

FISHERIES

SHRIMP HATCHERY TECHNOLOGY

Presently about 1.70 lakh hectares of brackish water area is under shrimp farming with a seed requirement of about 12–15 billion post larvae, which is being met by about 237 commercial shrimp hatcheries having installed capacity of 11.4 billion post larvae. It is estimated that by 2020 AD, the area under shrimp farming may be nearly double, leading to a demand of 30 billion post larvae annually. Hence there is an enormous scope for establishment of commercial shrimp hatcheries in the country.

The quality of the seed plays a very important role in shrimp seed production or hatchery technology as the shrimps do not mature and spawn under captive conditions. The early larval forms being purely marine, very much need marine environment for growth and survival. Hatchery technology therefore, aims to provide the larvae, conducive environment with stable water quality and proper quantity of quality feed. The Central Institute of Brackish Water Aquaculture (CIBA), Chennai has developed package of practices for shrimp hatchery technology. Based on production capacities, the shrimp hatcheries are classified as backyard, medium, and large scale hatcheries.

It is recommended that the ideal sites for shrimp hatchery are those that are located:

- Near calm seacoast.
- Away from any freshwater/brackish water inflow.

Water quality parameters like salinity, temperature and pH play important role in successful operation of a hatchery. Many contaminants and pollutants like pesticides and heavy metals should be well within the safe levels for the larvae as shown below:



Hatchery produced shrimp post larvae

Parameters	Tolerable Limit	Optimal Levels
Temperature (°C)	18–36	28–32
Salinity (ppt)	26–34	30–34
pH	7–9	8–8.4
Dissolved oxygen (ppm)	> 3	> 4
Ammonia-N (ppm)	≤ 0.1	< 0.01
Nitrite-N (ppm)	≤ 0.1	< 0.01

INFRASTRUCTURE REQUIREMENTS

A. Shrimp hatchery should have provisions for

- brood stock maintenance
- induced maturation (shrimps)
- spawning/hatching
- larval rearing
- live-feed culture (phytoplankton/zooplankton), and
- post larval rearing

B. Provision of four major infrastructure systems to maintain live organisms in the hatchery

- Assured seawater supply system consisting of water intake, pumps, settlement and treatment tanks, reservoir, filtration units, and distribution pipelines to various systems.
- Air-supply system consisting of air blowers and distribution system.
- Tanks of different capacities for maturation, spawning, hatching, larval rearing, algal culture, Artemia hatching and post larval rearing.
- Sheds to house the different systems.
- Analytical laboratory for water quality and health management.

Since the Shrimp hatcheries may have varying post larval production capacities—ranging from 2 to 200 million per annum, the capacities of above-mentioned items of infrastructure will proportionately vary according to the production capacity.

MANAGEMENT OF HATCHERY

Water quality management

To get clean and clear water without any suspended particles and harmful pathogens, requires settlement of the pumped water, chemical treatment with chlorine, de-chlorination, filtration through rapid sand filters and biological filters, UV filtration for algal culture and larval rearing.

Feed management

Maintain pure culture of diatoms and unicellular algae, mass culture



A small scale shrimp hatchery

of diatoms and algae, hatching of artemia cysts, preparation of suspension diet and artificial feed.

Schedule of water quality and feed management															
Days	0	1	2	3	4	5	6	7	8	9	10	12	15	20	30
Larval stages	Nauplius			Protozoa				Mysis				Postlarva			
Feeding schedule															
Algae/Diatoms				20,000–50,000 cells/ml											
<i>Artemia</i> nauplii	3–5 /ml									2–5/ml					
Suspension feed/ Palletized feed													5–10 g/t/day in small doses		
Water exchange	No change Only filling			30%				50%				50–100%			

Health management

Proper larval rearing is very important for Indian conditions as there had been an outbreak of White Spot Virus disease. Seed being one of the major source of this virus and vertical transmission of the virus has been established, the hatcheries should invariably adopt the following precautionary principles:

- Screen wild spawners and broodstock for virus.
- Treat wild and induced matured spawners with formalin to remove the external pathogens.
- Wash and treat eggs with formalin.
- Wash and treat of nauplii with formalin before stocking in larval rearing tanks.
- Apply probiotics in the larval rearing tanks.
- Screen all the feed used in the hatchery for virus/bacteria
- Screen post larvae of 5 days (PL5) for White spot virus before transfer to nursery tanks.
- Acclimatize the post larvae to the pond salinity conditions in the nursery.

The above recommended schedule is a generalized one. Various hatcheries adapt the same according to the conditions of the source water, water treatment methods followed and availability of live feed. Some of the hatcheries even use additional feed items such as Spirulina powder, Artemia

flake diets, commercial micro-encapsulated diets, etc.

CAPITAL INVESTMENT AND RETURN

Investment

The capital investment depends on the production capacity of the hatchery, the sea water quality and the availability of shrimp spawners. A hatchery of ten million capacity costs about Rs 20–25 lakhs, while for a 200 million hatchery capacity the cost is about Rs 80–100 lakhs. The recurring expenditure for production of one million post larvae (PL20) is about Rs 1.5 to 2.0 lakhs depending on the cost of spawners.

Return

Depending on the demand during stocking season, the cost of seed at the hatchery varies between Rs 300 to Rs 600 per thousand post larvae. Hence, on an average, sale price of Rs 4.0 to 4.5 lakhs per million of post larvae can be expected. The expected profit margin depending upon the management capacity is in the range of Rs 2–3 lakhs per million post larvae produced.

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