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Leading Machinery Suppliers for Aquafeed Manufacturing: Global Options for Fish and Shrimp Feed Production

Vesper organises aquaculture farmers meet on Current Trend in Shrimp Farming and Sustainable Management

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- Editor



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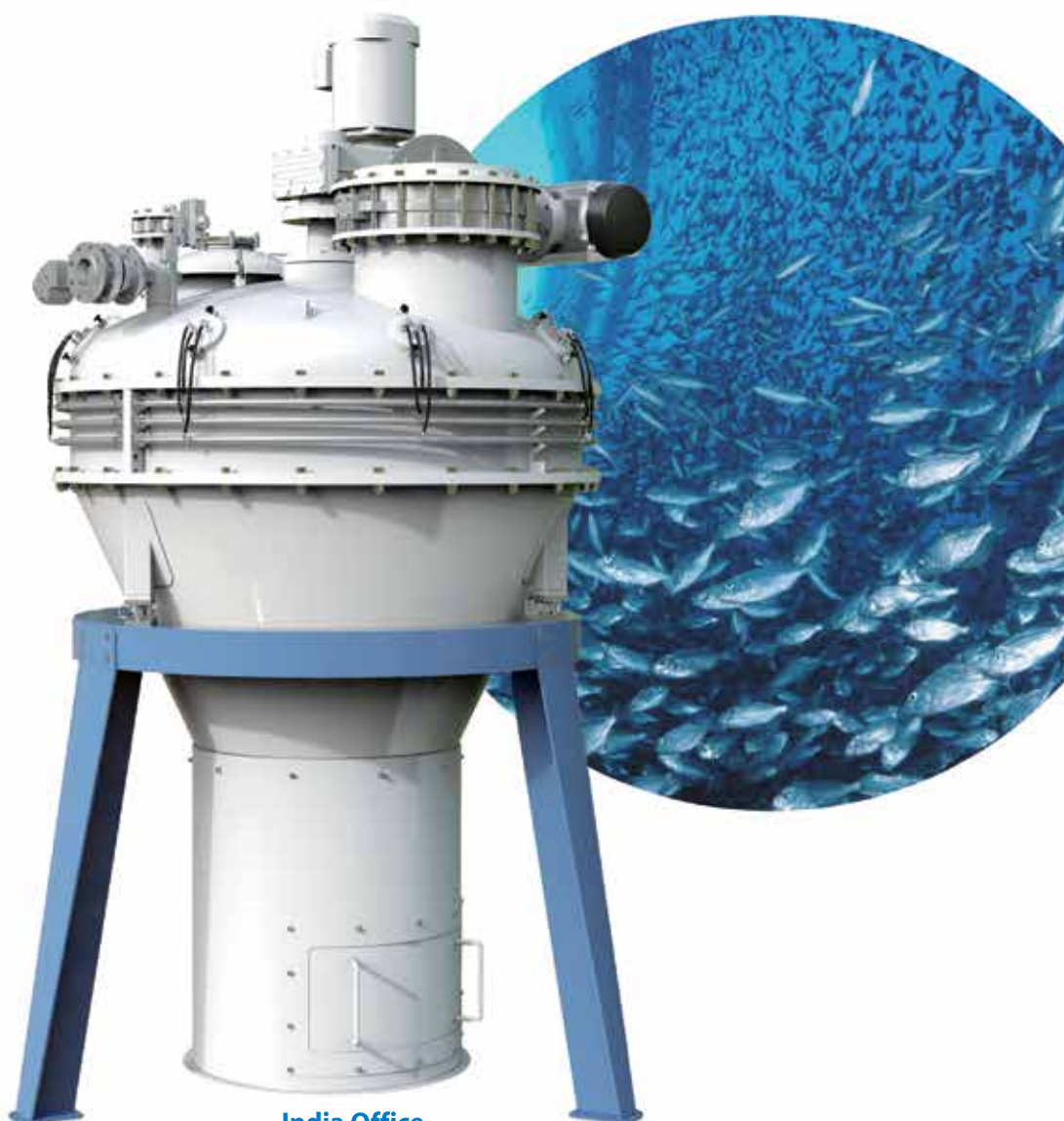
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Technology can improve productivity, disease control and traceability, but high costs and complexity can put extra pressure on small farmers

For a shrimp farmer, the most visible questions are usually about the pond. How is the water? Is the shrimp eating properly? Is growth on track? What is the survival rate? Can the crop reach the desired harvest size? But there is another question that is much less visible – and perhaps even more important: Where does the genetic potential of that shrimp come from? The foundation of a shrimp crop does not begin only when PL is stocked into the pond. It begins much earlier, inside the hatchery, with the selection and management of broodstock.



