

Culture Methods of Shrimp Farming in Pond

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[DOI:10.5281/ScienceWorld.15523709](https://doi.org/10.5281/ScienceWorld.15523709)

Abstract

Pond-based shrimp farming is a prevalent aquaculture technique that substantially enhances worldwide seafood. This technique entails the cultivation of shrimp species, chiefly *Penaeus monodon* and *Litopenaeus vannamei*, within regulated pond ecosystems. Essential elements comprise pond preparation, water quality control, stocking density, regulation and the application of formulated diets. Sustainable pond-based shrimp farming prioritizes biosecurity, disease control, and environmental management to optimize productivity and minimize ecological impact. Aeration, regular water exchange and sediment control are vital for sustaining ideal growth conditions. The use of best management practices (BMPs) and technological advancements, such as automated feeding and real-time monitoring, has enhanced yields and sustainability. Pond-based shrimp aquaculture presents economic prospects in coastal areas; yet, it necessitates meticulous management to mitigate obstacles including disease outbreaks, environmental degradation, and market volatility.

Keywords: Aquaculture, Shrimp farming, Sustainability, Best Management Practices (BMPs).

Introduction-

Shrimp farming is an important part of aquaculture. The global status of shrimp farming was 5.6 million metric tonnes in 2022, with an anticipated increase of 5.88 million metric tonnes. India is a prominent global producer of shrimp, especially whiteleg shrimp (*Litopenaeus vannamei*). Andhra Pradesh dominates shrimp production, with over 70% of India's total output. Additional significant producing states comprise West Bengal and Gujarat. In the 1990s, the culture of the species *Litopenaeus vannamei* and *Penaeus monodon* were defined by low risk and high profit. In 1995, shrimp production was seriously affected by viral infections, particularly the White Spot Syndrome Virus (WSSV).

Culture species in shrimp farming.

1. *Penaeus monodon*
2. *Litopenaeus vannamei*
3. *Penaeus indicus*

Site Selection for Shrimp Culture

The selection of a suitable site always plays a major role in shrimp farming. Brackish water should be available throughout the culture period. The water source should be free from any industrial or

agriculture Selection of good quality seed for stocking into a pond is the first important step of the shrimp grow-out management.

Pond management

Pond cleaning

The maintenance of a pond or the elimination of waste materials. Particularly the organic and phosphate residues that have accumulated at the pond's bottom. These approaches adversely affect the water and soil quality in the pond, perhaps leading to a reduction in the pond's production capacity.

Desiccated pond

This method is used when the pond bottom can be dried completely. Ponds were completely sundried until the bottom cracks 5-10 cm deep.

Ploughing and leveling

After drying ploughing had been completed with the help of tractor up to 5inch deep in soil ploughing mainly vertically and horizontal was done.

Liming

Liming increases the pH level in pond. For liming mainly Agriculture lime (CaCO_3) are used. Dose – fresh pond =250kg /ha Use Pond = 500kg /ha.

Water filling

Usually, the water is filled in the pond by using the pump.

Installation of aerators

The selection of aerator is dependent upon the water's depth. Paddle wheel aerators with one horsepower are suitable for ponds with a water depth of less than 1.2 meters, while those with two horsepower are appropriate for ponds beyond 1.2 meters in depth.

Fencing

Fencing is done around the pond as well as on the upper side also. It protects the shrimps from the predatory birds and animals.

Stocking

Litopenaeus vannamei is the most appropriate species for aquaculture in India. The stocking density is influenced by the accepted system and the chosen species for cultivation. In an intense culture, a properly managed pond with stable water quality can accommodate 25-30 post-larvae per square meter at a water depth of 1.2 meters and up to 40-50 post-larvae per square meter at a depth of 1.5 meters or above.

Technique of Stocking

Seeds are typically transported in plastic bags. The bags are typically filled to one-third capacity with water, oxygenated, and subsequently placed within boxes. If transportation exceeds

6 hours, little bags of ice should be placed in the boxes to lower the water temperature and maintain it at 20-22°C. The densities of PL in a bag are 1,000-2,000 seeds/l for PL 15 and 500-1,000 PL/l for PL 20. The optimal times for transit are early morning or night-time.

Water quality management

All measured water quality parameters, including dissolved oxygen (DO), pH, NH₃, NO₂, and turbidity, should not exceed the appropriate levels for white-leg shrimp culture (Schneider et al.,2005).

Parameter	Range
Temperature (°C)	27-28.5
DO (mg/L)	5.5-6.5
NH ₃ (mg/L)	0.02-0.03
NO ₂ (mg/L)	0.28-0.35
Ph	7.5-8
Turbidity (NTU)	52-57
Salinity (PPT)	32-35

Acclimatization

Acclimatization of seed to the water pH and temperature of the pond must be rendered upon arrival. (Jayasankar *et al.*, 2009) According to acclimatization to temperature and salinity is a crucial determinant influencing the efficacy of low-salinity shrimp aquaculture. Acclimatization strategies for the stocking of shrimp juveniles are categorized into one-step acclimatization and progressive acclimation.

Feed and feeding

Help to faster growth. 4 times feeding is done in a day (07:30am, 10:30am, 01:30pm,04:30pm). After 1hr distribute of feed check the check tray. Start the aerator just check the check tray for 1:30hr high protein feed are given 5% of body weight first 30 days The percentage of protein & fat in feed is 36-42% & 6-8%.

Feed Quality

The utilization of high-quality feed will enhance shrimp output and profitability while reducing environmental degradation associated with shrimp farming.

Feed Conversion Ratio (FCR)

Only the superior quality of feed can achieve an FCR of 1.2. (Fleckenstein *et al.*, 2020) reported low feed conversion ratio (FCR) values, varying from 1.0 to 1.1 in low-density (2.3 kg/m³) broiler feed regimens. Thus, the enhancement in enzyme activity is facilitating improved feed efficiency and diminished FCRs.

Harvesting and Handling

Successful harvesting is achieved if the shrimp can be obtained in optimal condition within a short amount of time. The harvesting method must neither harm nor infect the shrimp with debris. Complete harvesting can be executed by emptying the pond water using a bag net and manually collecting the contents. The typical culture period needed is approximately 120-150 days, during which the prawns will attain a size of 20-30 grams, contingent upon the species.

Conclusion

Pond-based shrimp aquaculture substantially enhances the world seafood supply and provides economic advantages, particularly in coastal areas. Implementing sustainable techniques like such as biosecurity, water quality control, and technological integration is crucial for achieving success. Efficient management is essential for addressing difficulties such as disease, environmental damage, and market volatility, while guaranteeing long-term productivity and sustainability.

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