m. (b) $S_1=1/336$, $S_2=1/355$, and $S_3=1/374$. ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of kapas. (iv) (a) 1964-only. (b) No. (c) Nil. (v) Abohar. (vi) and (vii) N.A.

5. RESULTS :

(i) 385 Kg/ha. (ii) 147.2Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

	S ₁	S ₂	S ₃	P ₁	P ₂	P ₃	H ₁	H ₂	H ₃	Mean
N ₀	396	350	339	312	392	383	351	341	394	362
N ₁	386	443	323	376	394	381	406	397	350	384
N ₂	419	390	419	399	428	400	399	425	402	409
Mean	400	394	360	362	405	388	385	388	382	385

Other tables are N.A.

Crop :- Cotton (Kharif).

Ref :- Pb. 64(77).

Site :- Punjab Agri. University, Ludhiana.

Type :- 'D'.

Object :- To study the effect of soaking of seed in different concentrations of some plant regulators on growth and yield of Cotton.

1. BASAL CONDITIONS :

(i) N.A. (ii) Sandy loam. (iii) May, 64. (iv) (a) 4 ploughings., 2-suhagas. (b) and (c) N.A. (d) As per treatments. (e) N.A. (v) N.A. (vi) F-320. (vii) Irrigated. (viii) 3 weedings. (ix) N.A. (x) 5.11.64. to 10.12.64.

2. TREATMENTS :

Same as in expt. No. 64 (107) conducted at Abohar and presented on page No. 706.

3. DESIGN :

(i) 3⁴ confd. (ii) (a) 9 plots/block, 9 blocks/replication. (b) N.A. (iii) 1. (iv) (a) 10*67m. x 3*05m. (b) S₁=10*36m. x 1*83m., S₂=10*06m. x 1*83m. and S₃=9*75m. x 1*83m, (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Attack of Jassids, spraying of endrax and D.D.T. (iii) Yield of kapas. (iv) (a) 1964-only. (b) No. (c) Nil. (v) Abohar. (vi) and (vii) N.A.

5. RESULTS :

(i) 1065 Kg/ha. (ii) 249.4 Kg/ha. (iii) Main effect of P alone is significant. (iv) Av. yield of kapas in Kg/ha.

	P ₁	P ₂	P ₃	N ₁	N ₂	N ₃	C ₁	C ₂	C ₃	Mean
S ₁	966	1199	1198	1077	1159	1128	1176	1125	1073	1121
S ₂	989	1096	1059	1010	1094	1041	1071	1146	956	1048
S ₃	927	1017	1134	1021	999	1059	1073	925	1050	1026
Mean	961	1104	1130	1036	1084	1076	1107	1076	1012	1065
C ₁	1039	1072	1210	1117	1049	1155				
C ₂	1021	1101	1108	1033	1154	1042				
C ₃	822	1140	1073	958	1049	1030				
N ₁	883	1110	1115							
N ₂	1018	1062	1172							
N ₃	983	1140	1105							

C.D. for P marginal means=96.2 Kg/ha.

Crop :- Cotton (Kharif).

Ref :- Pb. 63(175).

District :- Nasirpur Farm.

Type :- 'D'.

Object :—To study the effect of NOA spray on the yield of Cotton.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loamy Soil. (iii) 9.5.63. (iv) 5 to 6 ploughings. (b) to (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) 4 weedings. (ix) N.A. (x) 10.10.63 to 6.11.63.

2. TREATMENTS :

Same as in expt. no. 63(57) on page no. 705.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 20(2control plots in each replication). (b) N.A. (iii) 4. (iv) 6·10m.×4·88m. (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of kapas. (iv) (a) 1962-only. (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS:

(i) 1176 Kg/ha. (ii) 164·2 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of kapas in Kg/ha.

Control=1152 Kg/ha.

	C ₁	C ₂	C ₃	T ₁	T ₂	T ₃	Mean
W ₀	1250	1194	1141	1183	1125	1226	1178
W ₁	1187	1173	1180	1162	1222	1156	1180
Mean	1193	1184	1160	1172	1174	1191	1179
T ₁	1221	1162	1194				
T ₂	1228	1207	1087				
T ₃	1131	1242	1200				

Crop :- Tobacco (Rabi).

Ref :- Pb. 60(62).

Site :- Agri. Res. Stn., Ferozepur.

Type :- 'M'.

Object :—To study the effect of different methods of applications of different manures on the yield of Tobacco.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 29.2.60. (iv) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS:

Main-plot treatments :

3 sources of 112Kg/ha. of N: S₁=Urea, S₂=A/S. and S₃=C/A/N.

Sub-plot treatments :

3 methods of application of N : M_1 —Plough furrow, M_2 —Broad cast and M_3 —Band.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication; 3 sub-plots/main-plot. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 6'10m. × 3'66m.; 6'10m. × 2'44m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of dry leaf and green leaf. (iv) (a) 1960-61 (modified in 61) (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 20.50 Q/ha. (ii) (a) 5.83 Q/ha. (b) 3.50 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of dry leaves in Q/ha

	S_1	S_2	S_3	Mean
M_1	19.8	19.3	19.3	19.5
M_2	22.6	20.9	21.9	21.8
M_3	21.6	18.3	21.3	20.4
Mean	21.3	19.5	20.8	20.5

Crop :- Tobacco (Rabi).

Ref :- Pb 61(64).

Site :- Agri. Res. Stn., Ferozepur.

Type :- 'M'

Object :- To study the effect of different methods of application of different manures on the yield of Tobacco.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 29.11.61. (iv) to (vi) N.A. (vii) Irrigated. (viii) N.A. (ix) 24.6 cm. (x) May, 62.

2. TREATMENTS :

Main-plot treatments :

3 methods of application of N :— M_1 —Plough furrow, M_2 —Broadcast and M_3 —Band.

Sub-sub-plot treatments :

3 sources of 112Kg/ha. of N :— S_1 —Urea, S_2 —A/S and S_3 —C/A/N.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication ; 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1'8m. × 1'8m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of green leaf. (iv) (a) 1960-61. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 683 Q/ha. (ii) (a) 229.6 Q/ha. (b) 71.1 Q/ha. (iii) Main effect of S alone is significant. (iv) Av. yield of green leaf in Q/ha.

	S ₁	S ₂	S ₃	Mean
M ₁	721	802	816	780
M ₂	616	640	679	645
M ₃	577	672	623	624
Mean	638	705	706	683

C.D. for S marginal means=48.4 Q/ha.

Crop :- Tobacco (Rabi).

Ref :- Pb. 61(72).

Site :- Agri. Res. Stn., Ferozepur.

Type :- 'M'.

Object :-To study the effect of different methods of application of manures on the yield of Tobacco

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 1.3.61. (iv) (a) to (c) N.A. (d) 30cm. x 30cm. (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) N.A. (ix) 24.6cm. (x) N.A.

2. TREATMENTS :

Same as in expt. no. 61(64) on page. No. 719.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication, 3 sub-plots/main-plot. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 2.44m. x 6.10m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of green leaf. (iv) (a) 1960-61. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 159.5 Q/ha. (ii) (a) 29.0 Q/ha. (b) 19.2 Q/ha. (iii) Main effects of M and S are significant. (iv) Av. yield of green leaf in Q/ha.

	S ₁	S ₂	S ₃	Mean
M ₁	162.2	163.3	181.1	168.9
M ₂	159.7	159.7	184.6	168.0
M ₃	151.1	130.2	143.4	141.6
Mean	157.7	151.1	169.7	159.5

C.D. for M marginal means=21.5 Q/ha.

C.D. for S marginal means=13.1 Q/ha.

Crop :- Tobacco. (Rabi).

Ref :- Pb. 62(96).

Site :- Agri Res. Stn., Ferozepur.

Type :- 'M'.

Object :-To study the effect of different doses of N on the yield of Tobacco.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 1.3.62. (iv) (a) 4 to 5 ploughings. (b) Transplanting. (c) 0.288 Kg/ha. (d) 61cm. x 30cm. (e) — (v) N.A. (vi) T-17. (vii) Irrigated. (viii) 3 to 4 hoeings. (ix) 19.3cm. (x) June, 62.

2. TREATMENTS :

4 manurial treatments from two sources of N :— $M_1=98.8$, $M_2=222.4$, $M_3=333.6$ Kg/ha. of N as compost and $M_4=111.2$ Kg/ha. of N as A/S.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 6.10m. x 3.05m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of green leaf. (iv) (a) 1962-63 (modified in 63). (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 266.1 Q/ha. (ii) 22.1 Q/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of green leaf in Q/ha.

Source of N Treatment	Compost			Mean	A/S
	M_1	M_2	M_3		M_4
Av. yield.	241.9	221.9	253.3	239.0	347.4

C.D. for means of the sources = 22.2 Q/ha.

Crop :- Tobacco. (Rabi).

Ref :- Pb. 62(97), 64(127).

Site :- Agri, Res. Stn., Ferozepur.

Type :- 'M'.

Object :-To study the effect of trace elements on the yield of Tobacco.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 1.3.62; 7.3.64. (iv) (a) 4 to 5 ploughings. (b) Transplanting. (c) 0.288 Kg/ha. (d) 61cm. x 30cm. (e) One plant/hole. (v) N.A. (vi) N Tobacco, T-17. (vii) Irrigated. (viii) 3 to 4 hoeings. (ix) 19.3 cm; 17.2cm. (x) June, 62; June, 64.

2. TREATMENTS :

12 trace elements :— T_0 =Control (No trace element), $T_1=5.6$ Kg/ha. of Ferrous Sul., $T_2=11.2$ Kg/ha. of Ferrous Sul., $T_3=5.6$ Kg/ha. of Copper Sul., $T_4=11.2$ Kg/ha. of Copper Sul., $T_5=5.6$ Kg/ha. of Copper Sul., $T_6=28.0$ Kg/ha. of Manganese Sul., $T_7=5.6$ Kg/ha. of Zinc Sul., $T_8=22.4$ Kg/ha. Zinc Sul., $T_9=5.6$ Kg/ha. of Boric acid, $T_{10}=22.4$ Kg/ha. of Boric acid and $T_{11}=11.0$ Kg/ha. of mixture of Copper Sul. Zinc Sul. and Manganese Sul.

3. DESIGN :

(i) R.B.D. (ii) (a) 12. (b) N.A. (iii) 5. (iv) (a) N.A. (b) 1/1495 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of green leaf. (iv) 1962-64 (modified in 63). (b) No. (c) Nil. (v) N.A. (vi) Nil. (vii) Error variances are heterogeneous and Treatments x Years interaction is absent hence individual years results are presented under 5. Results.

5. RESULTS :

62(97)

(i) 372.6 Q/ha, (ii) 34.70 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of green leaf in Q/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁
Av. yield	350.0	362.2	371.9	389.0	364.6	371.9	375.6	404.9	367.1	382.9	342.7	389.0

64(127)

(i) 326.5 Q/ha, (ii) 46.94 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of green leaf in Q/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁
Av. yield	307.0	345.0	333.0	347.0	320.0	311.0	311.0	338.0	322.0	314.0	335.0	335.0

Crop :- Tobacco. (Rabi).

Ref :- Pb. 63(120).

Site :- Agri. Res. Stn., Ferozepur.

Type :- 'M'.

Object :—To study the effect of trace elements on the yield of Tobacco crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 24.2.63. (iv) (a) 4 to 5 ploughings. (b) Transplanting. (c) 0.288 Kg/ha. (d) 61cm. × 30cm. (e) N.A. (v) N.A. (vi) N Tobacco. (vii) Irrigated. (viii) N.A. (ix) 18.9cm. (x) Middle of June, 63.

2. TREATMENTS :

12 trace elements treatments :—T₀=Control (no trace element) N.A. T₁=2.25 Kg/ha. of Ferrous Sul., T₂=4.50 Kg/ha. of Ferrous Sul., T₃=2.25 Q/ha. of Copper Sul., T₄=4.50 Kg/ha. of Copper Sul., T₅=2.25 Kg/ha. of Manganese Sul., T₆=9 Kg/ha. of Manganese Sul., T₇=2.25 Kg/ha. of Zinc Sul., T₈=9 Kg/ha. of Zinc Sul., T₉=2.25Kg/ha. of Boric acid., T₁₀=9Kg/ha. of Boric acid, T₁₁=11Kg/ha. of mixture of Copper Sul., Zine Sul. and Manganese Sul. Trace elements applied. before transplanting by kera method.

3. DESIGN :

(i) R.B.D. (ii) (a) 12. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/1495 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of green leaf. (iv) (a) 1962-64 modified in 63. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 507.1 Q/ha. (ii) 47.3 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of green leaf in Q/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁
Av. yield	493.9	472.4	504.1	504.1	518.8	504.1	545.9	517.6	508.6	501.8	506.3	507.5

Crop :- Tobacco. (Rabi).

Ref :- Pb. 63(122).

Site :- Agri. Res. Stn. Ferozepur.

Type :- 'M'.

Object :—To study the effect of of N on the yield of Tobacco.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 27.2.63. (iv) to (vi) N.A. (vii) Irrigated. (viii) N.A. (ix) 18.9 cm. (x) June., 63.

2. TREATMENTS :

4 manurial treatments from two sources of N : $M_1=112$, $M_2=224$, $M_3=336$ Kg/ha. of N as compost and $M_4=112$ Kg/ha. of N as A/S.

3. DESIGN:

(i) R.B.D. (ii) (a) 4, (b) N.A. (iii) 6. (iv) (a) N.A. (b) 5'00m. × 5'40m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of green leaf. (iv) (a) 1963-only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 295.6 Q/ha. (ii) 108.5 Q/ha. (iii) Difference between means of two sources is highly significant. (iv) Av. yield of green leaf in Q/ha.

Sources of N. Treatment	Compost			Mean	A/S
	M_1	M_2	M_3		My
Av. yield.	247.3	249.5	285.3	260.7	400.5

C.D. for means of sources=108.9 Q/ha.

Crop :- Tobacco. (Rabi).

Ref :- Pb. 64(128).

Site :- Agri. Res. Stn., Ferozepur.

Type :- 'M'.

Object:—To study the effect of different trace elements on the yield of Tobacco.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 1.3.64. (iv) (a) 4 to 5 ploughings. (b) Transplanting. (c) 0.288Kg/ha. (d) 61cm. × 30cm. (e) N.A. (v) N.A. (vi) T-17. (vii) Irrigated. (viii) N.A. (ix) 17.2cm. (x) June., 64.

2. TREATMENTS :

10 trace elements. T_0 =Control (No trace element applied), T_1 =Zinc Sul. at 5.5 Kg/ha., T_2 =Zinc Sul. at 22 Kg/ha., T_3 =Copper Sul. at 5.5 Kg/ha., T_4 =Copper Sul. at 11 Kg/ha., T_5 =Manganese Sul. at 22 Kg/ha., T_6 =Spartin at 250 Kg/ha., T_7 =Spartin at 500 Kg/ha., T_8 =Spartin at 750 Kg/ha. and T_9 =Mixture of Zinc Sul., Copper Sul. and Manganese Sul. at 11 Kg/ha.

Trace elements applied before transplanting by Kera method.

3. DESIGN:

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1'22m. × 54'9m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of green leaf. (iv) (a) 1964-only (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

5. RESULTS;

(i) 399.0 Q/ha. (ii) 55.2 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of green leaf in Q/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9
Av. yield	394.3	411.1	371.9	429.8	375.6	413.0	424.2	375.6	388.7	405.5

Crop :- Tobacco. (Rabi).

Ref. Ph. 64(125), 65(400).

Site :- Agri. Res. Stn., Ferozepur.

Type :- 'M'.

Object :-To study the effect of different times of application of different manures.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 6.3.64.; 7.2.65. (iv) to (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. July, 64; May, 65.

2. TREATMENTS :

Main-plot treatments :

3 sources of N :— $S_1=C/A/N$, $S_2=A/S$ and $S_3=Urea$.

Sub-plot treatments :-

4 times of application of N :— $T_1=1/2$ before planting and $1/2$ 20 days after planting, $T_2=1/2$ before planting and $1/2$ 40 days after planting, $T_3=1/2$ before planting and $1/2$ 60 days after planting and $T_4=1/2$ 20 days after planting and $1/2$ 60 days after planting.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication and 4 sub-plots/main-plot. (b) N.A. (iii) 6. (iv) (a) N.A. (b) $2.44m. \times 5.49m$. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of green leaf. (iv) (a) 1964-65. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Nil. (vii) Error variances are homogeneous and Treatments \times Years interaction is absent.

5. RESULTS :

Pooled

(i) 345.5 Q/ha. (ii) (a) 51.60 Q/ha. (based on 22 d.f. made up of Treatments \times Years interaction with pooled error). (b) 23.40 Q/ha. (based on 99 d.f. made up of Treatments \times Years interaction with pooled error). (iii) Main effect of T and interaction $T \times S$ are highly significant. (iv) Av. yield of green leaf in Q/ha.

	T_1	T_2	T_3	T_4	Mean
S_1	358.5	364.5	329.5	323.5	344.0
S_2	355.0	340.0	360.5	330.5	346.5
S_3	354.0	340.0	342.5	347.5	346.0
Mean	355.8	348.1	344.1	333.8	345.5

C.D. for T marginal means=10.9 Q/ha.

C.D. for T means at the same level of S=27.5 Q/ha.

C.D. for S means at the same level of T=37.6 Q/ha.

Individual results :

Treatment	S_1	S_2	S_3	Sig.	T_1	T_2	T_3	T_4	Sig.	G.M.	S.E./plot	
											Main	Sub
Year												
1964	329.0	312.0	310.0	N.S.	324.0	312.0	302.0	330.0	*	317.0	55.20	25.60
1965	387.0	373.0	362.0	N.S.	370.0	367.0	374.0	385.0	N.S.	374.0	51.64	21.02
Pooled	344.0	346.5	346.0	N.S.	355.8	348.1	344.1	333.8	**	345.5	51.60	23.40

Crop :- Tobacco. (Rabi).**Ref :- Pb. 61(70), 63(123).****Site :- Agri. Res. Stn., Ferozpur.****Type :- 'MV'.**

Object — To study the effect of different doses of N on Tobacco varieties.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 29.11.61. ; 12.12.63. (iv) (a) 4 to 5 ploughings. (b) Transplanting. (c) to (e) N.A. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 3 to 4 hoeings. (ix) 24.6cm.; 16cm. (x) May, 62; June, 64.

2. TREATMENTS :**Main-plot treatments :**6 levels of N :— $N_1=168$, $N_2=224$, $N_3=280$, $N_4=336$, $N_5=392$ and $N_6=448$ Kg/ha.**Sub-plot treatments :**3 varieties :— $V_1=370$, $V_2=238$ and $V_3=302$.**3. DESIGN :**(i) Split-plot. (ii) (a) 6 main-plots/replication and 3 sub-plots/main-plot. (b) N.A. (iii) 6; 4. (iv) (a) N.A. (b) 1.80m. \times 1.80m.; 1.22m. \times 5.49m. (v) N.A. (vi) Yes.**4. GENERAL :**

(i) Normal. (ii) N.A. (iii) Yield of green leaf and dry leaf. (iv) (a) 1961 to 1963 (1962 - N.A.) (b) No. (c) Nil. (v) and (vi) N.A. (vii) As the sub-plot error variances are heterogeneous, the results of individual years are given below.

5. RESULTS :

Green leaf

61(70)

(i) 344.8 Q/ha. (ii) (a) 149.0 Q/ha. (b) 87.9 Q/ha. (iii) Main effect of V alone is highly significant. (iv) Av. yield of green leaf tobacco in Q/ha.

	N_1	N_2	N_3	N_4	N_5	N_6	Mean
V_1	388.4	478.4	344.7	439.8	427.0	357.5	406.0
V_2	298.4	403.8	342.1	329.2	331.8	354.9	341.4
V_3	228.9	360.1	262.3	288.1	313.8	257.2	285.1
Mean	305.2	414.1	316.4	352.4	357.5	323.2	344.8

C.D. for V marginal means=41.4 Q/ha.