Dear Readers,

The October 2026 issue of Aqua International is in your hands. In the news section, you may find news about...

During my recent interaction, Dr P. Ram

Mohan Rao, a very prominent aquaculture expert and the former Deputy Director of the Department of Fisheries, Government of Andhra Pradesh, as well as the former Assistant Director, State Institute of Fisheries Technology (SIFT) in Kakinada said that dealing with technology puts pressure on Aquaculture farmers. Technology can improve productivity, disease control and traceability, but high costs and complexity can put extra pressure on small farmers. **High costs:** Equipment, testing, software and maintenance increase expenses. **Skill & infrastructure gaps:** Digital tools can be difficult to use, especially with poor internet, electricity and local technical support. Documentation **burden:** Digital traceability and record-keeping require additional time and effort. **Service dependence:** Farmers may depend on private technicians and laboratories. **Uncertain returns:** Higher technology costs may not result in better prices. **Way Forward:** Promote simple, affordable and locally supported technologies, shared facilities through FPOs / Cooperatives, Farmer training and Common government digital platforms. Technology and traceability costs should be shared across the value chain, rather than falling mainly on small farmers. Technology should reduce the farmer's risk and workload – not add to the farmer's cost and burden.

The fisheries and aquaculture sector has emerged as a vital pillar of India's economic growth, supporting the livelihoods of nearly three crore fishers and fish farmers while generating employment across a vast value chain



spanning production, processing, marketing and exports. India today is the world's second-largest fish producer, contributing around 8 per cent of global fish production, the second-largest aquaculture producer, the largest producer and exporter of shrimp, and the second-largest producer in capture fisheries. These achievements reflect the growing strategic importance of the sector in advancing food and nutritional security, rural prosperity, export earnings and the country's blue economy aspirations. Equally important will be the diversification of aquaculture towards high-value species such as shrimp, trout, seabass, tilapia, murrel and pangasius, enabling greater value realisation and improved access to international markets. Supported by continuous skill development, industry partnerships and a robust policy framework, these technology-driven production systems can play a transformative role in strengthening food security, generating rural employment, expanding seafood exports and advancing the vision of a sustainable and prosperous blue economy.

Can the Andhra shrimp powerhouse stay ahead? The State accounts for around 30% of India's aquaculture fish production and 79% of shrimp production. Around 2.18 lakh farmers depend on aquaculture for their livelihoods.

Contd on next page



Our Mission

Aqua International will strive to be the reliable source of information to aquaculture industry in India.

AI will give its opinion and suggest the industry what is needed in the interest of the stakeholders of the industry.

AI will strive to be The Forum to the Stakeholders of the industry for development and self-regulation.

AI will recognize the efforts and contribution of individuals, institutions and organizations for the development of aquaculture industry in the country through annual Awards presentation.

AI will strive to maintain quality and standards at all times.

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Andhra Pradesh has built one of India's largest aquaculture ecosystems with shrimp at its centre and exports linking thousands of farms to global markets. In 2025-26, the State exported 4.09 lakh tonnes of seafood worth Rs 23,765 crore (\$2.72 billion), accounting for 20.75% of India's seafood export volume and more than 32% of its export value. But farmers face rising feed and input costs, disease and seed-quality concerns, volatile international markets, and disruptions in the US market. Can Andhra Pradesh turn its production strength into sustained farmer profitability and export competitiveness? Here, we examine the fresh challenges facing farmers amid the current global trade and economic environment. How large is Andhra Pradesh's aquaculture sector? Aquaculture has become a major economic activity in Andhra Pradesh, particularly along its coastal belt. The sector covers about 2.43 lakh hectares, or around 6.10 lakh acres, with aquaculture activity spread across hundreds of villages. Brackish-water shrimp cultivation alone is present in around 572 villages.

Government pushes aquaculture insurance with 40% premium incentive. India's rapidly expanding aquaculture sector is increasingly confronting a challenge that can undermine years of investment in a single crop cycle – the financial impact of disease, floods, cyclones and other natural and non-preventable risks. With fish production more than doubling over the past decade and aquaculture now accounting for around 74 per cent of the country's total fish production, the government is seeking to make insurance an integral part of aquaculture risk management through the Pradhan Mantri Matsya Kisan Samridhi Sah-Yojana (PM-MKSSY). The aquaculture insurance initiative under PM-MKSSY is designed to make insurance more affordable for farmers by providing a one-time incentive towards the premium for one crop cycle. The initiative is being implemented through the National Fisheries Digital Platform (NFDPP), with the benefit transferred directly to eligible farmers through Direct Benefit Transfer.

