

From Madagascar to India: Towards a successful hatchery business with SPF monodon shrimp

Setting an industry standard comes with particular attention to quality, strict codes on practices and a proprietary hatching technology

By Zuridah Merican



Uniform and clean PL16 for a customer.

Post larvae from specific pathogen free (SPF) *Penaeus monodon* broodstock, available since 2021, have been a new lifeline for many shrimp farmers in India. It has fuelled the current resurgence in monodon shrimp farming. The 2023 production estimate announced at Aqua India 2024 in February, was 39,000 tonnes of monodon shrimp., alongside 811,000 tonnes of *Penaeus vannamei* (Reddy, 2024). It is important to note that the return of the monodon shrimp is helping some farmers overcome some production woes with vannamei shrimp farming, from crop failures particularly over the hot summer months when temperatures are very high, disease problems, supply glut and low farmgate prices.

Market demand for monodon post larvae

Monodon shrimp hatcheries have a small window of demand since there is only one crop/year. In general, stocking occurs from February to April in all major shrimp farming areas in India such as Andhra Pradesh and Gujarat. The post larvae stocking density is around 5-10PL/m², up to 15PL/m² in Tamil Nadu and Andhra Pradesh, and 20-30PL/m² in Gujarat. According to Duraisamy (2024), monodon shrimp farms in Gujarat, Andhra Pradesh and Tamil Nadu use post larvae from SPF broodstocks, and only those in Kerala and West Bengal continue farming using post larvae from wild broodstocks. Currently, there are three sources of SPF monodon broodstocks: Aqualma, Moana and the Rajiv Gandhi Centre for Aquaculture (RGCA). The demand is 1.5 billion PL/year and this is expected to grow in the coming years.

The average harvest size is 50g achieved in 4-5 months but as prices are much better for large sizes, many farmers opt to harvest up to 100g shrimp which require a culture period of 8 months at survival rates of 80%. However, low farmgate prices for both species have become a

pull factor for the shift between monodon and vannamei shrimp farming in India. In 2023, Duraisamy said that in Gujarat, the ratio of monodon: vannamei was 1:1, from a predominant vannamei farming in 2022.

India's Coastal Aquaculture Authority (CAA) has determined that hatcheries can only produce one shrimp species i.e. either monodon or vannamei. Therefore, for hatcheries producing monodon post larvae, this small window of demand is a major business constraint. On the contrary, hatcheries producing vannamei post larvae have a larger market since farmers have at least two cycles or more when they harvest small sized shrimp. Vannamei post larvae sell at USD4/1,000 PL and farmers veer towards cheaper post larvae when farmgate shrimp prices are low, despite the general trend to reduce stocking density to 20-25PL/m² from 40-50PL/m².

The post larvae market is extremely reliant on farmgate prices. Industry reported that since August 2022, post larvae demand began to drop, as farmgate prices declined. This trend continued into 2023 as farmers were uncertain on the direction of prices and some stopped stocking. In comparison, 2021 and 2022 (until August) were good years for the post larvae market. Farmers also had cash flow problems with delayed payments by processors which affected post larvae purchases. In India, there are few farms producing vannamei alongside monodon shrimp. These are mainly large conglomerate farms with larger areas.

"The biggest challenge for us and other hatcheries is the one crop cycle, and we only have three months to produce and market post larvae. We bring broodstocks at the end of November and acclimatise them for 30-35 days before ablation. The other challenge is that this period is the rainy season, and we need to maintain salinity. Our animals must

be stress-free to perform well and luckily, we have the advantage of our experience working in Madagascar. We have only 4% mortality," said Easwara Prasad P., consultant to the Unibio hatchery, during a visit in February.

Madagascar SPF monodon shrimp

India's Unibio group, part of the joint venture with Unibio Holding, an associate company of Aqualma (Unima Group) in Madagascar began full operations in 2022 at its hatchery in Mugaiyur, Tamil Nadu, around 2 hours drive from Chennai. In India, the group has three associated hatcheries: MAS Aqua Techniks in Nellore, Golden Marine Harvest in Marakanam, Tamil Nadu and UniBay Aquabreeding in Visakhapatnam, Andhra Pradesh.

Previously, a vannamei shrimp hatchery, this facility in Mugaiyur, covering an area of 2ha, underwent considerable modifications and additions to meet the needs for monodon post larvae production. These include the complete renovation and construction of maturation sheds and a new PLRT (post larvae rearing tanks) section. The hatchery launched its first batch of post larvae on March 23, 2021.