63(123)

(i) 306.2 Q/ha. (ii) (a) 75.3 Q/ha. (b) 40.3 Q/ha. (iii) Main effect of T alone is highly significant. (iv) Av. yield of green leaf tobacco in Q/ha.

	N_1	N_2	N_3	N_4	N_5	N_6	Mean
V_1	248.5	287.8	300.7	287.8	280.3	293.4	283.1
V_2	355.1	336.4	397.3	366.3	377.1	313.9	357.7
V_3	246.7	269.1	326.3	286.7	259.0	278.4	277.7
Mean	283.4	297.8	341.4	313.6	305.5	295.2	306.2

C.D. for V marginal means=23.5 Q/ha.

Dry leaf

61(70)

(i) 41.5 Q/ha. (ii) (a) 6.57 Q/ha. (b) 4.26 Q/ha. (iii) All the effects are significant. (iv) Av. yield of dry leaf tobacco in Q/ha.

	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	Mean
V ₁	40.8	40.1	44.4	41.7	41.2	43.7	42.0
V ₂	39.5	36.9	40.6	38.6	37.8	46.3	40.0
V ₃	47.8	40.0	38.3	37.6	42.7	48.6	42.5
Mean	42.7	39.0	41.1	39.3	40.6	46.2	41.5

C.D. for N marginal means=4.51 Q/ha.

C.D. for V marginal means=2.00 Q/ha.

C.D. for V means at the same level of N=5.06 Q/ha.

C.D. for N means at the same level of V=5.14 Q/ha.

Crop :- Tobacco. (Rabi).

Ref :- Pb. 62(101),

Site :- Agri. Res. Stn., Ferozepur.

Type :- 'C'.

Object :- To study the effect of different spacings on the yield of Tobacco.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 27.11.62. (iv) (a) 4 to 5 ploughings (b) Transplanting. (c) 288 Kg/ha. (nursery). (d) As per treatments. (e) N.A. (v) N.A. (vi) Early Rustica, (vii) Irrigated. (viii) 3 to 4 harrowings. (ix) 19.3cm. (x) June, 63.

2. TREATMENTS:

6 spacings :- S₁=46×23, S₂=61×23, S₃=61×30, S₄=61×38, S₅=76×23 and S₆=76×30. sq. cm.

3. DESIGN:

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4' (iv) (a) N.A. (b) 1/179 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of green leaves. (iv) (a) 1961-only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 308.3 Q/ha. (ii) 28.9 Q/ha. (iii) Main effect of S alone is highly significant. (iv) Av. yield of green leaves in Q/ha.

Treatment	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆
Av. yield	354.6	344.4	263.9	315.5	303.3	268.1

C.D.=42.1 Q/ha.

Corp :- Tobacco. (Rabi).

Ref :- Pb. 60(63).

Site :- Govt. Agri. Stn., Ferozepur.

Type :- 'CV'

1. BASAL CONDITIONS

Object :- To study the effect of dates of planting on different varieties of Tobacco.

(i) (a) to (c) N.A. (ii) Clay loam (Heavy soil). (iii) As per treatments. (iv) (a) 4 to 5 ploughings. (b) Transplanting. (c) 0.288 Kg/ha. (nursery). (d) 61cm.×30cm. (e) — (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 3 to 4 hoeings. (ix) N.A. (x) May, 61.

2. TREATMENTS :

Main-plot treatments :

3 dates of planting :- D₁=1.11.60, D₂=21.11.60 and D₃=12.12.60.

Sub-plot treatments:2 varieties :— $V_1=232$, $V_2=C-302$.**3. DESIGN:**

(i) Split-plot. (ii) (a) 3 main-plots/block and 2 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1.52m. × 4.06m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of seed per plant. (iv) (a) 1960-only. (b) No. (c) Nil. (v) and (vi) N.A. (vii) Number of plants per plot are not available, hence results are given in per plant basis.

5. RESULTS :

(i) 20.02 gm./plant. (ii) (a) 5.3 gm./plant. (b) 4.9 gm./plant. (iii) Main effect of D is highly significant and that of V is significant. (iv) Av. yield of tobacco seed in gm./plant.

	D ₁	D ₂	D ₃	Mean
V ₁	27.88	22.38	18.30	22.85
V ₂	25.70	16.40	9.50	17.20
Mean	26.79	19.39	13.90	20.03

C.D. for D marginal means = 6.5 gm./plant.

C.D. for V marginal means = 4.5 gm./plant.

Crop :- Tobacco. (Rabi).**Ref :- Pb 61(68).****Site :- Agri. Res. Stn., Ferozepure.****Type :- 'CV'.****Object :-** To study the effect of piercing on different Tobacco varieties.**1. BASAL CONDITIONS:**

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 29.11.61. (iv) (a) 4 to 5 ploughings. (b) Transplanting. (c) 0.288 Kg/ha. (nursery.) (d) 61cm. × 30cm. (vi) As per treatments. (vii) Irrigated. (viii) 4 weedings. (ix) 24.6 cm. (x) May., 62.

2. TREATMENTS:**Main-plot treatments:**4 varieties: $V_1=302 \times 192$, $V_2=131 \times 192$, $V_3=238$ and $V_4=302$.**Sub-plot treatments:**2 cultural treatments: P_0 =No piercing and P_1 =piercing at 10 bag stage.**3. DESIGN:**

(i) Split-plot. (ii) (a) 4 main-plots/replication and 2 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1.8m. × 1.8m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of green leaves. (iv) (a) 1961-only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 105.6 Q/ha. (ii) (a) 15.7 Q/ha. (b) 10.2 Q/ha. (iii) Main effect of V is highly significant and interaction V × P is significant. (iv) Av. yield of green leaf in Q/ha.

	V ₁	V ₂	V ₃	V ₄	Mean
P ₀	123.4	131.2	88.7	88.7	108.0
P ₁	119.6	104.2	100.3	88.7	103.2
Mean	121.5	117.7	94.5	88.7	105.6

C.D. for V marginal means=17.8 Q/ha.

C.D. for P means at the same level of V=7.8 Q/ha.

C.D. for V means at the same level of P=14.8 Q/ha.

Crop :- Tobacco (Rabi).

Ref :- Pb 61(65).

Site :- Agri. Res. Stn., Ferozepur.

Type :- 'CV'.

Object :- To study the effect of topping on the different varieties of Tobacco.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 1.12.61. (iv) (a) 4 to 5 ploughings. (b) Transplanting. (c) 0.288 Kg/ha. (nursery) (d) 61cm. x 30cm. (e) — (vi) As per treatments. (vii) Irrigated. (viii) 4 hoeings. (ix) 24.6cm. (x) June, 61.

2. TREATMENTS:

Main-plot treatments

3 varieties: V₁=238, V₂=302 and V₃=370.

Sub-plot treatments

3 cultural treatments: T₀=Untopping, T₁=Topping and T₂=Topping at 12 leaves stage.

3. DESIGN:

(i) Split-plot. (ii) (a) 3 main-plots/block and 3 sub-plots/main-plot. (b) N.A. (iii) 5. (iv) (a) N.A. (b) 1.80m. x 3.60m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yteld of green leaves. (iv) (a) 1961-64, (modified in 62 and 63). (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 126 Q/ha. (ii) (a) 14.6 Q/ha. (b) 181 Q/ha. (iii) Main effect of V alone is highly significant. (iv) Av. yield of green leaves in Q/ha.

	V ₁	V ₂	V ₃	Mean
T ₀	100	148	100	116
T ₁	144	173	117	145
T ₂	110	114	117	117
Mean	118	145	115	126

C.D for V marginal means=12.4 Q/ha.

Crop :- Tobacco (Rabi).

Ref :- Pb. 62(95).

Site :- Agri. Res. Stn., Ferozepur.

Type :- 'CV'.

Object : To study the effect of topping on the different varieties of Tobacco.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) Feb., 62. (iv) (a) 4 to 5 ploughings. (b) Transplanting. (c) 0.288 Kg/ha. (nursery) (d) 61cm. × 30cm. (e) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 4 hoeings. (ix) 19.2cm. (x) June., 62.

2. TREATMENTS :**Main-plot treatments**

4 varieties: $V_1=17$, $V_2=59$, $V_3=59 \times 165$ and $V_4=337/7$.

Sub-plot treatments

3 cultural treatments: T_0 =No topping, T_1 =Topping and T_2 =topping at 12 leaves stage.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication; 3 sub-plots/main-plot. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1.20m. × 5.40m. (v) N.A. (vi) Yes.

4. GENERAL

(i) Normal. (ii) N.A. (iii) Yield of green leaves. (iv) (a) 1961-64(modified in 62 and 63) (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 184.7 Q/ha. (ii) (a) 26.3 Q/ha. (b) 26.8Q/ha. (iii) Main effects of V and T are highly significant. (iv) Av. yield of green leaves in Q/ha.

	V_1	V_2	V_3	V_4	Mean
T_0	216.0	165.4	120.9	154.8	164.3
T_1	255.1	224.3	151.0	212.2	210.4
T_2	195.2	199.1	150.5	172.8	179.4
Mean	221.8	196.3	140.8	179.9	184.7

C.D. for V marginal means=18.8Q/ha.

C.D. for T marginal means=15.6Q/ha.

Crop :- Tobacco (Rabi).

Ref :- Pb. 62(104), 63(126), 64(129).

Site :- Agri. Res. Stn., Ferozepur.

Type :- 'CV'.

Object :-To study the effect of piercing and topping on the different varieties of Tobacco.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) N.A. 12.2.63 ; 7.3.64. (iv) (a) to (c) N.A. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) N.A. (ix) 18.9 cm., 18.9 cm. 17.2 cm., (x) Mid. June, 62 ; May., 63 ; June 64.

2. TREATMENTS :**Main-plot treatments :**

4 varieties ;— $V_1=17$, $V_2=59$, $V_3=59 \times 165$ and $V_4=605$.
in expt for 62, varieties $V_3=399 \times 17$ and $V_4=59 \times 165$.

Sub-plot treatments :

All combinations of (1) and (2)

(1) 3 stages of topping :— T_1 =topping at 10 leaf., T_2 =12 leaf topping and T_3 =Topping at flowering.

(2) 2 piercing treatments:— P_0 =No piercing, and P_1 = piercing

3. DESIGN.

(i) Split-plot. (ii) 4 main-plots/replication, 6 sub-plots/main-plot; (b) N.A. (iii) 6 for 62 and 63; 5 for 64. (iv) (a) N.A. (b) 0.62m. × 6.0m. for 62, 0.60m. × 5.40m. for others, (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of green leaves. (iv) (a) 1962 to 64. (b) No. (c) Nil. (v) and (vi) Nil. (vii) As the error variances for sub-plot are heterogeneous for 63 and 64, results of individual years are given below (expt. for 62 has been treated separately)

5. RESULTS:

63(126)

(i) 377 Q/ha. (ii) (a) 53.4 Q/ha. (b) 33.8 Q/ha. (iii) Main effects of V, T and interaction T × V and × P are highly significant. (iv) Av. yield of green leaves in Q/ha.

	V ₁	V ₂	V ₃	V ₄	T ₁	T ₂	T ₃	Mean
P ₀	420	333	390	378	314	371	456	380
P ₁	394	329	401	374	330	343	450	374
Mean	407	331	395	376	322	357	453	377
T ₁	370	297	336	285				
T ₂	397	320	377	333				
T ₃	453	376	472	510				

C.D. for the body of T × P table = 19.4 Q/ha.

C.D. for V marginal means = 26.8 Q/ha.

C.D. for T marginal means = 13.7 Q/ha.

C.D. for T means at the same level of V = 27.4 Q/ha.

C.D. for V means at the same level of T = 34.9 Q/ha.

64(129)

(i) 220 Q/ha. (ii) (a) 80.25 Q/ha. (b) 44.8 Q/ha. (iii) Main effect of T alone is highly significant. (iv) Av. yield of green leaves in Q/ha.

	V ₁	V ₂	V ₃	V ₄	T ₁	T ₂	T ₃	Mean
P ₀	212	209	238	218	175	209	274	219
P ₁	214	203	241	226	166	215	282	221
Mean	213	206	240	222	170	212	278	220
T ₁	162	178	166	175				
T ₂	206	202	235	205				
T ₃	271	237	318	287				

C.D. for T marginal means = 19.99 Q/ha.

62(104)

(i) 31.5 Q/ha. (ii) (a) 14.2 Q/ha. (b) 12.8 Q/ha. (iii) Main effect of T alone is significant. (iv) Av. yield of green leaves in Q/ha.

	V ₁	V ₂	V ₃	V ₄	T ₁	T ₂	T ₃	Mean
P ₀	35.66	30.58	30.54	31.28	25.16	34.59	36.30	32.02
P ₁	27.50	33.37	27.34	35.78	23.21	32.54	37.24	31.00
Mean	31.58	31.98	28.94	33.53	24.19	33.56	36.77	31.51
T ₁	28.12	25.34	20.19	23.09				
T ₂	33.22	31.26	32.77	37.01				
T ₃	33.39	39.33	33.87	40.50				

C.D. for T marginal means=5.21 Q/ha

Crop :- Tobacco (Rabi).

Ref :-Pb. 63(121),64(117).

Site :- Agri. Res. Stn., Ferozepur.

Type :- 'CV'.

Object :- To study the effect of topping on the yield of different varieties of Tobacco.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 12.2.63; 8.3.64. (iv) (a) 4 to 5 ploughings. (b) Transplanting. (c) 0.288 Kg/ha. (nursery) (d) 61cm. x 30cm. (e) N.A. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 4 hoeings. (ix) 18.9 cm., 17.2cm. (x) June, 63; June, 64.

2. TREATMENTS:

Main-plot treatments :

8 varieties : V₁=V-17, V₂=V-59, V₃=V59x165, V₄=C-23, V₅=S-45, V₆=545, V₇=C-31 and V₈=K337/7.

Sub-plot treatments

3 cultural treatments: T₀=No topping, T₁=Topping and T₂=Topping at 12 leaves stage.

3. DESIGN :

(i) Split-plot. (ii) 8 main-plots/replication; 3 sub-plots/main-plot. (iii) 5; 4. (iv) (a) N.A. (b) 0.60m, x 5.40m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of green leaves. (iv) 1961-64 (modified in 62 and 63) (b) No. (c) Nil. (v) and (vi) N.A. (vii) As the error variances are heterogeneous, results of individual years are given under 5. Results.

5. RESULTS :

63(121)

(i) 992 Q/ha. (ii) (a) 138.6 Q/ha. (b) 56.9 Q/ha. (iii) Main effects of V and T are highly significant. (iv) Av. yield of Tobacco green leaves in Q/ha.

	V ₁	V ₂	V ₃	V ₄	V ₅	V ₆	V ₇	V ₈	Mean
T ₀	821	759	1096	1173	978	741	951	883	925
T ₁	1043	981	1302	1352	1093	935	1086	1099	1111
T ₂	997	861	1123	963	880	846	870	972	939
Mean	954	867	1174	1163	984	841	969	985	992

C.D. for V marginal means=103.6 Q/ha.

C.D. for T marginal means=43.2 Q/ha.

64(117)

(i) 271 Q/ha. (ii) (a) 194.8 Q/ha. (b) 59.6 Q/ha. (iii) Main effect of T alone is significant. (iv) Av. yield of green leaves in Q/ha.

	V ₁	V ₂	V ₃	V ₄	V ₅	V ₆	V ₇	V ₈	Mean
T ₀	264	212	242	265	243	324	150	292	249
T ₁	444	292	326	401	250	478	188	378	345
T ₂	211	198	204	231	226	273	177	224	218
Mean	306	234	237	299	240	358	172	298	271

C.D. for T marginal means=30.0

Crop :- Tobacco (Rabi).

Ref :- Pb. 64(123).

Crop :- Agri. Res. Stn., Ferozepur.

Type :- 'CV'.

Object :- To study the effect of topping on the yield of different varieties of Tobacco crop.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 8.3.64. (iv) (a) 4 to 5 ploughings. (b) Transplanting. (c) 0.288 Kg/ha. (d) 61cm. x 30cm. (e) N.A. (v) N.A. (vi) As per treatments (vii) Irrigated. (viii) 4 hoeings. (ix) 17.2cm. (x) June, 64.

2. TREATMENTS :

Main-plot treatments :

8 varieties : V₁=T-17, V₂=T-59, V₃=337/7, V₄=C-23, V₅=C-31, V₆=59 x 165, V₇=Ferozepur local and V₈=S-45.

Sub-plot treatments :

3 stages of topping :- T₀=No topping, T₁=Topping at flowering stage and T₂=Topping at 12 leaves stage.

3. DESIGN :

(i) Split-plot. (ii) (a) 8 main-plots/block and 3 sub-plots/main-plot. (b) N.A. (iii) 5. (iv) (a) N.A. (b) 0.60m. x 5.40m. 0.60m x 5.40m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of green leaves. (iv) (a) 1964-only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 393.1 Q/ha. (ii) (a) 51.3 Q/ha. (b) 30.4 Q/ha. (iii) All the effects are highly significant. (iv) Av. yield of green leaves in Q/ha.

	V ₁	V ₂	V ₃	V ₄	V ₅	V ₆	V ₇	V ₈	Mean
T ₀	237.7	351.9	330.2	345.7	438.3	339.5	503.1	478.4	378.1
T ₁	308.6	441.4	407.4	435.2	521.6	419.8	614.2	564.8	464.1
T ₂	261.1	344.4	314.8	319.1	345.7	336.4	390.7	385.8	337.2
Mean	269.1	379.2	350.8	366.7	435.2	365.2	502.7	476.3	393.1

C.D. for T marginal means=23.49 Q/ha.

C.D. for V marginal means=15.69 Q/ha.

Crop :- Tobacco (*Rabi*).

Ref. :- Pb. 62(106).

District :- Agri. Res. Stn., Ferozepur Cantt.

Type :- 'CM'.

Object :- To study the effect of different levels of N, P and K and spacings on the yield of Tobacco.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 25.12.62. (iv) (a) 4 to 5 ploughings. (b) Transplanting. (c) 0.144 Kg/ha. (d) As per treatments. (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) N.A. (ix) 19.3 cm. (x) May, 62.

2. TREATMENTS :

Main-plot treatments :

All combinations of (1) and (2)

(1) 2 levels of P as Super : $P_1=112$ and $P_2=168$ Kg/ha.(2) 3 levels of K : $K_0=0$: $K_1=112$ and $K_2=168$ Kg/ha.

Sub-plot treatments :

3 levels of N as C/A/N : $N_1=161$, $N_2=224$ and $N_3=280$ Kg/ha.

Sub-Sub-plot treatments

3 spacings : $S_1=60 \times 45$, $S_2=60 \times 30$ and $S_3=45 \times 45$ sq.cm.

3. DESIGN :

(i) Split-plot. (ii) (a) 6 main-plots/block; 3 sub-plots/main-plot; 3 sub-sub-plots/sub-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/1495 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of green leaves. (iv) (a) 1962-only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 294.1 Q/ha. (ii) (a) 101.8 Q/ha. (b) 29.5 Q/ha. (c) 23.80 Q/ha. (iii) Main effects of N and S are highly significant. while $S \times N$ interaction is significant. (iv) Av. yield of green leaves in Q/ha.

	N_1	N_2	N_3	K_0	K_1	K_2	P_0	P_1	P_2	Mean
S_1	307.3	335.2	372.9	321.1	349.5	344.8	330.0	340.9	344.6	338.5
S_2	269.8	294.1	320.3	280.3	306.0	297.0	282.4	298.8	303.0	294.7
S_3	231.0	245.1	271.1	244.0	250.7	252.4	238.5	248.5	260.2	249.1
Mean	269.4	284.7	309.0	281.8	302.1	298.4	283.6	296.1	302.6	294.1
P_0	257.2	284.7	309.0	283.9	288.6	278.3				
P_1	274.7	289.6	323.9	278.7	303.0	306.6				
P_2	276.2	300.1	331.4	282.8	314.7	310.3				
K_0	258.1	280.3	306.9							
K_1	278.5	300.0	327.9							
K_2	271.5	294.1	329.6							

C. D. for N marginal means=9.90 Q/ha.

C.D. for S marginal means=7.8Q/ha.