Vesper Group organised farmers meet on Current Trend in Shrimp Farming and Sustainable Management. Disease is one of the major constraints today in aqua farming. Major diseases such as WSSV, Vibriosis and EHP causing heavy loss to the farmer. Today, farmers are facing shrimp size variation problems. They are not getting 7 gm size even in 100 days crop. EHP plays major role in the failure of aqua farming. To overcome EHP problem farmers should start working on soil preparation and it is important to sun dry the pond. Follow proper chlorination and ensure water disinfection. Give importance to biosecurity and probiotics application from day 1 of the culture itself. Apply Vitamin C feed mix in the feed. Vibriosis is commonly known or referred to as a Vibrio infection, or more specifically by the name of the bacterial species causing the condition (such as Vibrio infection or non-cholera Vibrio infection when distinct from cholera).

In the Articles section, **The Genetics Behind the Brooder** authored by Dr Nitin Pipralia says that for a shrimp farmer, the most visible questions are usually about the pond. How is the water? Is the shrimp eating properly? Is growth on track? What is the survival rate? Can the crop reach the desired harvest size? But there is another question that is much less visible – and perhaps even more important: **Where does the genetic potential of that shrimp come from?** The foundation of a shrimp crop does not begin only when PL is stocked into

the pond. It begins much earlier, inside the hatchery, with the selection and management of broodstock.

As Indian shrimp farming expands across increasingly diverse environments—from the coastal systems of Andhra Pradesh, Tamil Nadu, Gujarat, Odisha and West Bengal to the inland farming areas of **Rajasthan, Haryana and Punjab** – the genetics behind the seed is becoming an increasingly important part of the production conversation. India's farmers are already demonstrating that shrimp can be cultured in environments very different from traditional coastal farming areas. Inland systems may involve saline or brackish groundwater, different soil characteristics, high summer temperatures, variable alkalinity and ionic balance, and significant seasonal fluctuations.

Another article titled, **Leading Machinery Suppliers for Aquafeed Manufacturing: Global Options for Fish and Shrimp Feed Production**, authored by R. Dinesh discussed that the article presents an overview of leading aqua feed machinery manufacturers from Asia, Europe, and the Americas that supply equipment for fish and shrimp feed production. It highlights the key technologies and equipment used in modern aqua feed manufacturing, including grinding, mixing, pelleting, extrusion, drying, cooling, and packaging systems. The article compares regional strengths, noting the cost-effective and large-scale solutions offered by Asian manufacturers and the advanced automation and extrusion technologies provided by North American and European companies. It emphasises the importance of selecting suitable machinery based on production capacity, feed type, energy efficiency, and after-sales support to enhance feed quality and operational performance. The article serves as a practical guide for aquaculture entrepreneurs, feed mill operators, investors, and industry stakeholders seeking reliable equipment solutions for sustainable and profitable aqua feed production.

Another article titled, **Practice of mullet farming in brackishwater impoundments in West Bengal** authored by Subrato Ghosh says that Mulletts are very much suitable for sustainable brackishwater finfish aquaculture in coastal West Bengal. The species *Liza parsia*, *L. tade*, *L. macrolepis* – all are oily fishes, cultivable, their cooked meat bears good flavour and are definitely very good in taste. These are farmed in traditional polyculture system in gher(s) and bheri(s) with compatible other species of brackishwater finfish and shellfish. *L. parsia* and *L. macrolepis* are cooked whole-bodied in Bengali households, transversely cut pieces of *L. tade* are used for cooking. Mullet farming in West Bengal is presently depended upon seed from wild waters for stocking. Small-scale brackishwater finfish farms have been established in North and South 24 Parganas districts of West Bengal, but mostly cultured in association with other finfishes and shrimps in improved traditional method.

Farmers are advised not to neglect and do not compromise in good farming and management practices to get specified results. As shrimp and fish are food for human consumption, maintain quality in all aspects to get better acceptance and price to your produce. Readers are invited to send their views and comments on the news, special feature and articles published in the magazine Aqua International which would be published under "Readers Column".

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Next-Gen Aquaculture in India: Harnessing RAS and Bio-floc Technology in the Blue Economy for the Atmanirbhar Bharat and Viksit Bharat Vision

Delhi 07 September

2026: The fisheries and aquaculture sector has emerged as a vital pillar of India's economic growth, supporting the livelihoods of nearly three crore fishers and fish farmers while generating employment across a vast value chain spanning production, processing, marketing and exports. India today is the world's second-largest fish producer, contributing around 8 per cent of global fish production, the second-largest aquaculture producer, the largest producer and exporter of shrimp, and the second-largest producer in capture fisheries. These achievements reflect the growing strategic importance of the sector in advancing food and nutritional security, rural prosperity, export earnings and the country's blue economy aspirations.