Indoor culture of algae. Photo credit. Unibio

"Unibio's broodstock from Madagascar is the 20th generation and we know that post larvae from such broodstocks are more resilient than from those produced using wild broodstocks. It is possible to get 4-5 spawns/female during 3 months of use for nauplii production. Fecundity can be as high as 500,000 to 700,000 nauplii for the larger 130-140g broodstock," said Prasad.

Unibio sells post larvae at USD12/1,000 PL while hatcheries using wild broodstocks sell them at USD4/1,000 PL. "Although not a usual practice, we can grow post larvae to larger sizes over 10 days in a nursery system and offer to farmers at USD15/1,000 PL. However, today, farmers are not ready to purchase and stock larger post larvae." In the future the post larvae prices may come down to USD7.0-8.0/1,000 PL if the demand goes up when harvesting sizes at 25-35g becomes viable.

In 2023, despite difficult times with low farmgate prices, Unibio managed to sell about 500 million post larvae (PL12-15). "More than 90% of our farmers reported good growth and good survival rates. Since they are happy, we are happy too. This set the base for this year's projection of 750 million post larvae production."

The quick transition to successful production in India is attributed to 40 years of experience of the management team, replicating their knowledge in operating the hatchery and farm operations at Aqualma in Madagascar to this facility in India.



At the packing station, preparing PL16 for delivery.

In the beginning: Managing logistics for broodstock

To meet planned post larvae production targets, the SPF broodstock requirement is met by weekly consignments of 400 animals imported from Aqualma at the beginning of the production season.

However, when Unibio started in 2020, it was in the midst of the Covid-19 pandemic and the company encountered logistics problems. Prasad commented, "Before the pandemic, flights from Madagascar to Chennai were through Mauritius but these were not operating in 2021.

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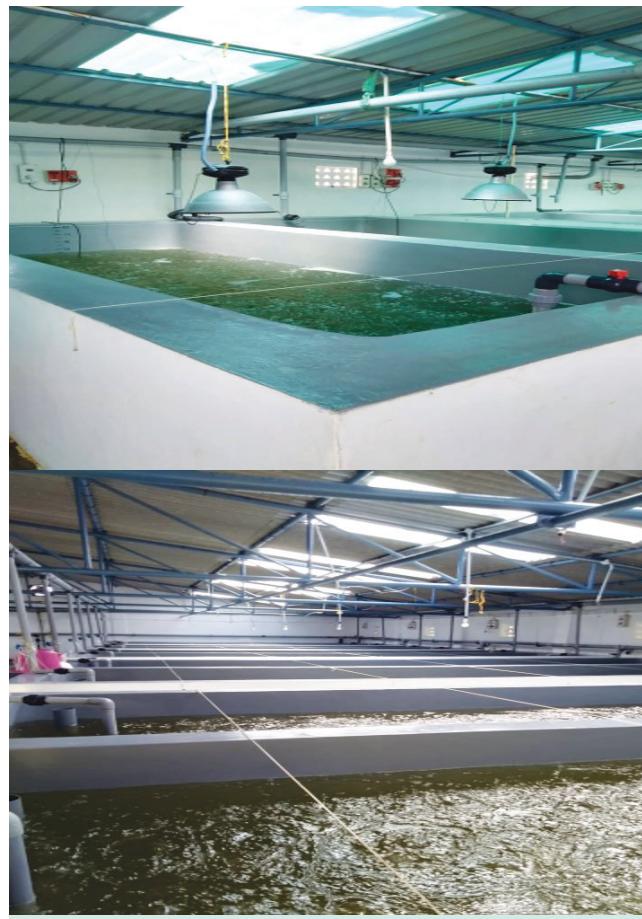


George Chamberlain, President TCRS (The Center for Responsible Seafood) with from left, the Unibio team of Panchu Duraisamy, Director, Unibio (India) and Manavendra Rao, Business Manager Aqualma with Ramraj D, Hi Breeds Aquatics; Victor Suresh United Research, and Jegan Michael, Growel Feeds. Photo credit. Unibio.

We resorted to charter flights which were not tenable in the long term. Full operations began in 2022 but logistics continued to be a burden with no flights via Mauritius. A recent strategy is flying broodstock via Addis Ababa with 3-4 consignments per month."

Quality post larvae production and strict protocols

The protocols in post larvae production at Unibio are very specific. It uses only females of 95-100g and 65-75g males to start with. These cost the company USD200/



Top. Larvae rearing tanks. Bottom. Post larvae rearing tanks. Photo credit. Unibio.