C.D. for S means at the same level of N=14.3 Q/ha.

C.D. for N means at the same level of S=15.2 Q/ha.

Crop :- Tobacco (Rabi).

Ref :- Pb. 64(131).

Site :- Agri. Res. Stn., Ferozepur.

Type :- 'GM'.

Object :-To study the effect of stages of toppings and spacing on the yield of Tobacco crop

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) Feb., 64. (iv) (a) to (c) N.A. (d) As per treatments. (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) N.A. (ix) 27.0cm. (x) June, 64.

2. TREATMENTS:

Main-plot treatments :

3 levels of N as C/A/N : $N_1=112$, $N_2=168$ and $N_3=224$ Kg/ha

Sub-plot treatments:

3 stages of topping : $T_1=10$ leaf stage, $T_2=12$ leaf stage and $T_3=$ Flowering stage

Sub-Sub-plot treatments:

3 spacings between rows : $S_1=23$, $S_2=30$ and $S_3=46$ cm.

3. DESIGN:

(i) Split-plot. (ii) (a) 3 main-plots/block; 3 sub-plots/main-plot; 3 sub-sub-plots/main-plot. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 0.60m. \times 5.40m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of green leaves. (iv) (a) 1964-only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 386.4 Q/ha. (ii) (a) 82.10Q/ha. (b) 56.48Q/ha. (c) 45.68Q/ha. (iii) Main effects of N, T and S are highly significant while the interactions $N \times T$ and $N \times S$ are significant. (iv) Av. yield of green leaves in Q/ha.

	N_1	N_2	N_3	T_1	T_2	T_3	Mean
S_1	403.5	459.4	500.0	431.4	438.8	492.6	454.3
S_2	355.8	405.0	406.6	335.7	394.5	437.1	389.1
S_3	296.8	315.3	335.0	282.9	352.2	339.5	315.7
Mean	352.0	393.2	413.9	349.9	386.2	423.1	386.4
T_1	307.8	367.5	374.3				
T_2	370.0	391.8	369.8				
T_3	378.3	420.4	470.5				

C.D. for N marginal means = 35.20 Q/ha.

C.D. for T marginal means = 22.19 Q/ha.

C.D. for S marginal means = 17.42 Q/ha.

C.D. for S means at the same level of N = 30.18 Q/ha.

C.D. for N means at the same level of S = 42.90 Q/ha.

C.D. for S means at the same level of T = 30.18 Q/ha.

C.D. for T means at the same level of S = 45.1 Q/ha.

Crop :- Tobacco (*Rabi*).

Ref. :- Pb. 63(125), 64(126).

Site :- Agri. Res. Sta., Ferozepur.

Type :- 'CMV'.

Object :- To study the effect of N and spacings on the different varieties of Tobacco crop.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) Mid. of Feb. (iv) (a) 4 to 5 ploughings. (b) Transplanting. (c) 0.288 Kg/ha. (d) Between rows 30cm. and between plants as per treatments. (e) As per treatments. (v) N.A. (vi) As per treatments. (vii) Irrigated. (viii) 4 hoeings. (ix) 18.9cm; N.A. (x) June.

2. TREATMENTS:

Main-plot treatments :

3 varieties : $V_1 = T-17$, $V_2 = T-59$ and $V_3 = 59 \times 165$.

Sub-plot treatments :

3 doses of N : $N_1 = 112$, $N_2 = 168$ and $N_3 = 224$ Kg/ha.

Sub-sub-plot treatments :

4 spacings between rows : $S_1 = 15$, $S_2 = 22.5$, $S_3 = 30$ and $S_4 = 45$ cm.

C/A/N broadcast half before transplanting. and 1/4 after 1½ month and 1/4 at flowering.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication, 3 sub-plots/main-plot and 4 sub-sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/2990 ha., 3.0m. \times 5.4m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of green leaf, yield of dry leaf. (iv) (a) 1963-64. (b) No. (c) Nil. (v) and (vi) N.A. (vii) As the error variances are heterogeneous, results of individual years are given under 5. Results.

5. RESULTS :

63(125)

(i) 454.5 Q/ha. (ii) (a) 89.7 Q/ha (b) 53.5 Q/ha. (c) 43.9 Q/ha. (iii) Main effects of N, V and S are highly significant. (iv) Av. yield of green leaves of tobacco. in Q/ha.

	N_1	N_2	N_3	S_1	S_2	S_3	S_4	Mean
V_1	379.2	453.2	461.1	520.2	433.8	408.7	362.0	431.2
V_2	379.7	429.2	453.2	565.6	433.8	399.4	343.9	420.7
V_3	455.4	531.1	548.7	611.9	515.5	493.9	425.6	511.7
Mean	404.8	471.2	487.7	545.9	461.0	434.0	377.2	454.5
S_1	493.4	554.7	589.7					
S_2	418.0	477.6	487.5					
S_3	381.3	446.6	474.1					
S_4	326.4	405.8	399.4					

C.D. for V marginal means = 44.8 Q/ha.

C.D. for N marginal means = 22.9 Q/ha.

C.D. for S marginal means = 20.5 Q/ha.

64(126)

(i) 60.62 Q/ha. (ii) (a) 16.93 Q/ha. (b) 12.54 Q/ha. (c) 9.26 Q/ha. (iii) Main effects of N and S are significant. (iv) Av. yield of dry leaves tobacco in Q/ha.

	N ₁	N ₂	N ₃	S ₁	S ₂	S ₃	S ₄	Mean
V ₁	53.09	57.72	63.89	71.35	58.85	55.61	47.12	58.23
V ₂	48.77	59.03	61.07	69.80	57.05	57.61	40.69	56.29
V ₃	60.80	69.33	71.91	83.08	71.50	61.21	53.60	67.35
Mean	54.22	62.03	65.62	74.74	62.47	58.14	47.14	60.62
S ₁	68.36	74.23	81.64					
S ₂	55.66	65.81	66.56					
S ₃	51.44	60.96	62.03					
S ₄	41.41	47.74	52.26					

C.D. for N marginal means = 5.4 Q/ha.
C.D. for S marginal means = 4.3 Q/ha.

Crop :- Tobacco (Rabi).

Ref :- Pb. 61(71), 62(100).

Site :- Agri. Res. Stn., Ferozepur.

Type 'D'.

Object :- To study the effect of different chemicals and oils on the suppression of suckers of Tobacco.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 29.11.61; Feb., 62. (iv) to (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) May, 62; June, 62.

2. TREATMENTS :

8 chemicals and oils for suppression: T₁=Control, T₂=Coconut oil, T₃=Coconut oil 1:5 emulsion, T₄=Coconut oil 1:2 emulsion, T₅=Nephth Acetic Acid, T₆=Mustard oil, T₇=Malice hydrazide 1% in H₂O and T₈=Malice hydrazide 2% in H₂O.

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1.8m. × 1.8m.; 0.6m. × 5.4m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of dry leaves. (iv) (a) 1961-62. (b) No. (c) Nil. (v) and (vi) Nil. (vii) As error variances are heterogeneous and Treatments × Years interaction is absent, results of individual years are given under 5. Results.

5. RESULTS :

61(71)

(i) 49.30 Q/ha. (ii) 15.99 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of dry leaves in Q/ha.

Treatment	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈
Av. yield	36.96	68.21	55.71	51.70	44.06	43.67	44.06	50.08

62(100)

(i) 36.30 Q/ha. (ii) 10.24 Q/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of leaves in Q/ha.

Treatment	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈
Av. yield	36.52	48.25	35.49	36.83	16.44	44.75	35.18	42.93

C.D. = 12.00 Q/ha

Crop :- Tobacco (Rabi).**Ref :- Pb 62(103), 64(120).****Site :- Agri. Res. Stn., Ferozepur.****Type:- 'D'.**

Object :—To study the effect of different chemicals and oils in the suppression of suckers of Tobacco.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam.; Clay loam. (iii) Feb.62; 6.3.64. (iv) (a) to (e) N.A. (v) N.A. (vi) N—Tobaccum; N.A. for 64. (vii) Irrigated. (viii) and (ix) N.A. (x) N.A.; June,64.

2. TREATMENTS:8 Chemical treatments :— T_0 =Control, T_1 =Mustard oil, T_2 =Coconut oil, T_3 =Coconut oil emulsion 1:5, T_4 =Coconut oil emulsion 1:2, T_5 =Malic hydrazide 1% in H_2O , T_6 =Malic hydrazide 2% in H_2O and T_7 =Naphthlene acetic acid.**3. DESIGN:**

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 0.60m. × 5.40m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Green leaf weight. (iv) (a) 1962-64(1963 N.A., (b) No. (c) Results of the combined analysis are presened. under 5. Results. (v) and (vi) Nil. (vii) Error variances are homogeneous and Treatments × Years interaction is absent.

5. RESULTS:

Pooled results

(i) 266.5 Q/ha. (ii) 59.9 Q/ha. (based on 77 d.f. made up of Treatments × Years interaction and pooled error) (iii) Treatment differences are highly significant. (iv) Av. yield of green leaves in Q/ha.

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7
Av. yield	276.7	299.6	244.8	267.8	241.5	297.8	287.3	216.9

C.D.=48.6 Q/ha.

Individual results

Treatment	T_0	T_1	T_2	T_3	T_4	T_5	T_6	T_7	Sig.	G.M.	S.E./plot
Year											
1962	279.8	307.1	249.5	270.1	244.3	256.2	290.6	259.8	N.S.	55.5	269.7
1964	273.7	292.2	240.2	238.7	265.4	339.5	284.0	173.9	**	59.9	263.4
Pooled	276.7	299.6	244.8	267.8	241.5	297.8	287.3	216.9	**	59.9	266.5

Crop :- Tobacco (Rabi).**Ref :- Pb. 64(119).****Site :- Agri. Res. Stn., Ferozepur.****Type :- 'D'.**

Object :—To study the effect of different chemicals and oils on the suppression of suckers.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 6.3.64. (iv) (a) to (c) N.A. (v) N.A. (vi) N tobacco. (vii) Irrigated. (viii) and (ix) N.A. (x) June., 64.

2. TREATMENTS:7 treatments : T_0 =Control, T_1 =Mustard oil, T_2 =coconut oil, 1:5 emulsion, T_3 =Coconut oil 1:2, T_4 =Malic hydrazide 1% in H_2O , T_5 =Malic hydrazide 2% in H_2O , and T_6 =Naphthlene acetic acid.

3. DESIGN:

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 5. (iv) (a) N.A. (b) 0.60m. x 5.40m. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of dry leaf. (iv) (a) 1964-only (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS:

(i) 20.31 Q/ha. (ii) 10.12 Q/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of dry leaf in Q/ha.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Av. yield	48.97	46.39	4.65	8.95	9.09	15.80	8.34

C.D. = 13.21 Q/ha.

Crop :- Groundnut (Kharif).

Ref:-Pb. 63(87).

Site :- Agri. Res. Stn., Kapurthala.

Type :- 'M'.

Object :- To study the effect of micronutrients in the presence and absence of P on the yield of Groundnut.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 4th week of June, 63. (iv) and (v) N.A. (vi) PG. No.1. (vii) Irrigated. (viii) and (ix) N.A. (x) 3 rd. week of Nov., 63.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 2 levels of P₂O₅ as Super: P₀=0 and P₁=28 Kg/ha.

(2) 7 micronutrients: T₀=Control, T₁=Manganese sul., T₂=Ferrous sul., T₃=Copper sul., T₄=Zinc sul., T₅=Magnesium sul. and T₆=Boric acid,

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 14. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/296.5 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of pod. (iv) (a) 1963-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 1023 Kg/ha. (ii) 218.0 Kg/ha. (iii) Main effect of T alone is highly significant. (iv) Av. yield of pods in Kg/ha.

	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	Mean
P ₀	1208	1371	1023	1053	689	986	1112	1063
P ₁	1171	1123	986	993	890	930	793	984
Mean	1190	1247	1004	1023	789	958	953	1023

C.D. for T marginal means = 220.5 Kg/ha.

Crop :- Groundnut (Kharif).

Ref :- Pb. 60(56).

Site :- Punjab Agri. University, Ludhiana.

Type :- 'M'

Object :- To study the effect of different levels of N,P and K on the yield of Groundnut.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 28.6.60. (iv) (a) to (c) N.A. (v) N.A. (vi) PG. No. 1. (vii) Irrigated. (viii) and (ix) N.A. (x) 23.11.60.

2. TREATMENTS :

All combinations of (1), (2) and (3)

(1) 2 levels of N as C/A/N: $N_0=0$, and $N_1=28$ Kg/ha.

(2) 2 levels of P_2O_5 as Super : $P_0=0$, and $P_1=28$ Kg/ha.

(3) 3 levels of K_2O as Mur. pot. : $K_0=0$, $K_1=14$ and $K_2=28$ Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) $10.06m. \times 3.66m.$ (b) $9.14m. \times 3.05m.$ (v) 46cm. $\times 30cm.$ (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of pod. (iv) (a) 1960-only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 2178 Kg/ha. (ii) 290.3 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of pod in Kg/ha.

	K_0	K_1	K_2	P_0	P_1	Mean
N_0	2185	2077	2062	2095	2121	2108
N_1	2250	2232	2263	2320	2177	2248
Mean	2217	2155	2162	2208	2149	2178
P_0	2227	2151	2245			
P_1	2208	2158	2080			

Crop :- Groundnut (Kharif).

Ref :- Pb. 60(57).

Site :- Punjab Agri. University, Ludhiana.

Type :- 'M'.

Object :- To study the effect of different manures on the yield of Groundnut.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 9.7.60 (iv) (a) to (d) N.A. (e) —. (v) N.A. (vi) PG. No. 1. (vii) Irrigated (viii) and (ix) N.A. (x) 24.11.60.

2. TREATMENTS :

8 manures. M_0 =Control, M_1 =A/S, M_2 =A/C, M_3 =Cal. chlo., M_4 =Cal. sul., M_5 =Sod. sul., M_6 =Super (single) and M_7 =Super (Triple).

N.B. doses of manures N.A.

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) 13.72m. × 3.66m. (b) 13.26m. × 3.05m. (v) 23cm. × 30cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of pod. (iv) (a) 1960-only. (b) and (c) —. (v) to (vii) N.A.

5. RESULTS :

(i) 1953 Kg/ha. (ii) 87.7 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of pod in Kg/ha.

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆	M ₇
Av. yield	1865	2106	1854	2013	2045	1836	1987	1919

C D. = 129.0 Kg/ha.

Crop :- Groundnut (Kharif).

Ref :- Pb. 60(140).

Site :- Punjab Agri. University, Ludhiana.

Type :- 'M'.

Object :- To study the effect of N and P on the yield of Groundnut.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 21.7.60. (iv) (a) 3 to 4 ploughings. (b) Line sowing. (c) 30 Kg/ha. (d) 23cm. × 20cm. (v) Nil. (vi) Pb-1. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) 7/8.11.60.

2. TREATMENTS :

5 manurial treatments :- M₀ = Control (no manure), M₁ = 28 Kg/ha. of P₂O₅, M₂ = 56 Kg/ha. of P₂O₅, M₃ = 14 Kg/ha. of P₂O₅ + 14 Kg/ha. of N and M₄ = 28 Kg/ha. of P₂O₅ + 28 Kg/ha. of N. (All fertilizers drilled below seed N applied as C/A/N and P₂O₅ as Super.)

3. DESIGN :

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/49.4 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of pod. (iv) (a) 1960-only. (b) and (c) — (v) to (vii) Nil.

5. RESULTS :

(i) 729 Kg/ha. (ii) 110.2 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of pod in Kg/ha.

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄
Av. yield	704	728	735	688	790

Crop:-Groundnut (Kharif).

Ref:-Pb. 60(144).

Site :- Punjab Agri. University, Ludhiana.

Type :- 'M'.

Object :- To study the effect of balanced dose. of N, P and K on the yield of Groundnut.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 20.7.60. (iv) (a) 3 to 4 ploughings. (b) N.A. (c) 30 Kg/ha. (d) 23cm. × 23cm. (v) Nil. (vi) PG. I. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) 5/6.11.60.

2. TREATMENTS:

All combinations of (1), (2) and (3).

(1) 2 levels of N as C/A/N :- $N_0=0$ and $N_1=28$ Kg/ha.

(2) 2 levels of P_2O_5 as Super :- $P_0=0$ and $P_1=28$ Kg/ha.

(3) 2 levels of K_2O as Mur. Pot: $K_0=0$ and $K_1=28$ Kg/ha.

All fertilizers drilled below seed at sowing.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/49.4 ha. (v) N.A. (vi) Yes.

4. GENERAL

(i) Normal. (ii) Nil. (iii) Yield of pod. (iv) (a) 1960-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS:

(i) 131.9 Kg/ha. (ii) 193.3 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of pods in Kg/ha.

	P_0	P_1	K_0	K_1	Mean
N_0	1288	1322	1320	1290	1305
N_1	1346	1322	1254	1414	1334
Mean	1317	1322	1287	1352	1319
K_0	1266	1308			
K_1	1368	1336			

Crop :- Groundnut.

Ref :- Pb. 60(139), 60(141), 60(148).

Site :- Govt. College, Ludhiana.

Type :- 'M'

Object :- To study the effect of different levels of P and N on the yield of Groundnut. (Expt. conducted at Sadhar, Ghungarli and Phullanwal respectively).

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Fine sand; Loamy sand; Sandy loam. (iii) 25.7.60; 16.7.60; 11.7.60. (iv) (a) 3 to 5 ploughings. (b) N.A. (c) 30 Kg/ha. (d) 23cm. × 23cm. (e) N.A. (v) Nil. (vi) Pb-1. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) 9/ 10.11.60; 4.11.60; 23/24.10.60.

2. TREATMENTS :

5 manurial treatments : M_0 =Control (no manure), M_1 =28 Kg/ha. of P_2O_5 as Super, M_2 =56 Kg/ha. of P_2O_5 as Super, M_3 =14 Kg/ha. of P_2O_5 +14 Kg/ha. of N as C/A/N and M_4 =28 Kg/ha. of P_2O_5 as Super+28Kg/ha. of N as C/A/N.

3. DESIGN :

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/49.4 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of pod. (iv) (a) 1960-only. (b) No. (c) Pooled results over places are presented under 5. Results. (v) At three villages. (vi) Nil. (vii) Error variances are homogeneous and Treatments \times Places interaction is present.

5. RESULTS

(i) 919 Kg/ha. (ii) 258.6 Kg/ha. (based on 8 d.f. made up of interaction of Treatments \times Places). (iii) Treatment differences are not significant. (iv) Av. yield of pod in Kg/ha.

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄
Av. yield	803	902	996	878	1016

Individual Results

Treatment	M ₀	M ₁	M ₂	M ₃	M ₄	Sig.	S.E./plot	G.M.
Village Sadhar	1079	1294	1372	1204	1372	**	1264	52.9
Ghungarli	741	639	689	849	933	**	770	94.6
Phullanwal	688	949	1189	773	969	**	914	76.2
Pooled	803	902	996	878	1016	N.S.	919	258.6

Crop :- Groundnut (*Kharij*).

Ref :- Pb. 60(142), 60(143), 60(145).

Site :- Phulanwal, Sadhar and Ghungarli (c.f.).

Type :- 'M'.

Object :- To study the effect of balanced doses of N, P and K on the yield of Groundnut.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) Nil. (iv) PG-1. (v) (a) 3 to 4 ploughings. (b) N.A. (c) 30 Kg/ha. (d) 23cm. \times 23cm. (e) —. (vi) 13.7.60; 25.7.60 and 17.7.60. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) 25.10.60; 9.11.60 and 6.11.60.