This transformation has been underpinned by sustained policy support and unprecedented public investment. Since 2015, the Government of India has approved or announced cumulative investments exceeding ₹39,272 crore across a range of flagship schemes and initiatives aimed at the holistic development of fisheries and aquaculture. These investments have strengthened production systems, modernized infrastructure, promoted technology adoption, improved market access

and enhanced global competitiveness, laying the foundation for a resilient, sustainable and globally competitive fisheries sector.

The impact of these interventions is reflected in the sector's remarkable growth trajectory over the past decade. Annual fish production has more than doubled, rising from 95.79 lakh tonnes in 2013-14 to a record 198 lakh tonnes in 2024-25. Much of this growth has been driven by the rapid expansion of inland fisheries and aquaculture, whose production increased by 147% during the same period, from 61.36 lakh tonnes to 151.60 lakh tonnes. India's seafood exports have witnessed a similar upward trajectory, more than doubling from ₹30,213 crore in 2013-14 to a record ₹73,890 crore in 2025-26. This sustained export growth, achieved amid an increasingly complex global trading environment and emerging tariff-related challenges, underscores the resilience, competitiveness and growing global acceptance of Indian seafood products.

Technology infusion has been a cornerstone of the sector's transformation, particularly in aquaculture. The adoption of advanced production systems such as Recirculatory Aquaculture Systems (RAS) and Biofloc technology under the Pradhan Mantri Matsya

Sampada Yojana (PMMSY) is enabling a transition towards more intensive, resource-efficient and commercially attractive modes of fish farming. Together with cage culture and other modern farming practices, these innovations are helping build a more productive, resilient and future-ready aquaculture ecosystem capable of meeting growing domestic and global demand for fish and fishery products.

Recirculatory Aquaculture Systems (RAS) and Biofloc technology represent a new generation of aquaculture practices that allow fish to be reared in controlled environments. While RAS relies on water treatment and recirculation systems to maintain optimal growing conditions, Biofloc technology harnesses beneficial microorganisms to improve water quality and support fish growth. Together, these technologies are expanding the scope of aquaculture by enabling fish farming in diverse agro-climatic conditions and locations where traditional aquaculture may not be feasible. By recycling up to 90–95% of water, RAS supports resource-efficient fish production and enables the establishment of farming units closer to urban consumption centres and export hubs, contributing to a more

circular and sustainable aquaculture economy.

Under Pradhan Mantri Matsya Sampada Yojna (PMMSY), 9,467 Recirculatory Aquaculture Systems (RAS) and 4,573 Biofloc units have been approved, facilitating year-round fish farming, signalling a shift towards intensive and commercially viable fish production models that are expanding aquaculture beyond traditional farming geographies. This technology infusion has been backed by investments of ₹4,120 crore under PMMSY, reflecting the Government's emphasis on modernizing fisheries production systems and accelerating the adoption of advanced aquaculture practices.

Beyond strengthening domestic production, RAS and Biofloc technologies are also supporting India's ambitions in high-value seafood exports. By enabling production in controlled farming environments, these systems help ensure consistency in quality, traceability and biosecurity—attributes that are increasingly important in global seafood markets. As the sector moves towards value addition and export-oriented production, such technology-driven aquaculture systems are expected to play an important role in enhancing the competitiveness of Indian seafood and reinforcing the country's position in international markets.

The versatility of RAS and Biofloc technologies is also enabling the expansion of

specialized aquaculture segments across the country. These systems are increasingly being adopted in cold-water fisheries clusters across Jammu & Kashmir, Ladakh, Uttarakhand and Himachal Pradesh for the culture of premium-value species such as trout, while also supporting the production of export-oriented shrimp in saline and brackish-water aquaculture systems. Their application in ornamental fish rearing units is further strengthening niche

markets and opening new opportunities for entrepreneurs. Together, these technologies are broadening the scope of aquaculture and creating fresh avenues for growth in high-value fisheries.

The road ahead for India's fisheries sector will be shaped by the continued integration of technology, innovation and sustainability. As the country seeks to build a resilient and globally competitive blue economy, the convergence of RAS

and Biofloc systems with digital monitoring platforms, artificial intelligence, drone-enabled services and renewable energy solutions has the potential to enhance operational efficiency and reduce production costs. Equally important will be the diversification of aquaculture towards high-value species such as shrimp, trout, seabass, tilapia, murrel and pangasius, enabling greater value realisation and improved access to

international markets. Supported by continuous skill development, industry partnerships and a robust policy framework, these technology-driven production systems can play a transformative role in strengthening food security, generating rural employment, expanding seafood exports and advancing the vision of a sustainable and prosperous blue economy under Viksit Bharat.