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Clockwise from top left, tanks in the maturation section, broodstock, spawning tanks and hatching caskets. Photo credit. Unibio.

broodstock, including import duties, quarantine and repacking charges. The minimum size for females is 95g as smaller broodstock shows sub-optimal performances at a fecundity of 200,000 to 300,000 nauplii.

Broodstocks are fed frozen squids from California, polychaetes from the Netherlands and moist pelleted feeds from the US. These broodstocks give an output of 15-20 million nauplii/day. Females moult at a frequency of 2 weeks which allows the male broodstocks to mate naturally. Post ablation, ready to spawn females are held individually overnight in 150L spawning tanks. There are specially designed hatching containers, a proprietary technology developed at Unima in Madagascar. The average hatching rate is 70%. Nauplii are washed following standard protocols. The average survival rate is 40-45% from nauplii to PL12.

Each cycle takes 21 days for a production of 22 million/cycle of PL12-16. The Unibio hatchery in Mugaiyur operates for 10-12 cycles in a production season. The standard operation procedures are very strict – there are calculations on the target growth of post larvae, on the carrying capacity of each tank and that PL12 should attain 4.5mg. When these do not match, the cycle is extended but this is not encouraged to avoid possible sanitary issues. “Fortunately, monodon has less issues with zoea syndrome compared to vannamei. The hatchery’s top concern is contamination with Vibrio. Therefore, it has opted for 100% culture of live feeds, Chaetoceros and Thalassiosira in indoor mass culture in transparent cylinders under controlled conditions. Transfers of PL5 to grow to PL12 are done manually,” added Prasad.



Prasad (left) with technician Padmaram in the rearing section for PL5.

The critical role of water quality is evident with massive volumes of water in large 150 tonnes and 200 tonnes capacity tanks being treated to accommodate the large flow-through system for the maturation facility. The seawater intake source is 50m from the hatchery. Water treatment starts with settlement, ozonation of incoming water, followed by cartridge filters and ultraviolet sterilisation. Water is cooled to maintain at 27–27.5°C for the flow-through system in the maturation facility.

According to Prasad, "The management is very particular on quality. If the batch does not reach the standard, the post larvae are discarded." Unibio is the only SPF monodon hatchery in India with Best Aquaculture Practice (BAP) certification for the full scope of BAP hatchery standard, from maturation, nauplii and post larvae production. Therefore, the target is to set industry standards.

Rising costs of post larvae production

The cost of post larvae production is increasing rapidly. Labour costs have risen by 20% with recent changes in minimum wages. There is a dependence on the electrical grid but concurrently, the generator is running for several hours. Transport costs have increased for broodstocks while fortunately post larvae delivery costs are the responsibility of the buyers.

Extra costs come with the promise to adjust post larvae transport conditions to align with conditions of stocking water, prior to delivery such as for farming in low saline water ponds. "The minimum salinity at which we pack the post larvae is 10ppt. Alongside these are the pre-production costs of broodstock transport and cubicle, and testing costs at the Aquatic Quarantine Facility, ranging from INR200,000 to 300,000 (USD2,352-3,529) per cubicle which holds 200-250 broodstock." explained Prasad.

Eyestalk ablation

A side discussion was on eyestalk ablation in monodon shrimp. There is considerable debate on shrimp welfare and how to phase out this practice from the point of view of certification. Prasad admitted that eliminating eyestalk ablation is difficult in the close theylcum monodon shrimp. "It is difficult to get them to mature and mate naturally under normal conditions. Aqualma is working with experts and trials are being carried out in Madagascar to eliminate eyestalk ablation.

"The major difference with non-ablated shrimp is the unpredictability in shrimp spawning. This translates to the inability to predict production and the hatchery cannot commit to having nauplii at a set date. Ablation gives a predictable cycle. All businesses need predictability. Fecundity is also predictable with ablated females, moving upwards from 200,000 to 700,000 nauplii. But with non-ablation, there is no guarantee on fecundity," said Prasad.

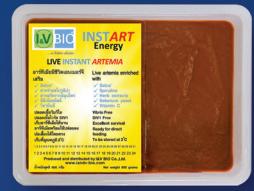
On the other hand, Prasad said that shrimp health can be affected by ablation but here at Unibio, with the expertise that they have developed to avoid stress at ablation, they have not seen mortality associated with ablation, other than the usual level. "The predictability which comes with ablated females is unmatched," emphasised Prasad.



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