2. TREATMENTS:

All combinations of (1), (2) and (3).

(1) 2 levels of N as C/A/N :- N₀=0 and N₁=28 Kg/ha.

(2) 2 levels of P₂O₅ as Super :- P₀=0 and P₁=28 Kg/ha.

(3) 2 levels of K₂O as Mur. Pot. :- K₀=0 and K₁=28 Kg/ha.

3. DESIGN:

(i) Fact, in R.B.D.; 8 plots/block; 4 replications. (ii) N.A. (iii) (a) N.A. (b) 1/49.4 ha. (iv) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of pod. (iv) (a) 1960-only. (b) No. (c) Nil. (v) 3 villages. (vi) Nil. (vii) Error variances are heterogeneous and (N \times P) \times Places and (P \times K) \times Places interactions are present.

5. RESULTS:

Pooled results.

(i) 840 Kg/ha. (ii) 192.5 Kg/ha. (based on 10 d.f. made up of interactions of N, P, K, N \times P and P \times K with places.) (iii) Main effect of N alone is significant. (iv) Av. yield of pod in Kg/ha.

	N ₀	N ₁	K ₀	K ₁	Mean
P ₀	731	867	741	858	799
P ₁	853	909	863	900	881
Mean	792	888	802	879	840

C.D. for N marginal means=87.5 Kg/ha.

Individual villages

Treatment Villages	N ₀	N ₁	Sig.	P ₀	P ₁	Sig.	K ₀	K ₁	Sig.	G.M.	S.E./plot.
Phulanwal	780	857	**	747	890	**	786	851	**	818	39.1
Sadhar	829	902	**	797	934	**	845	886	**	865	38.8
Ghungrali	767	907	**	854	820	**	774	900	**	837	90.7
Pooled	792	888	*	799	881	N.S.	802	879	N.S.	840	192.5

Crop :- Groundnut (Kharif).

Ref :- Pb. 60(21).

Site :- Oil seed Res. Stn., Samrala.

Type :- 'M'.

Object :- To study the effect of different levels of N,P and K on the yield of Groundnut.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 17.7.60. (iv) (a) 3 to 4 ploughings. (b) N.A. (c) 30 Kg/ha. (d) 23cm. x 23cm. (e) N.A. (v) Nil. (vi) C-145. (vii) Un-irrigated. (viii) and (ix) N.A. (x) 15.11.60.

2. TREATMENTS:

All combinations of (1), (2) and (3)

(1) 2 levels of N: N₀=0 and N₁=28 Kg/ha.

(2) 3 levels of K₂O: K₀=0, K₁=14 and K₂=28 Kg/ha.

(3) 2 levels of P₂O₅: P₀=0, and P₁=28 Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/358.3 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Satis factory. (ii) Nil. (iii) Yield of pod. (iv) (a) 1960-only. (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 1219 Kg/ha (ii) 323.0 Kg/ha. (iii) Main effect of K and interaction N x K are significant. (iv) Av. yield of pod in Kg/ha.

	K ₀	K ₁	K ₂	P ₀	P ₁	Mean
N ₀	1015	1143	1603	1284	1223	1254
N ₁	1211	1148	1195	1216	1154	1185
Mean	1113	1146	1399	1250	1188	1219
P ₀	1049	1143	1558			
P ₁	1177	1148	1240			

C.D. for K marginal means=232.6 Kg/ha.

C.D. for the body of N×K table=329.0 Kg/ha.

Crop :- Groundnut (Kharif).

Ref :- Pb. 60(22).

Site :- Oil seed Res. Stn., Samrala.

Type :- 'M'

Object :- To study the effect of calcium, N and K on the yield of Groundnut.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 20,7,60. (iv) (a) 3 to 4 ploughings. (b) N.A. (c) 81 Kg/ha. (d) 23cm.×23cm. (e) — (v) N.A. (vi) C-145. (vii) Un-irrigated. (viii) and (ix) N.A. (x) 16.11.60.

2. TREATMENTS -

All combinations of (1), (2) and (3)

(1) 3 levels of calcium C₀=0, C₁=56.0 and C₂=112.0 Kg/ha.

(2) 2 levels of K₂O: K₀=0 and K₁=28 Kg/ha.

(3) 2 levels of N: N₀=0 and N₁=28 Kg/ha.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/358.3 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Satisfactory. (ii) N.A. (iii) Yield of pod. (iv) (a) 1960-only. (b) and (c) — (v) to (vii) Nil.

5. RESULTS :

(i) 1179 Kg/ha. (ii) 183.9 Kg/ha. (iii) Main effect of C alone is significant. (iv) Av. yield of pod in Kg/ha.

	C ₀	C ₁	C ₂	K ₀	K ₁	Mean
N ₀	974	1284	1185	1100	1195	1148
N ₁	1151	1248	1232	1185	1235	1210
Mean	1062	1266	1209	1143	1215	1179
K ₀	974	1245	1209			
K ₁	1151	1287	1209			

C.D. for C marginal means=123 Kg/ha.

Crop :- Groundnut (Kharif).
Site :- Oil seed Res. Stn., Samrala.

Ref :- Pb. 63(202).
Type :- 'M'

Object :- To study the effect of different manures on the yield of Groundnut.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 1st week of July, 63. (iv) (a) 3 ploughings and 3 plankings. (b) Dibbling. (c) 79 Kg/ha. (d) 30cm. x 30cm. (v) Nil. (vi) PG. No. 1. (vii) Irrigated. (viii) 2 weedings. (ix) 61.7cm. (x) Dec., 63.

2. TREATMENTS :

10 manurial treatments: M_0 =Control, M_1 =112 Kg/ha. of A/S, M_2 =86.2 Kg/ha. of A/C, M_3 =174.7 Kg/ha. of Super, M_4 =58.2 Kg/ha. of Triple Super, M_5 =152.3 Kg/ha. of cal. sul., M_6 =44.8 Kg/ha. of cal. chlo. M_7 =52.6 Kg/ha. of Pot chlo. M_8 =122.1 Kg/ha. of Sod Sul. and M_9 =112 Kg/ha. of Sulphur.

3. DESIGN :

(i) R.B.D. (ii) (a) 10. (b) N.A. (iii) 4. (iv) (a) 29.26m. x 2.74m. (b) 24.69m. x 2.74m. (v) 2.28m. on either side along breadth. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of pod. (iv) (a) 1963-only. (b) and (c) — (v) to (vii) Nil.

5. RESULTS :

(i) 1035 Kg/ha. (ii) 125.2 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of pod in Kg/ha.

Treatment	M_0	M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8
Av. yield	952	1089	1093	1118	1085	967	1048	1048	934

Crop :- Groundnut (Kharif).
Site :- Oil seed Res. Stn., Samrala.

Ref :- Pb. 64(42).
Type :- 'M'

Object :- To study the effect of micronutrients on the yield of Groundnut.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (b) Gram. (c) N.A. (ii) Sandy loam. (iii) 11.7.64. (iv) (a) 4 to 5 ploughings. (b) N.A. (c) 30 Kg/ha. (d) 30cm. x 23cm. (e) —. (v) 28 Kg/ha. of P_2O_5 . (vi) Pb. No. 1. (vii) Irrigated. (viii) 2 hoeings. (ix) N.A. (x) 10.11.64.

2. TREATMENTS ;

All combinations of (1) and (2)

(1) 2 levels of P_2O_5 as Super: $P_0=0$, and $P_1=28$ Kg/ha.

(2) 8 micronutrients: M_0 =Control, M_1 =56 Kg/ha. of Manganese sul., M_2 =33.6 Kg/ha. of Zi ac sul., M_3 =22.4 Kg/ha. of Ferrous Sul., M_4 =22.4 Kg/ha. of Copper Sul., M_5 =1.2 ppm./ha. of Boric acid, M_6 =1.2 ppm./ha. of Molybid acidic and M_7 =112.0 Kg/ha. of Magnesium sul.

3. DESIGN :

(i) Fact in R.B.D. (ii) (a) 16 (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/395.2 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Good. (ii) Nil. (iii) Yield of pod. (iv) (a) 1964-contd. (expt. for 65 N.A.) (b) No. (c) Nil. (v) to (vii) Nil.

5. RESULTS :

(i) 2045 Kg/ha. (ii) 1061.2 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of pod in Kg/ha.

	M ₀	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆	M ₇	Mean
P ₀	2095	1977	1512	2362	1789	2006	2303	2086	2016
P ₁	2125	2352	1512	1917	1957	2451	2056	2224	2074
Mean	2110	2165	1512	2140	1873	2228	2179	2155	2045

Crop : Groundnut (*Kharif*). **Ref :- Pb. 60(S.F.T.) for Patiala and 60,61(S.F.T.) for Ludhiana,**

District :- Ludhiana, Patiala.

Type :- 'M'.

Object:—Type A: To study the response of Groundnut to different levels of N, P and K applied individually and in combination.

1. BASAL CONDITIONS :

(i) N.A. (ii) Alluvial. (iii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

N=22.4 Kg/ha. of N,

P=33.6 Kg/ha. of P₂O₅,

K=33.6 Kg/ha. of K₂O,

NP=22.4 Kg/ha. of N+33.6 Kg/ha of P₂O₅,

NK=22.4 Kg/ha. of N+33.6 Kg/ha. of K₂O,

PK=33.6 Kg/ha. of P₂O₅+33.6 Kg/ha. of K₂O and

NPK=22.4 Kg/ha. of N+33.6 Kg/ha. of P₂O₅+33.6 Kg/ha. of K₂O.

3. DESIGN :

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle/thana is changed once in two years with in the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on Kharif cereal, 8 on a Rabi cereal, 8 on Cash crop, 4 on an oilseed crop and 3 on a leguminous crop. Half the number of trials conducted are of type A and the other half of type B on crops other than the legumes. The three trials on legumes are of type C. Residual effects of phosphate application are studied on type C trials in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98.8ha. (b) 1/197.7ha. (iv) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of pod. (iv) to (vii) N.A.

5. RESULTS :

Av. response in Kg/ha.

District.	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.								
			N	P	K	S.E.	NP	NK	PK	NPK	S.E.
60 (S.F.T.)											
Ludhiana	7	1440	90	90	150	33.0	-40	-30	-10	-10	12.0
Patiala	6	720	150	260	100	20.0	10	20	-10	-20	11.0
61 (S.F.T.)											
Ludhiana	12	1230	140	240	120	55.0	-30	60	-10	30	39.0

Crop :- Groundnut (Kharif).
Site :- Patiala, Sangrur and Ludhiana.

Ref :- Pb. 60(S.F.T.).
Type :- 'M'.

Object :—Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. **BASAL CONDITIONS :**

(i) to (x) N.A.

2. **TREATMENTS :**

7 manurial treatments :

O=Control (no manure),

N₁=22.4 Kg/ha. of N as A/S,

N₂=44.8 Kg/ha. of N as A/S,

N₁'=22.4 Kg/ha. of N as Urea,

N₂'=44.8 Kg/ha. of N as Urea.,

N₁"=22.4 Kg/ha. of N as C/A/N and

N₂"=44.8 Kg/ha. of N as C/A/N.

3. **DESIGN :**

Same as in type A conducted on Groundnut crop on page No. 746.

4. **GENERAL :**

(i) and (ii) N.A. (iii) Yield of pod. (iv) (a) 1960-only. (b) and (c) N.A. (v) to (vii) N.A.

5. **RESULTS**

District.	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			N ₁	N ₂	N ₁ '	N ₂ '	N ₁ "	N ₂ "	
Patiala	4	1010	200	440	160	290	160	330	43.0
Sangrur	3	660	60	330	100	260	130	270	57.0
Ludhiana	7	1330	70	10	120	10	180	160	65.0

Crop :- Groundnut (Kharif).
District :- Ludhiana.

Ref :- Pb. 61(S.F.T.).
Type :- 'M'.

Object :—Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. **BASAL CONDITIONS :**

(i) to (x) N.A.

2. **TREATMENTS**

7 manurial treatments

O=Control (no manure),

N₁=22.4 Kg/ha. of N as A/S,

N₂=44.8 Kg/ha. of N as A/S,

N₁'=22.4 Kg/ha. of N as Urea.

N₂'=44.8 Kg/ha. of N as Urea,

$N_1' = 22.4$ Kg/ha. of N as A/S/N and

$N_2' = 44.8$ Kg/ha. of N as A/S/N.

3. DESIGN:

Same as in type A conducted on Groundnut crop on page No. 746

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of pod. (iv) (a) 1961-only. (b) and (e) N.A. (v) to (vii) N.A.

5. RESULTS:

District	No. of trials	Control yield in Kg/ha.	Av. response in Kg/ha.						S.E.
			N_1	N_2	N_1'	N_2'	N_1''	N_2''	
Ludhiana	12	1390	270	330	140	180	70	340	91.0

Crop:- Groundnut (Kharif).

Ref:- Pb. 64(S.F.T).

District :- Ludhiana.

Type :- 'M'.

Object :- Type A_1 : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS:

8 manurial treatments:

O = Control (no manure),

$N_1 = 15$ Kg/ha. of N,

$N_2 = 30$ Kg/ha. of N,

$P_1 = 30$ Kg/ha. of P_2O_5 ,

$N_1P_1 = 15$ Kg/ha. of N + 30 Kg/ha. of P_2O_5 ,

$N_2P_1 = 30$ Kg/ha. of N + 30 Kg/ha. of P_2O_5 ,

$N_2P_2 = 30$ Kg/ha. of N + 60 Kg/ha. of P_2O_5 and

$N_2P_2K_1 = 30$ Kg/ha. of N + 60 Kg/ha. of P_2O_5 + 30 Kg/ha. of K_2O .

3. DESIGN:

(i) and (ii) A selected district is divided into four agriculturally homogeneous zones based on climate, soil and cropping pattern etc. In each zone one block is selected at random. A block normally consists of a group of 50-100 villages. In each block 36 experiments are conducted in a year of which 11 are of type A_1 , 11 of type A_2 , 11 of type A_3 and 3 are of type C. The eleven experiments each under type A_1 , A_2 and A_3 are distributed as 3 on a Kharif cereal, 3 on a Rabi cereal, 3 on a Cash crop and 2 on an Oilseed crop. All the three type-C experiments are conducted on legume crop. For the purpose of conducting the A_1 , A_2 and A_3 experiments 11 villages are randomly selected in each block and in each village 3 experiments one each of type A_1 , A_2 and A_3 are laid out. For conducting these experiments, three villages are randomly selected in each block. (iii) (a) 1/100 ha. (b) 1/200 ha. (iv) Yes.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of pod. (iv) (a) 1964-only (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of pod in Kg/ha.	—38	185	279	483	473	841	1015	67.6

Control mean=1856 Kg/ha., No. of trials=6

Crop :- Groundnut (Kharif). Ref :- Pb. 64(S.F.T.) for Sangrur, and Patiala.
District :- Sangrur, Ludhiana and 62(S.F.T.) for Ludhiana
Patiala. Type :- 'M'.

Object:—Type A₁: To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments:

O=Control (no manure).

N₁=15 Kg/ha. of N,N₂=30 Kg/ha. of N,P₁=20 Kg/ha. of P₂O₅,N₁P₁=15 Kg/ha. of N+20 Kg/ha. of P₂O₅,N₂P₁=30 Kg/ha. of N+20 Kg/ha. of P₂O₅,N₂P₂=30 Kg/ha. of N+40 Kg/ha. of P₂O₅ andN₂P₂K₁=30 Kg/ha. of N+40 Kg/ha. of P₂O₅+20 Kg/ha. of K₂O.

3. DESIGN :

Same as in Type A₁ conducted under irrigated condition on Groundnut crop on page No. 746.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of pod. (iv) (a) 1964 for Sangrur and Patiala, 1962 to 66 for Ludhiana (63 to 65 N.A.) (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Sangrur

64 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of Pod in Kg/ha.	—49	39	301	316	133	509	474	173.5

Control mean=657 Kg/ha., No. of trials=2

Ludhiana

62 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of Pod in Kg/ha.	28	436	431	429	631	646	798	198.5

Control mean=1413 Kg/ha., No. of trials=11

Patiala

64 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of Pod in Kg/ha.	-523	-49	-69	326	494	681	543	262.9

Control means=1848 Kg/ha., No. of trials=2

Crop :- Groundnut (*Kharif*). Ref :- Pb. 64(S.F.T.) for Ludhiana and 65(S.F.T.) for Sangrur.

District :- Ludhiana and Sangrur. Type :- 'M'.

Object :- Type A₂ : To study the response curves of important cereal, cash and oil seed crops applied to P singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments:

O=Control (No manure),

N₁=15 Kg/ha. of N,

P₁=30 Kg/ha. of P₂O₅,

P₂=60 Kg/ha. of P₂O₅,

N₁P₁=15 Kg/ha. of N+30 Kg/ha. of P₂O₅,

N₁P₂=15 Kg/ha. of N+60 Kg/ha. of P₂O₅,

N₂P₂=30 Kg/ha. of N+60 Kg/ha. of P₂O₅ and

N₂P₂K₂=30 Kg/ha. of N+60 Kg/ha. of P₂O₅+60Kg/ha. of K₂O,

3. DESIGN :

Same as in type A₁ conducted under irrigated condition on Groundnut crop on page. No. 746.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of pod. (iv) (a) 1964 to 66 (65 N.A.) for Ludhiana and 1965 for Sangrur. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Ludhiana

64(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of Pod in Kg/ha.	174	390	859	405	807	839	1122	28.5

Control mean=1810 Kg/ha. ; No. of trials=6

Sangrur

65(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of Pod in Kg/ha.	285	110	560	635	735	985	860	189.4

Control mean=1440 Kg/ha.; No. of trials=2

Crop :- Groundnut (Kharif). Ref :- Pb. 62(S.F.T.) for Ludhiana and 64(S.F.T.) for Patiala .

District :- Ludhiana and Patiala.

Type :- 'M'.

Object :—Type A₂: To study the response curves of important cereal, cash and oil seed crops applied to P singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O = Control (no manure)

N₁ = 15 Kg/ha. of N,

P₁ = 20 Kg/ha. of P₂O₅,

P₂ = 40 Kg/ha. of K₂O,

N₁P₁ = 15 Kg/ha. of N + 20 Kg/ha. of P₂O₅,

N₁P₂ = 15 Kg/ha. of N + 40 Kg/ha. of P₂O₅,

N₂P₁ = 30 Kg/ha. of N + 40 Kg/ha. of P₂O₅ and

N₂P₂K₂ = 30 Kg/ha. of N + 40 Kg/ha. of P₂O₅ + 40 Kg/ha. of K₂O

3. DESIGN :

Same as in type A₁ conducted under irrigated conditions on Groundnut crop on page No. 746.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of pod. (iv) to (vii) N.A.

5. RESULTS :

Ludhiana

62(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of Pod in Kg/ha.	401	351	494	530	573	696	889	205.3

Control mean = 1413 Kg/ha., No. of trials = 9

Patiala

64(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of Pod in Kg/ha.	593	494	948	1344	494	751	1976	694.6

Control mean = 2708 Kg/ha.; No. of trials = 2

Crop :- Groundnut (Kharif).

Ref :- Pb. 64(S.F.T.) for Ludhiana and Patiala.

District :- Ludhiana and Patiala.

Type :- 'M'.

Object :—Type A₂: To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

8 manurial treatments :

O=Control (no manure),

$N_1=15$ Kg/ha. of N,

$K_1=30$ Kg/ha. of K_2O ,

$K_2=60$ Kg/ha. of K_2O ,

$N_1K_1=15$ Kg/ha. of N+30 Kg/ha. of K_2O ,

$N_1K_2=15$ Kg/ha. of N+60 Kg/ha. of K_2O ,

$N_2K_2=30$ Kg/ha. of N+60 Kg/ha. of K_2O . and

$N_1P_1K_1=15$ Kg/ha. of N+30 Kg/ha. of P_2O_5 +30 Kg/ha. of K_2O .