Courtesy by PIB

Can the Andhra shrimp powerhouse stay ahead ?

The State accounts for around 30% of India's aquaculture fish production and 79% of shrimp production. Around 2.18 lakh farmers depend on aquaculture for their livelihoods.



India exported 19,72,018 tonnes of seafood worth Rs 73,890.46 crore (\$8.45 billion) in 2025-26. Andhra Pradesh contributed 4,09,274 tonnes worth Rs 23,765.11 crore (\$2.72 billion).

02 October 2026: Andhra Pradesh has built one of India's largest aquaculture ecosystems, with shrimp at its centre and exports linking thousands of farms to global markets. In 2025-26, the State exported 4.09 lakh tonnes of seafood worth Rs 23,765 crore (\$2.72 billion), accounting for 20.75% of India's seafood export volume and more than 32% of its export value.

But farmers face rising feed and input costs, disease and seed-quality concerns, volatile international markets, and disruptions in the US market. Can Andhra Pradesh turn its production strength into sustained farmer profitability and export competitiveness? Here, we examine the fresh challenges facing farmers amid the current global trade and economic environment.

How large is Andhra Pradesh's aquaculture sector?

Aquaculture has become a major economic activity in Andhra Pradesh, particularly along its coastal belt. The State produces around 46.30 lakh tonnes of aquaculture annually, including 8.50 lakh tonnes of shrimp. The sector covers about 2.43 lakh hectares, or around 6.10 lakh acres, with

aquaculture activity spread across hundreds of villages. Brackish-water shrimp cultivation alone is present in around 572 villages.

The State accounts for around 30% of India's aquaculture fish production and 79% of shrimp production. Around 2.18 lakh farmers depend on aquaculture for their livelihoods. The wider value chain, including hatcheries, seed suppliers, feed companies, farm workers, transporters, processing units, cold-chain operators, traders and other associated activities, provides direct and indirect employment or livelihood opportunities to around 14.75 lakh people.

How much does the state earn from seafood exports?

In 2024-25, Andhra Pradesh exported 3,66,182 tonnes of seafood worth Rs 21,245.90 crore, or \$2.53 billion. In 2025-26, exports rose to 4,09,274 tonnes, while the value increased to Rs. 23,765.11 crore, or \$2.72 billion.

This was an increase of 11.76% in export quantity and 11.85% in rupee value. In

dollar terms, the increase was 7.39%.

How much does Andhra Pradesh contribute to India's seafood exports?

India exported 19,72,018 tonnes of seafood worth Rs 73,890.46 crore (\$8.45 billion) in 2025-26. Andhra Pradesh contributed 4,09,274 tonnes worth Rs 23,765.11 crore (\$2.72 billion).

Andhra Pradesh accounted for:

- 20.75% of India's seafood export quantity
- 32.16% of India's seafood export value in rupee terms
- 32.21% of India's seafood export value in US dollars

In simple terms, more than Rs 32 out of every Rs 100 India earned from seafood exports came from Andhra Pradesh.

What are the major challenges facing the state's aquaculture sector?

The sector faces rising production costs, disease risks, weak farm-level margins, and uncertainty in international markets.

Feed costs are among the biggest concerns. Prices of key ingredients such as fishmeal and fish oil have risen sharply, increasing shrimp feed costs and the financial burden on farmers. Because feed accounts for a major share of cultivation costs, even a moderate increase can hurt returns.

Disease outbreaks and seed quality are another major concern. Poor-quality or untraceable seed can lead to low survival rates. At the same time, viral diseases can wipe out a crop after farmers have already

spent heavily on pond preparation, seed, and feed. Stronger seed certification, traceability, biosecurity and early disease detection are therefore important.

Farm-level profitability is another concern. Farmers must balance stocking density, crop duration, shrimp size, and market prices. Keeping shrimp longer to reach larger sizes means higher expenditure on feed, power, and labour, but there is no guarantee the additional cost will be recovered through better prices.

How are international markets and climate risks adding to the pressure, and how important are the US and China markets for India's shrimp exports?

Shrimp farming is closely linked to global markets, making farmers vulnerable to changes beyond their control. The US remains an important market for Indian shrimp, while China, the European Union, Southeast Asia, the Middle East and Japan are other major destinations.

Changes in tariffs, import rules, demand, currency movements and international shrimp prices can affect the export chain and, eventually, farm-gate prices.

The US is the most important destination for India's frozen shrimp exports. During 2025-26, frozen shrimp accounted for 42.42% of total marine export quantity and 66.52% of total export earnings. Frozen shrimp exports increased by 6.89% in quantity and 13.16% in value during the year.

The US accounted for

44.53% of India's frozen shrimp export earnings in dollar terms, followed by the European Union at 15.79%, Southeast Asia at 13.49%, the Middle East at 9.36% and Japan at 3.68%.

China is also an important market, particularly for Black Tiger shrimp. China accounted for 35.87% of Black Tiger shrimp exports by value, followed by the Middle East at 23%, Southeast Asia at 20% and other countries at 5.90%.

Exporters can also move beyond bulk frozen shrimp towards value-added products such as peeled and deveined shrimp, cooked products, ready-to-cook seafood and other processed products. Value addition can generate more revenue from the same volume of raw material.

Farmers also face climate and water-quality risks. Temperature fluctuations, low dissolved oxygen, salinity changes, heavy rainfall and extreme weather can stress shrimp and increase disease vulnerability. Better water-quality monitoring, scientific farm management, disease surveillance and climate-resilient practices are needed to reduce crop losses.

Can increasing domestic consumption provide an alternative market for shrimp farmers? What is needed to make shrimp more affordable and readily available to Indian consumers?

Currently, consumers who want to eat shrimp often find it either not readily available in local markets or relatively expensive. As a result, shrimp remains an occasional food for many

consumers rather than a regular part of their diet.

Farmers and traders can ensure a more consistent supply to local markets, while processors can introduce smaller, affordable packs and convenient ready-to-cook products. The government can promote shrimp's nutritional value, strengthen seafood retail infrastructure and support hygienic marketing.

How did the Government respond to the tariff hike affecting seafood exports, and what specific measures were taken?

The Government of Andhra Pradesh adopted a strategy to safeguard the interests of aqua farmers, seafood exporters and allied stakeholders amid global trade disruptions and tariff-related challenges.

It has requested the Centre to pursue diplomatic engagement with major importing countries and use India's Free Trade Agreements (FTAs).

India's trade agreements with the UAE (CEPA), Australia (ECTA), EFTA countries (TEPA) and the recently concluded India-UK FTA, along with ongoing negotiations with the European Union, Oman, New Zealand and Peru, are expected to improve market access and the competitiveness of Indian seafood exports.

The Government has implemented measures to improve competitiveness and reduce the impact of global market fluctuations. These include:

Extending subsidised electricity to registered aquaculture farms to reduce



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After

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Before



After

Improve water color



Before



After

* COMPOSITION:

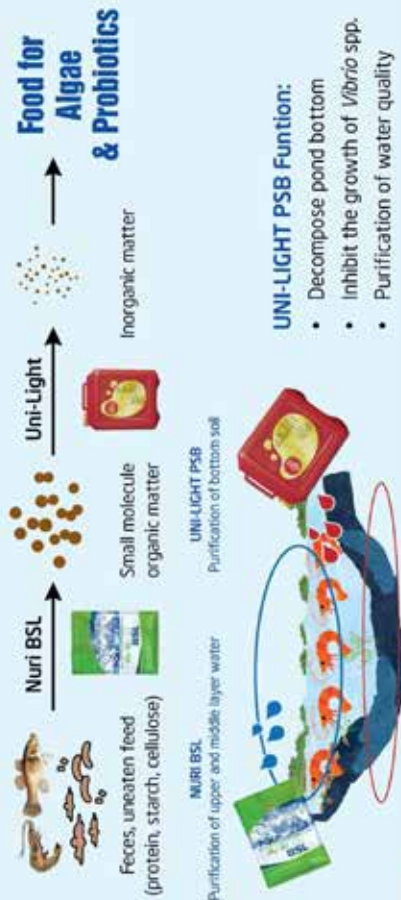
***Bacillus* spp. > 1×10^{11} cfu/kg**
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7 days before stocking	800 g - 1,000 g	1,200 - 1,500 g	1,200 - 1,500 g
Day of stocking	300 g - 500 g	800 g - 1,000 g	800 g - 1,000 g
Every 7 - 10 days after stocking	300 g - 500 g	800 g - 1,000 g	3 - 5 days / use 1,000g - 2,000g

***Dosages can be adjusted according to the water conditions and practices.

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Advocating with the Government of India for rationalisation of input costs, improved availability of feed ingredients, better market access and favourable trade policies.