3. DESIGN :

Same as in type A_1 conducted under irrigated condition on Groundnut crop on page No. 746.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of pod. (iv) (a) 1962 to 66 (62,63 and 65 N.A.) for Ludhiana and 1962 to 66 for Patiala (62,63 and 65 N.A.) (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Ludhiana

64 (S.F.T.)

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of Pod in Kg/ha.	385	-53	110	208	233	523	584	135.6

Control mean=1818 Kg/ha.; No. of trials=5

Patiala

64 (S.F.T.)

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of Pod in Kg/ha.	385	444	474	316	1245	909	-197	613.2

Control mean=1739 Kg/ha.; No. of trials=2

Crop :- Groundnut (Kharif).

Ref :- Pb.62(S.F.T.).

District :- Ludhiana.

Type :- 'M'.

Object :- Type A_3 : To study the response curves of important cereal, cash and oil seed crops to K applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Un-irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments :

O=Control (no manure),

$N_1=15$ Kg/ha. of N,

$K_1=20$ Kg/ha. of K_2O ,

$K_2=40$ Kg/ha. of K_2O ,

$N_1K_1=15$ Kg/ha. of N+20 Kg/ha. of K_2O ,

$N_1K_2=15$ Kg/ha. of N + 40 Kg/ha. of K_2O .

$N_2K_2=30$ Kg/ha. of N + 40 Kg/ha. of K_2O .

$N_1P_1K_1=15$ Kg/ha. of N + 20 Kg/ha. of P_2O_5 + 20 Kg/ha. of K_2O .

3. DESIGN:

Same as in type A_1 conducted under irrigated condition on Groundnut crop on page No 749.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of pod. (iv) (a) 1962 to 66 (63 to 65 N.A.), (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

62.(S.F.T.)

Ludhiana

Treatment	N_1	K_1	K_2	N_1K_1	N_1K_2	N_2K_2	$N_1P_1K_1$	S.E.
Av. response of yield in Kg/ha.	237	74	235	344	268	465	456	255.4

Control mean = 1389 Kg/ha.; No. of trials = 9

Crop:- Groundnut (Kharif).

Ref :- Pb. 61(56), 63(99).

Site :- Punjab Agri. University, Ludhiana.

Type :- 'C'.

Object :- To study the effect of different spacings on the yield of Groundnut.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 1.7.61; 4th week of June, 63. (iv) (a) to (d) N.A. (e) — (v) N.A.; 11.3Kg/ha. of P_2O_5 as Super at sowing. (vi) P.G. 1. (vii) Irrigated. (viii) and (ix) N.A. (x) 3rd week of November.

2. TREATMENTS:

All combinations of (1) and (2).

(1) 2 spacings between rows : $R_1=46$ and $R_2=69$ cm.

(2) 3 spacings between plants : $S_1=8$, $S_2=15$ and $S_3=23$ cm.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 6. (b) N.A. (iii) 10. (iv) (a) 5.94m. × 4.11m.; N.A. (b) 5.49m. × 2.74m.; 1/247.1 ha. (v) 23cm. × 69cm.; N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of pod. (iv) (a) 1961-63 (1962 N.A.) (b) No. (c) Results of combined analysis have been presented under 5. Results. (v) N.A. (vi) Nil. (vii) Error variances are heterogeneous and Treatments × Years interaction is present.

5. RESULTS:

Pooled results.

(i) 5595 Kg/ha. (ii) 1181.2 Kg/ha. (based on 5 d.f. made up of Treatments × Years interaction). (iii) None of the effects is significant. (iv) Av. yield of pod in Kg/ha.

	S ₁	S ₂	S ₃	Mean
R ₁	5600	6128	5348	5692
R ₂	5800	5526	5167	5498
Mean	5700	5827	5257	5595

Individual results

Treatment	R ₁	R ₂	Sig.	S ₁	S ₂	S ₃	Sig.	S.E./plot.	G.M.
Year 1961	7825	7798	N.S.	7687	8220	7526	**	602.7	7811
1963	2138	1665	**	2389	1839	1476	**	306.4	1901
Pooled	5692	5498	N.S.	5700	5827	5257	N.S.	1181.2	5595

Crop :- Groundnut (Kharif).**Ref :- Pb. 61(57), 63(98).****Site:- Punjab Agri. University, Ludhiana.****Type :- 'C.****Object: -**To study the effect of different spacings on the yield of Groundnut.**1. BASAL CONDITIONS :**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 25.6.61; 4th week of June, 63. (iv) (a) to (d) N.A. (e) — (v) N.A.; 11.3 Kg/ha of K₂O at sowing for 63 (vi) 501/90; C-501. (vii) Irrigated. (viii) and (ix) N.A. (x) 14 to 21.11.61; 3rd week of Nov., 63.

2. TREATMENTS.

All combinations of (1) and (2)

(1) 2 spacings between rows: R₁=30cm. and R₂=46cm.(2) 3 spacings between plants: S₁=8cm., S₂=15cm. and S₃=23cm.**3. DESIGN:**

(i) Fact. in R.B.D. (ii) (a) 6. (b) N.A. (iii) 10;6 (iv) (a) 5.94m. × 3.66m.; N.A. (b) 5.49m. × 2.74m.; 1/247.1 ha. (v) 23cm. × 46cm.; N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of pod. (iv) (a) 1961-63(1962 N.A.) (b) No. (c) Results of combined analysis have been presented under 5. Results. (v) N.A. (vi) Nil. (vii) Error variances are heterogeneous and Treatments × Years interaction is present.

5. RESULTS:**Pooled results**

(i) 5413 Kg/ha. (ii) 617.8 Kg/ha. (based on 5 d.f. made up of Treatments × Years interaction) (iii) Main effect of R is highly significant and that of S is significant. (iv) Av. yield of pod. is Kg/ha.

	S ₁	S ₂	S ₃	Mean
R ₁	6027	5797	5457	5760
R ₂	5545	4973	4678	5065
Mean	5786	5385	5068	5413

C.D. for R marginal means = 324.2 Kg/ha.

C.D. for S marginal means = 397.0 Kg/ha.

Individual results

Treatment	R ₁	R ₂	Sig.	S ₁	S ₂	S ₃	Sig.	S.E./plot	G.M.
Year									
1963	7845	6948	**	7804	7372	7015	**	540.5	7397
1964	2286	1928	**	2424	2074	1822	**	340.2	1107
Pooled	5760	5065	**	5786	5385	5068	**	617.8	5413

Crop :- Groundnut (Kharif).

Ref :- Pb. 63(101).

Site :- Punjab Agri. University, Ludhiana.

Type :- 'C'.

Object :- To study the effect of dates of sowing and time of harvesting on the yield of Groundnut.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) As per treatments. (iv) (a) to (d) N.A. (e) — (v) N.A. (vi) PG. No. 1. (vii) Irrigated. (viii) 4 hoeings. (ix) N.A. (x) As per treatments.

2. TREATMENTS :

Main-plot treatments :

3 dates of sowing : D₁ = 12.6.63; D₂ = 19.6.63 and D₃ = 26.6.63.

Sub-plot treatments :

3 times of harvesting : H₁ = at 115, H₂ = at 125 and H₃ = at 135 days after sowing.

3. DESIGN.

(i) Split-plot. (ii) (a) 3 main-plots/replication; 3 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/271.8 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of pod. (iv) (a) 1963-only. (b) and (c) — (v) N.A. (vi) and (vii) Nil.

5. RESULTS :

(i) 1809 Kg/ha. (ii) (a) 368.0 Kg/ha. (b) 276.2 Kg/ha. (iii) None of effects is significant. (iv) Av. yield of pod. in Kg/ha.

	D ₁	D ₂	D ₃	Mean
H ₁	1685	1835	1808	1776
H ₂	1971	1991	1685	1882
H ₃	1549	1916	1842	1769
Mean	1735	1914	1778	1809

Crop Groundnut (Kharif).

Ref :- Pb. 63(102).

Site :- Punjab Agri. University, Ludhiana.

Type :- 'C'.

Object :- To study the effect of different spacings and methods of sowing on the yield of Groundnut.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 18.6.63. (iv) (a) 3 ploughings. (b) As per treatments. (c) N.A. (d) As per treatments. (e) — (v) N.A. (vi) C-501. (vii) Irrigated. (viii) 4 hoeings. (ix) N.A. (x) Mid of Oct., 63.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 3 methods of sowing : M₁—Ridge sowing, M₂—Flat sowing and M₃—Flat sowing cum earthing up.

(2) 4 spacings : S₁—30cm. × 15cm., S₂—30cm. × 23cm., S₃—46cm. × 15cm. and S₄—46cm. × 23cm.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 12. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/494.2 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of pod. (iv) (a) 1963-only. (b) and (c) — (v) to (vii) N.A.

5. RESULTS :

(i) 1224 Kg/ha. (ii) 207.6 Kg/ha. (iii) Main effect of S and interaction of M × S are highly significant. (iv) Av. yield of pod. in Kg/ha.

	S ₁	S ₂	S ₃	S ₄	Mean
M ₁	1174	1557	803	1273	1202
M ₂	1396	1557	1063	976	1248
M ₃	1495	1223	1310	865	1223
Mean	1355	1446	1059	1038	1224

C.D. for S marginal means = 172.3 Kg/ha.

C.D. for the body of M × S table = 298.9 Kg/ha.

Crop :- Groundnut (*Kharif*).

Ref :- Pb. 61(31), 62(41), 63(204).

Site :- Oil seed Res., Stn, Samrala.

Type :- 'C'.

Object :—To study the effect of spacing on the yield of Groundnut.

1. BASAL CONDITIONS :

(i) (a) N.A. (b) Fallow, Groundnut; N.A.; (c) Nil.; G.M.; N.A. (ii) Sandy loam. (iii) 5.7 61; 18.7.62; 1st week of July, 63. (iv) (a) 4 to 5 ploughings. (b) Dibbling for 63; N.A. for others. (c) 74 Kg/ha. (d) As per treatments. (e) — (v) Nil. (vi) 145/12-P for 63; C-145 for others. (vii) Unirrigated. (viii) Weeding and hoeings. (ix) N.A., N.A., 61.7cm. (x) Nov., 61; 15.11.62; Dec., 63.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 2 spacings between rows : $R_1=23\text{cm.}$ and $R_2=30\text{cm.}$ (2) 2 spacings between plants : $S_1=15\text{cm.}$ and $S_2=23\text{cm.}$

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 4. (b) N.A. (iii) 8. (iv) (a) N.A. for 62; $14.63\text{m.} \times 3.66\text{m.}$ for others. (b) $1/147.6\text{ ha.}$ for 62; $13.72\text{m.} \times 3.66\text{m.}$ for others. (v) N.A. for 62; 45cm. on either side along breadth for others. (vi) Yes.

4. GENERAL :

(i) Satisfactory for 61 and 62 Normal for 63. (ii) Nil. (iii) Yield of pod. (iv) (a) 1961-63 (b) No. (c) Nil. (v) N.A. (vi) Nil. (vii) As the error variances are heterogeneous and Treatments \times Years interaction is absent, the results of individual experiments have been presented under 5. Results.

5. RESULTS :

61(31)

(i) 2170 Kg/ha. (ii) 1045.9 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of pod in Kg/ha.

	S_1	S_2	Mean
R_1	1992	2293	2142
R_2	2193	2204	2198
Mean	2092	2248	2170

62(41)

(i) 2031 Kg/ha. (ii) 217.7 Kg/ha. (iii) Main effect of S alone is significant. (iv) Av. yield of pod in Kg/ha.

	S_1	S_2	Mean
R_1	2182	1922	2052
R_2	2081	1938	2010
Mean	2132	1930	2031

C.D. for S marginal means = 159.9 Kg/ha.

63(204)

(i) 1292 Kg/ha. (ii) 133.6 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of pod in Kg/ha.

	S ₁	S ₂	Mean
R ₁	1333	1306	1319
R ₂	1343	1186	1264
Mean	1338	1246	1292

Crop :- Groundnut (Kharif).

Ref : Pb. 60(58).

Site :- Punjab Agri. University, Ludhiana.

Type :- 'CM'.

Object :- To study the effect of different spacings and levels of N on the yield of Groundnut.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 28.6,60. (iv) (a) to (c) N.A. (d) As per treatments. (e) - (v) N.A. (vi) P.G. No. 1. (vii) Irrigated. (viii) and (ix) N.A. (x) 3rd week of Nov., 60.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 2 levels of N as C/A/N : N₀=0 and N₁=28 Kg/ha.

(2) 4 spacings between rows : S₁=23, S₂=30, S₃=38 and S₄=46cm.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) 13.72m. × 3.66m. (b) 9.14m. × 2.74m. (v) 229cm. × 46cm. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of pod. (iv) (a) 1960-only. (b) and (c) - (v) to (vii) N.A.

5. RESULTS ;

(i) 1677 Kg/ha. (ii) 152.1 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of pod in Kg/ha.

	S ₁	S ₂	S ₃	S ₄	Mean
N ₀	1640	1571	1768	1565	1636
N ₁	1768	1623	1791	1693	1719
Mean	1704	1597	1780	1629	1677

Crop :- Groundnut (Kharif).

Ref :- Pb. 61(29).

Site :- Oil seed Res. Stn., Samrala.

Type 'CM'.

Object :- To study the effect of hoeings and weedings on the yield of the Groundnut crop in the presence and absence of Phosphoric acid.

1. BASAL CONDITIONS :

(i) (a) Nil. (b) Fallow. (c) Nil. (ii) Sandy loam. (iii) 5.7.61. (iv) (a) 4 to 5 ploughings. (b) N.A. (c) 69 Kg/ha. (d) 30cm. x 23cm. (e) — (v) N.A. (vi) C-501. (vii) Un-irrigated. (viii) As per treatments. (ix) N.A. (x) 10.11.61.

2. TREATMENTS :

All combinations of (1) and (2)

(1) 2 levels of P_2O_5 : $P_0=0$ and $P_1=184.5$ Kg/ha.

(2) 4 cultural treatments: C_0 =No hoeing and No weeding, C_1 =1 hoeing+1 weeding, C_2 =2 hoeings+2 weedings and C_3 = C_2 +2 earthings.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 8. (b) N.A. (iii) 6. (iv) (a) 14.63m. x 2.44m. (b) 13.72m. x 2.44m. (v) 46cm. on either side along breadth. (vi) Yes.

4. GENERAL :

(i) Satisfactory. (ii) Nil. (iii) Yield of pod. (iv) (a) 1961-only. (b) and (c) —. (v) to (vii) Nil.

5. RESULTS :

(i) 1035 Kg/ha. (ii) 150.2 Kg/ha. (iii) Main effect of C is highly significant. (iv) Av. yield of pod in Kg/ha.

	C_0	C_1	C_2	C_3	Mean
P_0	897	953	1179	1130	1040
P_1	1016	915	1133	1060	1031
Mean	956	934	1156	1095	1035

C.D. for C marginal means = 124.6 Kg/ha.

Crop :- Groundnut (Kharif).

Ref :- Pb. 61(32), 63(205).

Site :- Oil seed Res. Stn., Samrala.

Type :- 'CM'.

Object :- To study the effect of manures and different cultural practices on the yield of Groundnut.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 16.7.61; 1st week of July, 63. (iv) (a) 3 to 5 ploughings and planking. (b) Dibbling. (c) 79 Kg/ha. (d) 23cm. x 23cm.; 30cm. x 23cm. (e) —. (v) N.A. (vi) P.G. No. 1. (vii) Un-irrigated. (viii) As per treatments. (ix) N.A.; 61.7cm. (x) Nov. and December, 61; December, 63.

2. TREATMENTS :

All combinations (1) and (2)

(1) 2 levels of P_2O_5 : $P_0=0$ and $P_1=184.5$ Kg/ha.

(2) 3 cultural treatments: C_0 =No hoeing and weeding, C_1 =1 hoeing and 1weeding and C_2 =2 hoeings and 2 weedings.

3. DESIGN :

(i) Fact. in R.B.D. (ii) (a) 6. (b) N.A. (iii) 6; 8. (iv) (a) 14.63m. x 2.44m. (b) 13.72m. x 2.44m. (v) 46cm. on either side along breadth. (vi) Yes.

4. GENERAL :

(i) Satisfactory. (ii) Nil. (iii) Yield of pod. (iv) (a) 1961-63 (62 N.A.), (b) N.A. (c) Results combined analysis have been presented under 5. Results. (v) N.A. (vi) Nil. (vii) Error variances are homogeneous and Treatments \times Years interaction is present.

5. RESULTS :**Pooled results**

(i) 1206 Kg/ha. (ii) 290.2 Kg/ha. (based on 5 d. f. made up of Treatments \times Years interaction). (iii) Main effect of P alone is highly significant. (iv) Av. yield of pod in Kg/ha.

	C ₀	C ₁	C ₂	Mean
P ₀	892	1081	1116	1030
P ₁	1314	1349	1484	1382
Mean	1103	1215	1300	1206

C.D. for P marginal means = 162.7 Kg/ha.

Individual results

Treatment	P ₀	P ₁	Sig.	C ₀	C ₁	C ₂	Sig.	G.M.	S.E./plot
Year									
1961	1149	1367	**	1126	1316	1332	**	1258	143.7
1963	941	1394	**	1086	1140	1276	**	1167	160.6
Pooled	1030	1382	**	1103	1215	1300	**	1206	290.2

Crop :- Sesamum (Kharif).

Ref :- Pb. 64(95).

Site :- Oil seed Res. Sub-Stn., Gurdaspur.

Type :- 'M'.

Object :- To study the effect of different levels of N on the yield of Sesamum.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) N.A. (iii) 24.7.64. (iv) (a) 1 ploughing with soil turning plough and 2 ploughings with *Deshi* plough. (b) Kera method. (c) 9 Kg/ha. (d) Rows 30cm. apart. (e) —. (v) N.A. (vi) Pb. Til No. 1. (vii) to (ix) N.A. (x) 2.11.64.

2. TREATMENTS:

6 levels of N : N₀=0, N₁=22.4, N₂=44.8, N₃=67.2, N₄=89.6 and N₅=112.0 Kg/ha.

3. DESIGN:

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 4.57m. \times 8.84m. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of seed. (iv) (a) 1964-only (b) No, (c) Nil. (v) to (vii) NIL.

5. RESULTS :

(i) 72 Kg/ha. (ii) 27.4 Kg/ha. (iii) Treatment differences are not significant, (iv) Av. yield of seed in Kg/ha.

Treatment	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅
Av. yield	75	67	79	97	55	57

Crop :- Sesamum (Kharif).

Ref :- Pb. 64(96).

Site :- Oil seed Res. Stn., Gurdaspur.

Type :- 'C'

Object :-To study the effect of different spacings on the yield of Sesamum.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) N.A. (iii) 24.7.64. (iv) (a) 1 ploughing by soil turning and 2 ploughings by **Desbi** plough. (b) Kera method. (c) 9 Kg/ha. (d) As per treatments. (e) —. (v) N.A. (vi) As per treatments. (vii) to (ix) N.A. (x) 2.11.64.

2. TREATMENTS :

4 spacings : S₁=30cm. × 30cm., S₂=23cm. × 23cm., S₃=23cm. × 15cm. and S₄=15cm. × 15cm. In S₁ and S₂ variety Pb Til No. 1 is taken and in S₃ and S₄ T.H. 52.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/741 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of seed. (iv) (a) N.A. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 78 Kg/ha. (ii) 25.1 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of seed in Kg/ha.

Treatment	S ₁	S ₂	S ₃	S ₄
Av. yield	100	79	64	67

Crop :- Sesamum (Kharif).

Ref :- Pb. 65(153).

Site :- Oil seed Res. Sub-Stn., Gurdaspur.

Type :- 'CM'.