What is the Government's long-term strategy to enhance Andhra Pradesh's position in global seafood exports?

The Government's vision is to position Andhra Pradesh as the Global Seafood Capital of India by promoting sustainable aquaculture, value addition and internationally competitive seafood exports.

The long-term strategy includes:

Providing Rs 1,150 crore in power subsidy to 2.12 lakh aqua farmers with 71,000 power connections across the State.

Converting more than 90% of major aquaculture areas into aqua zones through a cluster approach.

Using digital technologies, including geo-tagging of 2,07,765 aqua ponds across the State in 69 mega water-source-based clusters and 2,150 sub-clusters, with geo-

fencing.

Strengthening traceability systems, with more than 10,000 aqua business input and hand-holding support units across the State.

Using AI-based IoT sensors with integrated farm management.

Developing skills among fishermen, farmers, entrepreneurs and processors.

Reducing production costs through nursery systems with Biofloc technologies.

Promoting private investment and ease of doing business.

Integrating 25 lakh stakeholders in the sector.

What will determine whether Andhra Pradesh can retain its position?

Andhra Pradesh's next phase of aquaculture growth will depend on producing shrimp more efficiently, sustainably and profitably.

The State already has a large production base, farming community and export ecosystem. The main areas needing attention are input costs, disease management, seed quality, value addition, and farmer price realisation.

With around 2.18 lakh farmers and 14.75 lakh people depending directly or indirectly on the sector, developments in aquaculture affect a large section of the State's economy and livelihoods. The focus will therefore be on strengthening the sector and improving farmers' returns.

Courtesy by The New Indian Express

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Government pushes aquaculture insurance with 40% premium incentive



28 September 2026 :

India's rapidly expanding aquaculture sector is increasingly confronting a challenge that can undermine years of investment in a single crop cycle – the financial impact of disease, floods, cyclones and other natural and non-preventable risks.

With fish production more than doubling over the past decade and aquaculture now accounting for around 74 per cent of the country's total fish production, the government is seeking to make insurance an integral part of aquaculture risk management through the Pradhan Mantri Matsya Kisan Samridhi Sah-Yojana (PM-MKSSY).

The aquaculture insurance initiative under PM-MKSSY is designed to make insurance more affordable for farmers by providing a one-time incentive towards the premium for one crop cycle. The initiative is being implemented through the National Fisheries Digital Platform (NFDP), with the benefit transferred directly to eligible farmers through Direct Benefit Transfer.

Aquaculture growth brings new risks

India recorded its highest-

ever fish production of 19.8 million tonnes in 2024-25, making it the world's second-largest fish-producing country with an estimated 8 per cent share of global production.

The country's total fish production has increased from 9.6 million tonnes in 2013-14 to 19.8 million tonnes in 2024-25. Inland fish production has also risen sharply, reaching 14.74 million tonnes in 2024-25 from 6.1 million tonnes in 2013-14.

Aquaculture, which includes freshwater carp farming, brackish-water shrimp and prawn farming, cage culture and the production of cold-water and marine species, now contributes more than 74 per cent of India's total fish output.

The sector still has considerable room for expansion. India has around 1.95 lakh km of rivers and canals, 31.5 lakh hectares of reservoirs, 22.1 lakh hectares of ponds and tanks and 14.1 lakh hectares of brackish-water area. However, only around 17 per cent of the available brackish-water area has been developed for aquaculture.

Average aquaculture productivity has risen to 4.77 tonnes per hectare, close to the government's target of 5 tonnes per hectare under the Pradhan Mantri Matsya Sampada Yojana (PMMSY).

The growth, however, is accompanied by exposure to a range of risks. Disease outbreaks, summer kill, pollution, earthquakes, cyclones, floods and other natural calamities can destroy an entire crop cycle, leaving farmers with significant losses after months of investment.

For small and marginal aquaculture farmers operating on limited margins, a crop failure can also create difficulties in servicing loans and financing the next production cycle. The government therefore sees insurance not only as a mechanism for compensating losses, but also as an instrument to strengthen the sector's resilience and encourage continued investment.

How the aquaculture insurance incentive works

The Union Government approved PM-MKSSY on February 8, 2024, with incentivisation of aquaculture insurance included under Component 1-B of the scheme.

Eligible aquaculture farmers can receive an incentive of up to 40 per cent of the insurance premium for one crop cycle.

For pond-based

aquaculture, the incentive is capped at ₹25,000 per hectare of water-spread area, subject to a maximum of ₹1 lakh for up to four hectares. Farms measuring less than one hectare are eligible for the incentive on a pro-rata basis.