Object :-To find out the optimum sowing date, proper spacing and adequate manurial dose for Sesamum.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (li) Sandy loam. (iii) to (v) N.A. (vi) Pb. Til No. 1. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

Main-plot treatments:

4 dates of sowing: D₁=16th July, D₂=26th July, D₃=5th Aug. and D₄=20th Aug.

Sub-plot treatments :

All combinations of (1) and (2)

(1) 4 spacings: S₁=30.0cm. × 15.0cm., S₂=30.0cm. × 22.5cm. S₃=22.5cm. × 15.0cm. and S₄=22.5cm. × 22.5cm.

(2) 3 levels of N :- $N_0=0$, $N_1=33.6$ and $N_2=67.2$ Kg/ha.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication, 12 sub-plots/main-plot. (iii) 4. (iv) and (v) N.A. (vi) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of seed. (iv) (a) 1965-only. (b) No. (c) Nil. (v) and (vi) Nil. (vii) Complete results in 2-way tables are not available. Hence only marginal means are given in results under 5. Results.

5. RESULTS :

(i) 126.8 Kg/ha. (ii) (a) 142.7 Kg/ha. (b) 62.0 Kg/ha. (iii) Main effects of D and N are highly significant. (iv) Av. yield of seed in Kg/ha.

Treatment	D ₁	D ₂	D ₃	D ₄	S ₁	S ₂	S ₃	S ₄	N ₀	N ₁	N ₂
Marginal means	289.6	111.5	95.0	11.5	125.7	124.8	133.5	123.6	101.4	134.6	144.7

G.D. for D marginal means = 65.9 Kg/ha.

C.D. for N marginal means = 21.70 Kg/ha.

Crop :- Castor (Kharif).

Ref :- Pb. 60(54), 61(56).

Site :- Oil seed Res. Stn., Faridkot.

Type :- 'C'.

Object :- To study the effect of dates of sowing and spacing on the yield of Castor.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) As per treatments. (iv) (a) to (c) N.A. (d) As per treatments. (e) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

Main-plot treatments

3 dates of sowing : D₁ = 1st July, D₂ = 1st August and D₃ = 1st Sept.

Sub-plot treatments

4 spacings : S₁ = 46cm., S₂ = 61cm., S₃ = 76cm. and S₄ = 91cm.

3. DESIGN :

(i) Split-plot. (ii) (a) 3 main-plots/replication, 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/298.9 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of castor seed. (iv) (a) 1960-only. (b) and (c) No. (v) N.A. (vi) Nil. (vii) Since the error variances for sub-plot are heterogeneous, individual years results are presented under 5. Results.

5. RESULTS :

60(54)

(i) 629 Kg/ha. (ii) (a) 405.4 Kg/ha. (b) 181.5 Kg/ha. (iii) Main effect of D and interaction D x S are significant. (iv) Av. yield of castor in Kg/ha.

	S ₁	S ₂	S ₃	S ₄	Mean
D ₁	884	666	854	821	806
D ₂	669	621	748	1099	784
D ₃	256	337	348	252	298
Mean	603	541	650	724	629

C.D. for D marginal means=350.7 Kg/ha.

C.D. for S means at the same level of D=263.3 Kg/ha.

C.D. for D means at the same level of S=416.9 Kg/ha.

61(58)

(i) 897 Kg/ha. (ii) (a) 350.4 Kg/ha. (b) 633.0 Kg/ha. (iii) None of the effects is significant. (iv) Av. yield of castor in Kg/ha.

	S ₁	S ₂	S ₃	S ₄	Mean
D ₁	910	718	695	1294	904
D ₂	790	1336	1278	1124	1082
D ₃	681	593	851	694	705
Mean	794	816	941	1037	897

Crop :- Mustard (Rabi).

District :- Ferozepur.

Ref :- Pb. 61(S.F.T.).

Type :- 'M'.

Object :- Type B : To investigate the relative efficiency of different N fertilizers at different doses.

1. BASAL CONDITIONS :

(i) to (x) N.A.

2. TREATMENTS :

7 manurial treatments:

O=Control (no manure),

N₁=22.4 Kg/ha. of N as A/S.,

N₂=44.8 Kg/ha. of N as A/S.,

N₁'=22.4 Kg/ha. of N as Urea.,

N₂'=44.8 Kg/ha. of N as Urea.,

N₁"=22.4 Kg/ha. of N as A/S/N. and

N₂"=44.8 Kg/ha. of N as A/S/N.

3. DESIGN :

(i) and (ii) The district has been divided into four agriculturally homogeneous zones and one field assistant posted in each zone. The field assistant conducts the trials in one revenue circle or thana in the zone and the circle/thana is changed once in two years with in the same zone. Each field assistant is required to conduct 31 trials in a year, 8 on Kharif cereal, 8 on a Rabi cereal, 8 on Cash crop, 4 on an oilseed crop and 3 on a leguminous crop, half the number of trials conducted are of type A and the other half of type B on

crops other than the legumes. The three trials on legumes are of type C. Residual effects of Phosphate application are studied on Type C trials in two out of the 4 zones in each district every year. The experiments are laid out in randomly located fields in randomly selected villages in each of the 4 zones at the rate of one experiment per village. (iii) (a) 1/98.8 ha. (b) 1/197.7 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of seed. (iv) (a) 1961-only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

District	No. of trials	Av. response in Kg/ha.						S.E.	
		Control mean in Kg/ha.	N ₁	N ₂	N ₁ '	N ₂ '	N ₁ '		N ₂ '
Ferozepur	2	740	300	410	320	540	350	640	138.0

Crop :- Mustard (Rabi).

Ref :- Pb. 65(S.F.T.) for Patiala,
Ludhiana and 64(S.F.T.) for Ferozepur.

District :- Patiala, Ludhiana and Ferozepur.

Type :- 'M'.

Object : Type A₁ : To study the response curves of important cereal, cash and oil seed crops to N applied singly and in combination with other nutrients.

1. BASAL CONDITIONS :

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

8 manurial treatments,

O=Control(no manure),

N₁=35 Kg/ha. of N,

N₂=70 Kg/ha. of N,

P₁=25 Kg/ha. of P₂O₅,

N₁P₁=35 Kg/ha. of N+25 Kg/ha. of P₂O₅,

N₂P₁=70 Kg/ha. of N+25 Kg/ha. of P₂O₅,

N₂P₂=70 Kg/ha. of N+50 Kg/ha. of P₂O₅ and

N₂P₂K₁=70 Kg/ha. of N+50 Kg/ha. of P₂O₅+25 Kg/ha. of K₂O.

3. DESIGN :

(i) and (ii) A selected district is divided into four agriculturally homogeneous zones based on climate, soil cropping pattern etc., in each zone one block is selected at random. A block normally consists of a group of 50-100 villages, in each block 36 experiments are conducted in a year of which 11 are of type A₁, 11 of type A₂, 11 of type A₃ and 3 are of type C. The eleven experiments under type A₁, A₂ and A₃ are distributed as 3 on a Kharif cereal, 3 on a Rabi cereal, 3 on a cash crop and 2 on oil seed crop. All the three type-C experiments are conducted on a legume crop and for the purpose of conducting the A₁, A₂ and A₃ experiments 11 villages are randomly selected in each block and in each village 3 experiments one each of type A₁, A₂ and A₃ are laid out. For conducting these experiments, the three villages are randomly selected in each block. (iii) (a) 1/100 ha. (b) 1/200 ha. (iv) Yes.

4. GENERAL :

(i) and (ii) N.A. (iii) Yield of seed. (iv) (a) 1965 for Patiala, Ludhiana and 1964 for Ferozepur. (d) and (c) N.A. (v) to (vii) N.A.

5. RESULTS:

Patiala

65 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	250	450	60	450	630	580	660	139.3

Control mean=1100 Kg/ha.; No. of trials=2

Ludhiana

65 (S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₁ P ₂	N ₂ P ₁ K ₁	S.E.
Av. response of yield in Kg/ha.	282	517	401	564	629	1049	1044	98.0

Control mean=1906 Kg/ha.; No. of trials=8

Ferozepur

64(S.F.T.)

Treatment	N ₁	N ₂	P ₁	N ₁ P ₁	N ₂ P ₁	N ₂ P ₂	N ₂ P ₂ K ₁	S.E.
Av. response of yield in Kg/ha.	438	606	97	607	734	812	992	52.5

Control mean=925 Kg/ha. ; No. of trials=2

Crop :- Mustard (*Rabi*).

Ref :- Pb. 65(S.F.T.) for Patiala and Ferozepur.

District :- Patiala and Ferozepur.

Type :- 'M'.

Object :—Type A₂ : To study the response curves of important cereal, cash and oil seed crops to P applied singly and in combination with other nutrients.

1. BASAL CONDITIONS:

(i) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS:

8 manurial treatments :

O=Control (no manure),

N₁=35 Kg/ha. of N,P₁=25 Kg/ha. of P₂O₅,P₂=50 Kg/ha. of P₂O₅,N₁P₁=35 Kg/ha. of N+25 Kg/ha. of P₂O₅,N₁P₂=35 Kg/ha. of N+50 Kg/ha. of P₂O₅,N₂P₂=70 Kg/ha. of N+50 Kg/ha. of P₂O₅ andN₂P₂K₁=70 Kg/ha. of N+50 Kg/ha. of P₂O₅+50 Kg/ha. of K₂O.

3. DESIGN :

Same as in type A₁ conducted on mustard crop on page. No. 764.

4. GENERAL:

(i) and (ii) N.A. (iii) Yield of seed. (iv) (a) 1565-only. (b) and (c) N.A. (v) to (vii) N.A.

5. RESULTS :

Patiala

65(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	250	465	380	395	440	800	810	89.5

Control mean=900 Kg/ha. ; No. of trials=2

Ferozepur

65(S.F.T.)

Treatment	N ₁	P ₁	P ₂	N ₁ P ₁	N ₁ P ₂	N ₂ P ₂	N ₂ P ₂ K ₂	S.E.
Av. response of yield in Kg/ha.	453	95	192	598	649	796	1015	38.7

Control mean= 845Kg/ha. ; No. of trials=2

Crop :- Toria (Rabi).**Ref :- Pb. 60(53).****Site : Oil seed Res. Stn., Ferozepur.****Type :- 'M'.**

Object — To study the effect of different methods of placement on the yield of Toria.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Loam. (iii) Oct., 60. (iv) (a) 5 to 6 ploughings. (b) to (e) N.A. (v) N.A. (vi) T,S.F. (vii) Irrigated. (viii) Thinning and hoeings. (ix) N.A. (x) Dec. to Feb., 61.

2. TREATMENTS :

6 methods of A/S application at 28 Kg/ha. : N₀=Control (No manure). N₁=Full dose drilled at sowing. N₂=Full dose broadcasted at sowing. N₃=Full dose with first sowing. N₄=Half dose broadcasted at sowing and half dose with first irrigation and N₅=Half dose drilled at sowing and half dose with first irrigation.

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 5. (iv) (a) N.A. (b) 1/266.8 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of Toria. (iv) 1960-only. (b) No. (c) Nil. (v) to (vii) N.A.

5. RESULTS :

(i) 1621 Kg/ha. (ii) 110.1 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of Toria in Kg/ha.

Treatment	N ₀	N ₁	N ₂	N ₃	N ₄	N ₅
Av. yield	1438	1673	1746	1697	1596	1577

C.D.=145.2 Kg/ha.

Crop :- Toria (Rabi).**Ref :- Pb. 63(86), 64(69).****Site :- Oil seed Res. Stn., Kapurthala.****Type :- 'M'.**

Object :- To study the effect of different levels of N on the yield of Toria.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) October. (iv) (a) 5 to 7 ploughings. (b) to (c) N.A. (v) N.A. (vi) Improved selection; N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) Dec. to Feb., 64; March, 65.

2. TREATMENTS6 levels of N as C/A/N: $N_0=0$, $N_1=22.4$, $N_2=44.8$, $N_3=67.2$, $N_4=89.6$ and $N_5=112.0$ Kg/ha. N applied at sowing.**3. DESIGN:**

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4;6 (iv) (a) N.A. (b) 1/197.6 ha. (v) N.A. (vi) Yes.

4. GENERAL:(i) Normal. (ii) N.A. (iii) Yield of Toria. (iv) (a) 1963-64. (b) No. (c) Results of combined analysis have been presented under 5. Results. (v) and (vi) N.A. (vii) Error variances are heterogeneous and Treatments \times Years interaction is present.**5. RESULTS:**

Pooled results

(i) 937 Kg/ha. (ii) 331.8 Kg/ha. (based on 5 d.f. made up of Treatments \times Years interaction) (iii) Treatment differences are not significant. (iv) Av. yield of Toria in Kg/ha.

Treatment	N_0	N_1	N_2	N_3	N_4	N_5
Av. yield	648	824	1000	1052	1086	1014

Treatment year	N_0	N_1	N_2	N_3	N_4	N_5	Sig.	G. Mean	S. E./plot
1963	450	462	501	516	670	731	**	555	74.0
1964	781	1066	1333	1410	1364	1203	**	1193	138.4
Pooled	648	824	1000	1052	1086	1014	N.S.	937	331.8

Crop :- Grass.**Ref :- Pb. 60(77), 61(76), 62(144), 63(165).****Site :- Soil conservation Res. cum. demonstration and Training Centre, Chandigarh.****Type :- 'M'.**

Object :- To study the effect of fertilizers on Forage production of Natural grass lands.

1. BASAL CONDITIONS:

(i) Village common land. (ii) Gravelly soil. (iii) Natural. (iv) Mixed grasses. (v) Natural. (vi) to (ix) Nil. (x) Unirrigated. (xi) N.A. (xii) Oct./Nov. for all years.

2. TREATMENTS:

6 manurial treatments: F_0 =Control, F_1 =22.5 Kg/ha. of N as A/S, F_2 =22.5 Kg/ha. of P_2O_5 as Super, F_3 =22.5Kg/ha. of K_2O as Mur. Pot, F_4 = F_1 + F_2 and F_5 = F_1 + F_3 + F_2 .

3. DESIGN:

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) 1/300ha. (b)— (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Weight of dry grass. (iv) 1960-63. (v) to (vii) Nil.

5. RESULTS:

60(77)

(i) 50.4Q/ha. (ii) 21.78 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grass in Q/ha.

Treatment	F_0	F_1	F_2	F_3	F_4	F_5
Av. yield	47.4	53.9	40.2	47.0	56.6	57.3

61(76)

(i) 144.6Q/ha. (ii) 38.4 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grass in Q/ha.

Treatment	F_0	F_1	F_2	F_3	F_4	F_5
Av. yield	128.8	164.3	137.9	123.8	148.7	164.3

62(144)

(i) 89.1 Q/ha. (ii) 9.75 Q/ha. (iii) Treatment differences are significant. (iv) Av. yield of grass in Q/ha.

Treatment	F_0	F_1	F_2	F_3	F_4	F_5
Av. yield	79.2	91.5	88.3	79.6	96.9	99.3

63(165)

(i) 68.8Q/ha. (ii) 13.74Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grass in Q/ha.

Treatment	F_0	F_1	F_2	F_3	F_4	F_5
Av. yield	59.5	84.1	75.9	60.2	64.3	69.1

Crop :- Grass.**Ref :- Pb, 62(141). 63(163).****Site :- Soil Cons. Res. Cum. Demous. and Trg.****Centre, Chandigarh.****Type :- 'M'**

Object :- To study the effect of fertilizers on forage production.

1. BASAL CONDITIONS :

(i) Culturable land. (ii) N.A. (iii) Slip planting. (iv) Bhabhav. (v) July, 61, 30cm. x 30cm. (vi) Gear. (vii) Nil. (viii) Weeding. (ix) Nil. (x) Un-irrigated. (xi) N.A. (xii) Oct./Nov., 62; Feb., 63.

2. TREATMENTS :

All combinations of (1) and (2) +extra treatment.

(1) 4 levels of N as A/S: N_0 =0, N_1 =112, N_2 =168 and N_3 =224 Kg/ha.

(2) 2 levels of P_2O_5 as Super: P_0 =0, and P_1 =112 Kg/ha.

Extra treatment: E_1 =224 Kg/ha. of N+112 Kg/ha. of P_2O_5 +28 Kg/ha. of K_2O as Mur. Pot.

Fertilizer applied by broadcast at the early monsoon showers.

3. DESIGN :

(i) R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) 1/346 ha. (b) — (v) Nil. (vi) Yes.

4. GENERAL :

(i) Good. (ii) Nil. (iii) Yield of dry grass. (iv) 1952-63. (v) to (viii) Nil.

5. RESULTS :

62 (141)

(i) 23.2 Q/ha. (ii) 3.26 Q/ha. (iii) Main effect of N and extra vs. others are highly significant. (iv) Av. yield of dry fodder in Q/ha.

E₁=30.1 Q/ha.

	N ₀	N ₁	N ₂	N ₃	Mean
P ₀	15.7	19.3	24.4	26.5	21.5
P ₁	20.0	23.2	23.9	25.8	23.2
Mean	17.8	21.3	24.2	26.2	22.4

C. D. for N marginal means=3.37 Q/ha.

C.D for extra vs. others=3.56 Q/ha.

63(163)

(i) 21.42 Q/ha. (ii) 5.61 Q/ha. (iii) Main effect of N alone is significant. (iv) Av. yield of dry fodder in Q/ha.

E₁=20.9 Q/ha.

	N ₀	N ₁	N ₂	N ₃	Mean
P ₀	17.1	20.7	24.6	20.9	20.8
P ₁	16.9	21.8	21.1	29.2	22.3
Mean	17.0	21.2	22.8	25.1	21.5

C.D. for N marginal means=5.79 Q/ha.

Crop :- Grass.**Ref :- Pb. 60(76), 61(75), 62(143),****Site :- Soil Cons. Res. Cum Demons. & Trg.****63(164), 64(155).****Centre. Chandigarh.****Type :- 'M'.****Object :-**To study the effect of fertilizers on forage production of natural Grass.**1. BASAL CONDITIONS:**

(i) Village common land. (ii) Deep alluvial. (iii) Natural. (iv) Mixed grasses. (v) and (vi) Natural. (vii) to (ix) Nil. (x) Unirrigated. (xi) N.A. (xii) Oct./Nov. every year.

2. TREATMENTS:6 manurial treatments :- F₀=Control, F₁=22.4 Kg/ha. of N as A/S, F₂=22.4 Kg/ha. of P₂O₅ as super, F₃=22.4Kg/ha. of K₂O as Mur. Pot, F₄=F₁+F₂ and F₅=F₁+F₂+F₃.

Fertilisers were broadcasted with early monsoon showers.

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) 1/300 ha. (b) — (v) Nil. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of dry grass. (iv) 1960-64. (v) to (viii) Nil.

5. RESULTS:

60 (76)

(i) 123.3 Q/ha. (ii) 20.55 Q/ha. (iii) Treatment differences are significant. (iv) Av. yield of dry grass in Q/ha.

Treatment	F ₀	F ₁	F ₂	F ₃	F ₄	F ₅
Av. yield	115.9	121.9	111.9	94.8	165.7	129.9

C.D. = 31.0 Q/ha.

61(75)

(i) 142.2 Q/ha. (ii) 18.50 Q/ha. (iii) Treatment differences are significant. (iv) Av. yield of dry grass in Q/ha.

Treatment	F ₀	F ₁	F ₂	F ₃	F ₄	F ₅
Av. yield	125.9	164.2	126.0	130.3	148.6	158.0

C.D. = 27.88 Q/ha.

62(143)

(i) 87.9 Q/ha. (ii) 3.66 Q/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of dry grass in Q/ha.

Treatment	F ₀	F ₁	F ₂	F ₃	F ₄	F ₅
Av. yield	81.0	94.2	82.9	85.8	90.2	95.2

C.D. = 5.52 Q/ha.

63(164)

(i) 67.7 Q/ha. (ii) 15.12 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of dry grass in Q/ha.

Treatment	F ₀	F ₁	F ₂	F ₃	F ₄	F ₅
Av. yield	58.5	68.9	56.8	60.2	90.5	71.4

64(155)

(i) 86.2 Q/ha. (ii) 9.72 Q/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of dry grass in Q/ha.

Treatment	F ₀	F ₁	F ₂	F ₃	F ₄	F ₅
Av. yield	77.9	103.4	77.6	71.4	93.2	93.6

C.D. = 14.65 Q/ha.

Crop :- Grass.**Ref. :- Pb. 63(167), 64(158).****Site :- Soil Cons. Res. Cum Demons. & Trg. Centre, Chandigarh.****Type :- 'M'.****Object :-** To study the effect of fertilizers on forage production.**1. BASAL CONDITIONS :**

(i) Culturable land. (ii) N.A. (iii) Slip planting. (iv) Dholu. (v) July 62, 30cm x 30cm. (vi) 1 year. (vii) Nil. (viii) 1 weeding. (ix) Nil. (x) Un-irrigated. (xi) N.A. (xii) Oct./Nov. every year.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 2 levels of N as A/S: $N_0=0$, $N_1=28$ Kg/ha.

(2) 3 levels of P_2O_5 as Super: $P_0=0$, $P_1=28$ and $P_2=56$ Kg/ha.

Fertilisers applied, with the early monsoon showers by broadcast.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) 1/346 ha. (b) — (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of dry grass. (iv) 1963-64. (v) to (vii) Nil.

5. RESULTS:

63(167)

(i) 51.0 Q/ha. (ii) 7.51 Q/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grass in Q/ha.

	P_0	P_1	P_2	Mean
N_0	43.6	45.9	42.4	43.9
N_1	56.9	58.1	59.2	58.1
Mean	50.2	52.0	50.8	51.0

C.D. for N marginal means = 6.53 Q/ha.

64(158)

(i) 81.6 Q/ha. (ii) 12.90 Q/ha. (iii) Main effect of N alone is significant. (iv) Av. yield of grass in Q/ha.

	P_0	P_1	P_2	Mean
N_0	70.6	82.2	67.9	73.6
N_1	91.8	90.6	86.3	89.6
Mean	81.2	86.4	77.1	81.6

C.D. for N marginal means = 11.22 Q/ha.

Crop :- Grass.

Ref :- Pb. 61(77), 62(145), 63(166), 64(156).

Site :- Soil Cons. Res. Cum Demons. & Trg.

Centre, Chandigarh.

Type :- 'M'.

Object :- To study the effect of manures on the yield of grass.

1. BASAL CONDITIONS:

(i) Village common land. (ii) Deep alluvial. (iii) Strip planting. (iv) Bhabbar. (v) July 60, 30 cm x 30 cm.
(vi) 1 year. (vii) to (ix) Nil. (x) Un-irrigated. (xi) N.A. (xii) Oct/Nov. every year.

2. TREATMENTS:

All combinations of (1) and (2)+extra treatments.

(1) 3 levels of N as C/A/N: $N_0=0$, $N_1=22.4$ and $N_2=44.8$ Kg/ha.

(2) 3 levels of P_2O_5 as Super: $P_0=0$, $P_1=22.4$ and $P_2=44.8$ Kg/ha.

Extra treatment: $E_1=22.4$ Kg/ha. of N+22.4 Kg/ha of P_2O_5 +22.4 Kg/ha. of K_2O as Mur. Pot.

$E_2=44.8$ Kg/ha. of N+22.4 Kg/ha. of P_2O_5 +22.4 Kg/ha. of K_2O as Mur. Pot.

Fertilisers applied with the early showers of monsoon.

3. DESIGN :

(i) R.B.D. (ii) (a) 11. (b) N.A. (iii) 4. (iv) (a) 1/150ha. (b) — (v) Nil. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) Nil. (iii) Yield of grass. (iv) 1961-64. (v) and (vi) Nil. (vii) Green. wt of. grass is taken in 61.

5. RESULTS:

61(77)

(i) 44.5Q/ha. (ii) 6.84 Q/ha. (iii) Interaction $N \times P$ and extra vs. others are highly significant. (iv) Av. yield of grass in Q/ha.

$E_1=35.9$ Q/ha. and $E_2=34.7$ Q/ha.

	N_0	N_1	N_2	Mean
P_0	38.8	55.7	54.6	49.7
P_1	49.5	42.5	45.3	45.8
P_2	46.8	43.9	41.5	44.1
Mean	45.0	47.4	47.1	46.5

C.D. for the body of $N \times P$ table=9.9 Q/ha.

C.D. for extra vs. others=5.50 Q/ha.

62(145)

(i) 6.1 Q/ha. (ii) 1.23 Q/ha. (iii) Main effect of N alone is highly significant. (iv) Av. yield of grass in Q/ha.
 $E_1=6.6$ Q/ha. and $E_2=6.7$ Q/ha.

	N_0	N_1	N_2	Mean
P_0	4.3	6.0	6.5	5.6
P_1	4.9	5.4	7.1	5.8
P_2	5.1	6.9	7.2	6.4
Mean	4.7	6.1	7.0	5.9

C.D. for N marginal means=1.45 Q/ha.

63(166)

(i) 11.8 Q/ha. (ii) 2.69 Q/ha. (iii) None of the effects is significant. (iv) Av. yield of grass in Q/ha.

$E_1=12.2$ Q/ha. and $E_2=10.9$ Q/ha.

	N_0	N_1	N_2	Mean
P_0	10.0	10.9	12.0	11.0
P_1	11.4	11.1	11.4	11.3
P_2	13.7	12.0	13.6	13.1
Mean	11.7	11.4	12.3	11.8

64(156)

- (i) 7.3 Q/ha. (ii) 1.08 Q/ha. (iii) Main effect of N is highly significant and interaction $N \times P$ is significant.
 (iv) Av. yield of grass in Q/ha.

$E_1=7.6$ Q/ha. (ii) $E_2=6.8$ Q/ha.

	N_0	N_1	N_2	Mean
P_0	6.0	6.9	9.3	7.4
P_1	7.2	6.0	7.6	6.9
P_2	6.3	8.3	8.4	7.7
Mean	6.5	7.1	8.4	7.3

C.D. for N marginal means=0.90 Q/ha.

C.D. for the body of $N \times P$ table=1.56 Q/ha.

Crop :- Grass.

Ref :- Pb. 60(75), 61(74), 62(140), 63(162).

Site : Soil Cons. Res. Cum Demons. & Trg.

Centre, Chandigarh.]

Type : 'C'.

Object :-To study the effect of structural treatment on the yield of Grass.

1. BASAL CONDITIONS :

- (i) Village common land. (ii) Gravelly soil. (iii) Natural. (iv) Mixed grasses. (v) Natural growth. (vi) to (ix) Nil. (x) Un-irrigated. (xi) N.A. (xii) Oct/Nov. every year.

2. TREATMENTS :

4 structural treatments : T_1 =Control, T_2 =Contour furrowed, T_3 =Contour ridges, and T_4 =Basin histing.

3. DESIGN :

- (i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 4. (iv) (a) 1/400 ha. (b) — (v) Nil. (vi) Yes.

4. GENERAL :

- (i) Normal. (ii) Nil. (iii) Yield of dry grass. (iv) 1960-63. (v) (a) and (b) Nil. (vi) and (vii) Nil.

5. RESULTS:

60(75)

(i) 44.2 Q/ha. (ii) 6.10 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grass in Q/ha.

Treatment	T ₁	T ₂	T ₃	T ₄
Av. yield	37.7	41.2	55.6	42.2

61(74)

(i) 84.5 Q/ha. (ii) 9.94 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grass in Q/ha.

Treatment	T ₁	T ₂	T ₃	T ₄
Av. yield	77.8	87.7	90.6	81.9

62(140)

(i) 51.4 Q/ha. (ii) 3.98Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grass in Q/ha.

Treatment	T ₁	T ₂	T ₃	T ₄
Av. yield	46.2	53.5	53.7	52.1

63(162)

(i) 11.9 Q/ha. (ii) 1.96 Q/ha. (iii) Treatment differences are not significant. (iv) Av. yield of grass in Q/ha.

Treatment	T ₁	T ₂	T ₃	T ₄
Av. yield	10.8	12.5	12.7	11.6

Crop :- Sweet lime.**Ref :-Pb. 60(3), 61(1), 62(1).****Site :-Govt. Fruit Res. Stn., Attari.****Type :- 'CM'.**

Object :—To see the effect of A/S alone and in combination with green manuring.

1. BASAL CONDITIONS:

(i) and (ii) N.A. (iii) By budding. (iv) N.A. for 60; citrus auranti folia swingh for 61 and 62. (v) 1941, 5.49m.X5.49m. (vi) 6 to 12 months. (vii) 67 Kg/ha. of super+45 Kg/ha. of F.Y.M. /tree, 67 Kg/ha. of super before sowing of Guara and Senji. (viii) N.A.; 3 hoeings and 2 weedings for 61 and 62. (ix) As per. treatments; Nil for 61 and 62. (x) Irrigated. (xi) and (xii) N.A.

2. TREATMENTS:

All combinations of (1) and (2)

(1) 2 levels of N as A/S: N₀=0, and N₁=2.2 Kg/tree.(2) 3 inter croppings: C₀=N₀ crop, C₁=Guara as summer G.M. and C₂=Senji as winter G.M.

3. DESIGN:

(i) Fact. in R.B.D. (ii) (a) 6. (b) — (iii) 5. (iv) (a) — (b) 3. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) No of fruits/tree. (iv) 1951-62. (v) and (vi) N.A. (vii) and (viii) Nil.

5. RESULTS:

60(3)

(i) 57 fruits/tree (ii) 41.7 fruits/tree. (iii) Main effect of C alone is significant. (iv) Av. no. of fruits/tree.

	C ₀	C ₁	C ₂	Mean
N ₀	24	68	100	64
N ₁	18	68	62	49
Mean	21	68	81	57

C.D. for C marginal means=38.9 fruits/tree

(i) 30 fruits/tree. (ii) 21.0 fruits/tree (iii) Main effect of C alone is highly significant. (iv) Av. no. of fruits/tree

	C ₀	C ₁	C ₂	Mean
N ₀	6	10	45	20
N ₁	17	41	62	40
Mean	12	25	54	30

C.D. for C marginal means=19.5 fruits/tree

C.D. for N marginal means=15.9 fruits/tree

62(1)

(i) 47 fruits/tree (ii) 28.0 fruits/tree. (iii) Main effect of C alone is highly significant. (iv) Av. no. of fruits/tree

	C ₀	C ₁	C ₂	Mean
N ₀	18	44	78	47
N ₁	13	54	76	48
Mean	16	49	77	47

C.D. for C marginal means=26.2fruits/tree.

Crop :- Sweet Orange.

Ref :-Pb :- 63(15).

Site :-Fruit Res. Stn., Bahadurgarh.

Type :- 'M'.

Object :-To study the comparative effect of different concentrations of Zn So₄ on chlorosis of Citrus.

1. BASAL CONDITIONS :

(i) N.A. (ii) Sandy loam. (iii) Budding. (iv) Taffa. (v) N.A., square method with 7.62m. of spacing. (vi) 1year (vii) 0.06 Kg/tree. of N as C/A/N per year age of tree in two doses in Nov., 63 and March, 64 (viii) and (ix) N.A. (x) Irrigated. (xi) N.A. (xii) Fruiting not yet started.

2. TREATMENTS :

T₀=Control (water spray), T₁=0.3% of Zinc sul. (1.36 Kg. of Znso₄+0.68 Kg of hydrate lime 100 gallon of water), T₂=2T₁ and T₃=3T₁.

Note :-1st spraying in Oct, 73 and 2 nd in April 74.

3. DESIGN :

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 5. (iv) (a) 4 twigs of a plant. (b) — (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Percentage improvement in chlorosis. (iv) 1963. (v) and (vi) Nil. (vii) and (viii) Nil.

5. RESULTS :

(i) 55.8% (ii) 9.35% (iii) Treatment differences are highly significant. (iv) Av. percentage improvement in chlorosis.

Treatment	T ₀	T ₁	T ₂	T ₃
Av. % improvement	12.8	80.4	63.0	67.4

C.D. = 12.88%

Crop :- Sweet Orange.

Ref :- Pb. 60(1), 61(2), 62(2).

District :- Govt. Res. Stn., Attari.

Type :- 'MV'.

Object :- To determine the effect of N on the yield of different varieties of sweet Orange.

1. BASAL CONDITIONS :

(i) and (ii) N.A. (iii) Budding. (iv) As per treatments (v) 1941, 5.49m. x 5.49m. (vi) N.A. (vii) 234.5Kg of F.Y.M; Nil. (viii) and (ix) N.A. (x) Irrigated. (xi) and (xii) N.A.

2. TREATMENTS :

Main-plot treatments:

4 sources of 1.36 K₁₁ of N/tree: M₀ = Control (no manure), M₁ = F.Y.M., M₂ = A/S and M₃ = A/S + F.Y.M.

Sub-plot treatments :

5 varieties: V₁ = Pineapple, V₂ = Common, V₃ = Homline, V₄ = Blood red and V₅ = valericia late (N as A/S applied in 3 parts while F.Y.M. one time)

3. DESIGN :

(i) Split-plot. (ii) 4 main-plots/replication, 5 sub-plots/main-plot. (b) . (iii) 6. (iv) (a) — (b) 4. (v) N.A. (vi) Yes

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield/tree. (iv) 1959-62. (v) to (vii) Nil. (viii) Nil, Dose-regulated with due regard to the age of tree and N contents of the manure and fertilizer. Dose made constant after the age of 14th year of the trees, N-3 in/tree.

5. RESULTS :

60(1)

(i) 143 fruits/tree. (ii) (a) 86.4 fruits/tree (b) 74.1 fruits/tree. (iii) Main effect of M is highly significant and that of V is significant. (iv) Av. yield of fruits/tree (in number).

	M ₀	M ₁	M ₂	M ₃	Mean
V ₁	116	136	172	225	163
V ₂	108	92	130	192	130
V ₃	110	199	156	231	174
V ₄	115	96	141	203	139
V ₅	68	150	92	132	110
Mean	103	135	138	197	143

C.D. for M marginal means=48 fruits/tree

C.D. for V marginal means=41 fruits/tree

62(2)

(i) 161 fruits/tree. (ii) (a) 75 fruits/tree. (b) 66 fruits/tree. (iii) Main effects of M and V both are highly significant. (iv) Av. yield of sweet orange(in number).

	M ₀	M ₁	M ₂	M ₃	Mean
V ₁	77	117	155	248	149
V ₂	88	82	149	216	134
V ₃	139	213	237	302	223
V ₄	101	96	203	236	159
V ₅	91	121	93	256	140
Mean	99	126	167	252	161

C.D. for M marginal means=41 fruits/tree

C.D. for V₂ marginal means=37 fruits/tree.

62(2)

(i) 212 fruits/tree. (ii) (a) 100 fruits/tree (b) 108 fruits/tree. (iii) Main effect of S alone is highly significant. (iv) Av. yield of fruits.(in number).

	M ₀	M ₁	M ₂	M ₃	Mean
V ₁	97	105	303	357	216
V ₂	97	131	216	203	162
V ₃	121	154	249	459	246
V ₄	128	158	272	293	213
V ₅	105	181	259	352	224
Mean	110	146	260	333	212

Crop :- Sweet Orange.**Ref. :- Pb. 63(16).****Site :- Fruit Res. Stn., Bahadurgarh.****Type :- 'C'.**

Object —To study the effect of intercropping on the chlorosis of citrus.

1. BASAL CONDITIONS:

(i) N.A. (ii) Sandy loam. (iii) Budding. (iv) Jaffa. (v) Initial observation recorded in Oct., 63; square method with 7.62m. of spacing. (vi) 1 year. (vii) 0.06Kg/trce of N as C/A/N per year age of tree in two doses in Nov. and March. (viii) N.A. (ix) As per treatments (x) Irrigated. (xi) N.A. (xii) Fruiting not yet started.

2. TREATMENTS:6 inter croppings. T₀=Control (no intercropping), T₁=Senji, T₂=Guava, T₃=Berseem, T₄=Gram and T₅=Chillies.**3. DESIGN:**

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 6. (iv) (a) and (b) 3. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Percentage increase in chlorosis. (iv) 1963-only. (v) Nil. (vi) — (vii) Nil. (viii) Two twigs on each plant were selected at random for to bing observation.

5. RESULTS:

(i) 34.6% (ii) 9.52% (iii) Treatment differences are highly significant. (iv) Av. percentage increase in chlorosis.

Treatment	T ₀	T ₁	T ₂	T ₃	T ₄	T ₅
Av. % increase	42.7	33.2	29.8	38.8	33.0	30.0

C.D.=11.30%

Crop :-Citrus.**Ref :-Pb. 61(149), 62(233).****Site :-Fruit Res. Stn., Khanpur.****Type :- 'M'.**

Object :-To study the effect of different concentrations of zinc sulphate sprays on the incident of chlorosis of citrus.

1. BASAL CONDITIONS:

(i) N.A. (ii) (a) Silly loam. (b) N.A. (iii) N.A. (iv) Blood red. (v) to (ix) N.A (x) Irrigated. (xi) N.A. (xii) July.

2. TREATMENTS:3 sprayings :- T₀=Control(no spray), T₁=0.3%of Zinc Sul. , 0.9 Kg/ha. hydrated lime in 100 gallon of H₂O, T₂=0.6%of Zinc Sul.+1.8 Kg hydrated lime in 100 gallon of H₂O and T₃=0.9% of Zinc Sul. +2.7 Kg hydrated lime in 100 gallon of H₂O.**3. DESIGN:**

(i) R.B.D. (ii) (a) 4. (b) N.A. (iii) 4. (iv) and (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) %improvement in chlorosis. (iv) 1961-62. (v) N.A. (vi) to (viii) Nil.

5. RESULTS :

61(149)

(i) 65.31% improvement. (ii) 18.52% improvement. (iii) Treatment differences are highly significant. (iv) Av. percentage improvement in chlorosis.

Treatment	T ₁	T ₂	T ₃	T ₄
% Improvement	11.00	89.25	81.00	80.00

62(233)

(i) 27.62% Improvement. (ii) 15.81% Improvement. (iii) Treatment differences are not significant. (iv) Av. percentage improvement in chlorosis.

Treatment	T ₁	T ₂	T ₃	T ₄
% Improvement	9.50	39.00	24.00	38.00

Crop :- Grape Fruit.

Ref :- Pb. 60(2), 62(49).

Site :- Govt. Fruit Res. Stn., Attari.

Type :- 'MV'.

Object:—To see the effect of N alone and in combination with P and K on the yield of the fruit of different varieties.

1. BASAL CONDITIONS :

(i) and (ii) N.A. (iii) Budding. (iv) As per treatments. (v) 1941 (year of planting) 5.49m. x 5.49m. (vi) N.A. (vii) 45.4 Kg/tree of F.Y.M. (viii) to (x) N.A.

2. TREATMENTS :

Main-plot treatments :

4 manurial treatments :- M₁=A/S, M₂=A/S+Super, M₃=A/S+Mur. pot., and M₄=A/S+Mur. pot. (Actual doses—N.A.)

Sub-plot treatments :

4 varieties :- V₁=Buncan, V₂=Marsh seed less, V₃=Poonra budded and V₄=Foster.

3. DESIGN :

(i) Split-plot. (ii) (a) 4 main-plots/replication and 4 sub-plots/main-plot. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 8. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) No. of fruits/tree. (iv) 1960-62(61 N.A.) (v) and (vi) N.A. (vii) and (viii) Nil.

5. RESULTS:

60(2)

(i) 78 fruits/tree. (ii) (a) 55.5 fruits/tree. (b) 59.0 fruits/tree. (iii) Main effect of V alone is highly significant. (iv) Av. no. of fruits/tree.

	M ₁	M ₂	M ₃	M ₄	Mean
V ₁	123	146	97	68	108
V ₂	44	24	12	21	25
V ₃	158	26	103	104	98
V ₄	111	122	45	37	79
Mean	109	80	64	58	78

C.D. for V marginal means = 42.0 fruits/tree

62(49)

(i) 144 fruits/tree. (ii) (a) 94 fruits/tree. (b) 77 fruits/tree. (iii) Interaction M × V is highly significant only (iv) Av. no. of fruits/tree.

	M ₁	M ₂	M ₃	M ₄	Mean
V ₁	172	199	161	129	165
V ₂	170	131	67	83	113
V ₃	249	74	200	204	182
V ₄	134	201	61	69	116
Mean	181	151	122	121	144

C.D. for V means at the same level of M = 110.4 fruits/tree

C.D. for M means at the same level of V = 125.8 fruits/tree.

Crop :- Wheat and Gram (Rabi).
Site :- Agri. Res. Stn., Ferozepur.

Ref :- Pb. 61(22), 62(40).
Type :- 'X'.

Object :- To study the mixed cropping of Wheat and Gram.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 30.10.61; 7.11.62. (iv) (a) and (b) N.A. (c) Wheat 74 Kg/ha.; gram desi 42 Kg/ha. and gram kabli 99 Kg/ha. (d) and (e) N.A. (v) N.A. (vi) Wheat : C.273, Gram desi = C-104 Gram kabli: Pb. 7. (vii) Irrigated; unirrigated. for 62. (viii) and (ix) N.A. (x) 12.4.62; 1st week of May, 63

2. TREATMENTS:

7 mixtures of different crops :- M₁ = Gram kabli alone, M₂ = Gram desi alone, M₃ = Wheat alone, M₄ = Wheat and gram kabli in alternate rows, M₅ = Wheat and gram desi in alternate rows, M₆ = Wheat and gram kabli mixture in all rows and M₇ = Wheat and gram desi mixture in all rows.

3. DESIGN:

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/247 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Satisfactory; unsatisfactory for Wheat. (ii) Nil; N.A. (iii) Mixed yield of Wheat and gram grains. (iv) (a) 1961-62. (b) No. (c) Results of combined analysis are presented under 5. Results. (v) N.A. (vi) Nil; Heavy rains. (vii) Error variances are homogeneous and Treatments × Years interaction is absent.

5. RESULTS:

Pooled results

(i) 1651 Kg/ha. (ii) 1552.9 Kg/ha. (based on 42 d.f. made up of Treatments \times Years interaction and pooled error). (iii) Treatments differences are not significant. (iv) Av. yield of mixture in Kg/ha.

Treatment	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆	M ₇
Av. yield	1810	1470	1686	1393	1917	1597	1681

Individual results:

Treatment	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆	M ₇	Sig.	G.M.	S.E./plot
Year										
1961	1455	1529	1822	1044	1696	1146	1442	**	1448	242.2
1962	2165	1412	1551	1742	2138	2048	1921	**	1854	207.5
Pooled	1810	1470	1686	1393	1917	1597	1681	N.S.	1651	1552.9

Crop :- Wheat & Gram.

Ref:- Pb. 63(48), 64(31), 65(85).

Site :- Agri. Res. Stn., Ferozepur.

Type :- 'X'

Object :- To study the effect of mixed cropping of desi and kabuli Gram With Wheat.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 12.10.63; 3.11.64 and 20.11.65. (iv) (a) to (e) N.A. (v) Nil for 63 and N.A. for others. (vi) Wheat C-273, Gram C-104 and Pb-7. (vii) Irrigated. (viii) and (ix) N.A. (x) 1st week of April, 64 and N.A. for others.

2. TREATMENTS:

Mixtures of different crops : M₁=Wheat alone, M₂=Gram alone, M₃=Pb gram alone, M₄=Wheat and gram in alternate rows in north south direction, M₅=Wheat and Pb gram in rows in north south direction, M₆=Wheat and gram in alt. rows in East-West direction. M₇=Wheat and Pb gram in alt. rows in East-West direction, M₈=Wheat and gram mixture in alt. rows, M₉=Wheat and Pb gram mixture in alt. rows.

3. DESIGN:

(i) R.B.D. (ii) (a) 9. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/247 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal for 63 and 65; Satisfactory for 64. (ii) Nil for 63 and N.A. for others. (iii) Yield of mixture of Wheat and gram grains. (iv) (a) 1963 to 65. (b) No. (c) Nil. (v) N.A. (vi) Nil. (vii) Error variances are homogeneous and Treatments \times Years interaction is present.

5. RESULTS:

Pooled results

(i) 1103 Kg/ha. (ii) 434.6 Kg/ha. (based on 16 d.f. made up of interaction of Treatments \times Years). (iii) Treatment differences are not significant. (iv) Av. yield of mixture of Wheat and gram grains in Kg/ha.

Treatment	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆	M ₇	M ₈	M ₉
Av. yield	1018	1131	977	1287	1161	1106	1079	1071	1095

Individual results :

Treatment	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆	M ₇	M ₈	M ₉	Sig.	G.M.	S.E./plot
Year												
1963	689	1277	1011	1009	1110	919	844	876	729	**	940	171.9
1964	1210	1468	1425	1576	1241	1336	1391	1274	1623	**	1395	142.9
1965	1155	649	494	1279	1131	1063	1001	1063	933	**	974	138.3
Pooled	1018	1131	977	1287	1161	1106	1079	1071	1095	N.S.	1103	434.6

Crop :- Wheat-Barley-Gram (Rabi).

Ref :-Pb. 62(27).

Site :- Agri. Res. Stn., Ferozepur.

Type :- 'X'.

Object :-To study the effect of Mixed cropping of Wheat-Barley and Gram.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) Nov., 62 (iv) (a) to (e) N.A. (v) N.A. (vi) Wheat=C-273, Gram =S-26, Barley=C-164. (vii) Un-irrigated. (viii) and (ix) N.A. (x) 1st week of May, 63.

2. TREATMENTS :

7 mixtures of different crops : M₁=Gram alone, M₂=Wheat alone, M₃=Barley, M₄=Wheat and gram in alt. rows, M₅=Gram and Barley in alt. rows, M₆=Wheat and gram mixture in all rows and M₇=Gram and Barley mixture in all rows.

3. DESIGN:

(i) R.B.D. (ii) (a) 7. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/247 ha. (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain of mixture of Wheat, Barley and Gram. (iv) (a) and (b) No. (c) Nil. (v) N.A. (vi) and (vii) Nil.

RESULTS:

(i) 2178 Kg/ha, (ii) 273.9 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of mixture in Kg/ha.

Treatment	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆	M ₇
Av. yield	1693	2446	2446	2141	1952	2536	2032

C.D.=406.9 Kg/ha,

Crop :- Wheat, Gram and Barley (Rabi).

Ref :-Pb. 63(50), 64(29).

Site :- Agri. Res. Stn., Ferozepur.

Type :- 'X'.

Object :-To study the mixed cropping of Wheat, Gram and Barley.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) N.A.; Oct; 64. (iv) (a) to (e) N.A. (v) Nil, for 63 and N.A. for 64. (vi) Wheat=C. 273, Barley=C. 138 and Gram=S-26. (vii) Unirrigated. (viii) and (ix) N.A. (x) End of April.

2. TREATMENTS :

9 mixtures of different crops: M_1 =Wheat alone, M_2 =Barley alone, M_3 =Gram alone, M_4 =Wheat and gram in alt. rows in N-S direction, M_5 =Barley and gram in alt. rows in N-S direction, Wheat and Gram in alt. rows in E-W direction., M_7 =Barley and gram in alt. rows in E-W direction, M_8 =Wheat and gram mixed in all rows and M_9 =Barley and gram mixed in all rows.

3. DESIGN :

(i) R.B.D. (ii) (a) 9. (b) N.A. (iii) 4;3. (iv) (a) N.A. (b) 1/247 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil for 63 and N.A. for 64. (iii) Yield of grain of mixed crops. (iv) (a) 1963 to 64. (b) N.A. (c) Nil. (v) N.A. (vi) Nil. (vii) Error variances are homogeneous and Treatments \times Years interaction is absent.

5. RESULTS :

Pooled results

(i) 1418 Kg/ha. (ii) 396.4 Kg/ha. (based on 48 d.f. made up of Treatments \times Years interaction and pooled error) (iii) Treatment differences are not significant. (iv) Av. yield of mixture of gram and Barley in Kg/ha.

Treatment	M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8	M_9	Sig.	G.M.	S.E./plot
Av. yield	1452	1171	1442	1368	1391	1597	1570	1508	1263			
1963	771	480	749	1014	680	998	1029	950	555	*	803	431.9
1964	2359	2093	2366	1839	2338	2395	2291	2251	2208	N.S.	2238	355.8
Pooled	1452	1171	1442	1368	1391	1597	1570	1508	1263	N.S.	1418	396.4

Crop :- Bajra, Guar and Moth (Kharif).

Ref :-Pb. 63(40).

Site :- Agri. Res. Stn., Ferozepur.

Type :- 'X'

Object :-To study the effect of taking Guar and Moth with Bajra on the yield of Bajra under unirrigated condition.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Clay loam. (iii) 15.7.63. (iv) (a) to (e) N.A. (v) N.A. (vi) T-55. (vii) Unirrigated. (viii) rnd (ix) N.A. (x) 10.10.63.

2. TREATMENTS:

5 treatments :- T_1 =Bajra and Guara mixture in the same rows, T_2 =Bajra and guara in nature rows, T_3 =Bajra and Moth in alternative rows, T_4 =Bajra and Moth mixture in same rows and T_5 =Bajra alone

3. DESIGN:

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/247 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) Nil. (iii) Yield of Bajra grain (iv) (a) and (b) No. (c) Nil. (v) N.A. (vi) Nil. (vii) Only yield of Bajra is available.

5. RESULTS :

(i) 1209 Kg/ha. (ii) 166.8 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of Bajra grain in Kg/ha.

Treatment	T ₁	T ₂	T ₃	T ₄	T ₅
Av. yield	1010	1407	1385	1075	1168

C.D.—201 Kg/ha.

Crop :- Cotton & Groundnut.

Ref :-Pb. 62(218).

Site :- Agri. Res. Stn., Gurdaspur.

Type :- 'X'.

Object :-To study the effect of taking Groundnut with Cotton on the yield of Cotton.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Loamy (iii) 23.4.62. (iv) (a) 6 ploughings. (b) to (e) N.A. (v) 62 Kg/ha. of N at sowing. (vi) R-231. (vii) Irrigated. (viii) 3 weedings. (ix) N.A. (x) 20.9.62 to 17.12.62.

2. TREATMENTS :

5 mixed crops :- M₁=Cotton alone, M₂=Cotton and Groundnut in 1:1 ratio, M₃=Cotton and Mash in 1:1 ratio, M₄=Cotton and Groundnut in 1:3 ratio and M₅=Cotton and Mash in 1:3 ratio.

3. DESIGN :

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 6. (iv) (a) N.A. (b) 1/395 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of kapas. (iv) (a) 1962-only. (b) No. (c) Nil. (v) and (vi) Nil. (vii) Yield of kapas is available only.

5. RESULTS :

(i) 806 Kg/ha. (ii) 132.1 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. yield of kapas in Kg/ha.

Treatment	T ₁	T ₂	T ₃	T ₄	T ₅
Av. yield	960	949	827	671	621

C.D.—159.1 Kg/ha.

Crop :- Groundnut and Cotton (Kharif).

Ref :- Pb. 63(103).

Site :- Punjab Agri. University, Ludhiana.

Type 'X'.

Object :-To study the effect of taking Castor with Groundnut on the yield Groundnut.

1. BASAL CONDITIONS :

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 18.6.63. (iv) (a) 5 ploughings. (b) to (c) N.A. (v) and (vi) N.A. (vii) Irrigated. (viii) and (ix) N.A. (x) Nov. and Dec., 63.

2. TREATMENTS:

6 mixed crops :- M_1 = Groundnut alone, M_2 = Groundnut and Castor at 90cm. apart, M_3 = 2 rows of groundnut and 1 row of Castor, M_4 = 4 rows of Groundnut and one row of Castor, M_5 = 8 rows of Groundnut and 1 row of Castor and M_6 = 11 rows of Groundnut and 1 row of Castor.

3. DESIGN :

(i) R.B.D. (ii) (a) 6. (b) N.A. (iii) 4. (iv) (a) N.A. (b) 1/336 ha. (v) N.A. (vi) Yes.

4. GENERAL :

(i) Normal. (ii) N.A. (iii) Yield of groundnut pods. (iv) (a) 1963-only. (b) No. (c) Nil. (v) N.A. (vi) Nil. (vii) Yield of groundnut is available only.

5. RESULTS:

(i) 2585 Kg/ha. (ii) 379.0 Kg/ha. (iii) Treatment differences are not significant. (iv) Av. yield of Groundnut pods in Kg/ha.

Treatment	T_1	T_2	T_3	T_4	T_5	T_6
Av. yield	2802	2569	2327	2419	2652	2744

Crop :- Groundnut and Castor (Kharif).

Ref :- Pb. 65(200).

Site :- Punjab Agri. University, Ludhiana.

Type :- 'X'

Object :- To find out the suitability of grown Castor as a mixed crop with Groundnut.

1. BASAL CONDITIONS:

(i) (a) to (c) N.A. (ii) Sandy loam (iii) to (vi) N.A. (vii) Irrigated. (viii) to (x) N.A.

2. TREATMENTS :

6 mixtures of different crops :- M_1 = Groundnut alone, M_2 = Castor alone, M_3 = 6 rows of Groundnut and 1 row of Castor, M_4 = 9 rows of Groundnut and 2 rows of Castor and M_5 = 12 rows of Castor.

3. DESIGN

(i) R.B.D. (ii) (a) 5. (b) N.A. (iii) 4. (iv) and (v) N.A. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of grain and seed and the monetary outturn. (iv) (a) 1965-only. (b) and (c) No. (v) to (vii) Nil.

5. RESULTS :

(i) 2263 Kg/ha. (ii) 175.9 Kg/ha. (iii) Treatment differences are highly significant. (iv) Av. value of monetary return in Rs/ha.

Treatment	M ₁	M ₂	M ₃	M ₄	M ₅
Av. value	2977	1742	2293	2237	2068

C.D.=271 Kg/ha.

Crop :- Groundnut, Castor and Arhar (Kharif).**Ref :- Pb. 63(203).****Site :- Oil seed Res., Sub-Stn., Samrala.****Type :- 'X'****Object** -To study the effect of taking Castor and Arhar with Groundnut.**1. BASAL CONDITIONS :**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) 2.7.63. (iv) (a) 3 ploughings and 3 sohagas. (b) Dibbling. (c) 79 Kg/ha. (d) As per treatments. (e) 1. (v) Nil. (vi) P.G. No. I. (vii) Unirrigated. (viii) 2 weedings. (ix) 61.7cm. (x) Dec., 63.

2. TREATMENTS:

8 treatments :-T₁=Groundnut pure with 30cm.×23cm. spacing, T₂=Castor pure with 91cm.×46cm. spacing, T₃=Groundnut and Castor rows 90cm. apart, T₄=Groundnut and castor rows 180cm. apart, T₅=Groundnut and Castor rows 270cm. apart, T₆=Groundnut and Arhar rows 90cm. apart. T₇=Groundnut and Arhar rows 180cm. apart and T₈=Groundnut and Arhar rows 270cm. apart.

3. DESIGN :

(i) R.B.D. (ii) (a) 8. (b) N.A. (iii) 4. (iv) (a) 17.37m.×2.74m. (b) 16.46m.×2.74m. (v) 46cm. on both sides of width. (vi) Yes.

4. GENERAL:

(i) Normal. (ii) N.A. (iii) Yield of Groundnut pods. (iv) (a) 1963-only. (b) No. (c) Nil. (v) Nil. (vi) N.A. (vii) Yield of groundnut is available only.

5. RESULTS :

(i) 1307 Kg/ha. (ii) 189.2 Kg/ha. (iii) Treatment differences are significant. (iv) Av. groundnut pod yield in Kg/ha.

Treatment	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇
Av. yield	1395	1357	1296	1545	1124	1096	1340

C.D.=281.0 Kg/ha.

Crop :- Groundnut and Castor (Kharif).**Ref :-Pb. 65(197).****Site :- Oil seed Res. Stn., Samrala.****Type :-'X'.****Object** :-To find out the suitability of growing Castor. as a mixed crop with Groundnut.**1. BASAL CONDITIONS :**

(i) (a) to (c) N.A. (ii) Sandy loam. (iii) to (vi) N.A. (vii) Unirrigated. (viii) to (x) N.A.

2. TREATMENTS and 4. GENERAL

Same as in expt. no. 65(200) Conducted at Ludhiana and presented on page no.-785.

5. RESULTS:

(i) 1666 Rs/ha. (ii) 208.3 Rs/ha. (iii) Treatment differences are highly significant (iv) Av. value of monetary return in Rs/ha.

Treatment	M ₁	M ₂	M ₃	M ₄	M ₅
Av. value	1541	1252	1899	1880	1759

C.D. = 321.0 Rs/ha.

INDEX

(Crop-wise and Type-wise)

(Page Number)

ATE	Type	M	MV	C	CV	CM	CMV	I	IC	IM	IMV	ICV	ICM	D	X	R
	Crop															
CHAL DESH	Sugarcane	—	—	305	—	—	—	—	—	—	—	—	—	—	—	—
	Groundnut	—	—	306	—	—	—	—	—	—	—	—	—	—	—	—
	Sesamum	—	—	307	—	—	—	—	—	—	—	—	—	—	—	—
	Sarson	308	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Linseed	309	—	315	—	315	—	—	—	—	—	—	—	—	—	—
	Chillies	318	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Zira	320	—	321	—	—	—	—	—	—	—	—	—	—	—	—
	Tea	322	—	325	—	—	—	—	—	—	—	—	—	—	—	—
	Apple	—	—	—	327	—	—	—	—	—	—	—	—	—	—	—
	Apricot	328	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Malta	830	—	332	—	—	—	—	—	—	—	—	—	—	—	—
	Sweet orange	333	—	333	—	—	—	—	—	—	—	—	—	—	—	—
	Orange	335	—	335	—	—	—	—	—	—	—	—	—	—	—	—
Plum	336	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
MMU SHMIR	Paddy	341	349	351	352	354	—	—	—	—	—	355	—	—	—	—
	Wheat	—	—	—	—	—	—	—	—	—	—	363	—	—	—	—
	Maize	—	—	—	—	—	—	—	—	—	—	364	—	—	—	—
	Peas	369	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Potato	372	—	378	379	380	—	—	—	—	—	—	—	—	—	—
	Radish	384	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Tomato	385	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Cabbage	386	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Cauliflower	387	—	389	—	—	—	—	—	—	—	—	—	—	—	—
	Turnip	391	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Knol Khol	—	—	—	—	392	394	—	—	—	—	—	—	—	—	—
	Onion	—	—	395	—	397	—	—	—	—	—	—	—	—	—	—
	Apple	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Saffron	401	—	402	—	—	—	—	—	—	—	—	400	—	—	—	
PUNJAB	Paddy	407	425	425	428	431	—	—	—	—	—	—	—	—	—	—
	Wheat	434	495	501	504	511	—	519	—	520	521	—	—	522	—	—
	Maize	523	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Barley	557	—	558	—	559	—	—	—	559	—	—	—	—	—	—
	Bajra	560 564	570	562, 571	563	573	—	—	—	—	—	—	—	—	—	—
	Gram	578	—	581	—	587	590	—	—	—	—	591	592	—	—	—
	Mash	594	—	595	—	—	—	—	—	—	—	—	—	—	—	—
	Massor	597	—	597	—	—	—	—	—	—	—	—	—	—	—	—
	Peas	598	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Potato	—	600	—	—	—	—	—	—	—	—	—	—	—	—	—
	Sugarcane	602	629	636	—	641	—	—	646	—	645	647	—	647	—	—