For advanced aquaculture systems such as cage culture, Recirculatory Aquaculture Systems (RAS), biofloc and raceways, the incentive is 40 per cent of the insurance premium, subject to a maximum of ₹1 lakh and an eligible unit size of up to 1,800 cubic metres.

The scheme also provides an additional incentive for certain beneficiaries. Scheduled Caste, Scheduled Tribe and women beneficiaries are eligible for an additional incentive of 10 per cent of the incentive payable to beneficiaries in the general category.

Focus on timely claim settlement

The effectiveness of insurance ultimately depends on how quickly and transparently claims are settled after a loss.

Under the scheme, farmers are required to immediately inform the insurance company when an insured peril occurs and submit documentary evidence in accordance with the terms of the policy. The insurer then appoints a loss assessor to evaluate the damage.

Following assessment, the claim is processed and payment is made to the insured, with status updates provided through the insurer's portal.

The stipulated settlement

period is 30 days for shrimp culture and 45 days for other aquaculture activities.

Four insurers are currently operational under the initiative – Oriental Insurance Company Limited (OICL), Agriculture Insurance Company of India Limited (AICL), National Insurance Company Limited (NICT) and United India Insurance Company Limited (UIIC). They provide coverage for shrimp and prawn farming, freshwater fish and cold-water species. The onboarding of private insurers is also underway to expand the insurance ecosystem.

Early implementation shows progress

The One-Time Incentive (OTI) component has so far received 316 applications covering 730.61 hectares.

Of these, 127 applications have been approved and the incentive has been disbursed to farmers covering 321.74 hectares. The total amount disbursed stands at ₹40.03 lakh.

The government views these initial numbers as an indication of growing adoption, while recognising that wider participation will be necessary for aquaculture insurance to become a mainstream risk-management tool.

Building confidence in insurance

For aquaculture farmers, the effectiveness of the scheme will ultimately depend on whether insurance delivers timely and fair protection when losses occur. Greater transparency in assessment, faster verification of damage

and predictable claim settlement will therefore be critical to building confidence among farmers.

The government's approach under PM-MKSSY extends beyond subsidising insurance premiums. It seeks to develop a sustainable aquaculture insurance market in which risk protection becomes part of routine farm management.

This will require coordination among multiple stakeholders. The Centre is responsible for policy direction and digital infrastructure, while States are expected to support outreach and implementation at the field level. Insurers need to develop and service credible insurance products, while farmers need to adopt risk protection as part of their production planning. Technical institutions also have a role in strengthening risk assessment, disease surveillance and loss verification.

As India's aquaculture industry expands and becomes increasingly important to rural livelihoods, food security and seafood exports, the government is positioning insurance as a tool to help farmers withstand production shocks and sustain their participation in the sector.

The longer-term objective is for aquaculture insurance to evolve from a government-supported intervention into a durable component of a resilient and financially sustainable aquaculture economy.

Courtesy by DD India

Congrats 'Senior Designate Counsel' C. Sreenivas



Congrats: 'Senior Designate Counsel' designation has been conferred on Mr Chetluru Sreenivas by the honourable High Court of Telangana on 16 September 2026. Advocate Sreenivas has been a close associate of NRS Group. M.A. Nazeer, Editor & Publisher of NRS Group of publications presenting a bouquet to Chetluru Sreenivas at a felicitation function held on 2 October 2026 at Jubilee Hills Club, Hyderabad, and the Editor conveyed his greetings to Chetluru Sreenivas, Senior Designate Counsel. His juniors K.S. Kushal and Yajur Putta are seen in the photo with the senior.

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Vesper organises aquaculture farmers meet on Current Trend in Shrimp Farming and Sustainable Management

Nagapattinam: Vesper groups has organised aquaculture farmers meet on 25 August 2026 at Hotel Queens Inn, Velankanni, Nagapattinam district, Tamilnadu. About 100 farmers attended.



K.S. Saran Kumar,
Director, Vesper Group

Mr K.S. Saran Kumar, Director, Vesper Group, spoke on the role of Vesper Group in manufacturing and providing quality products for over three decades in livestock sector and the credibility of the company in the industry. He asked the dealers and the farmers in shrimp and fish aquaculture to get benefited by using Vesper products in the industry.



Dr P.E. Cheran,
Super Shrimp Consultant

Dr P.E Cheran, Super Shrimp Consultant, gave a detailed lecture and covered the topics of current trend in shrimp farming and sustainable management.

Disease is one of the major constraints today in aqua farming. Major diseases such as WSSV, Vibriosis and EHP causing heavy loss to the farmer. Today, farmers are facing shrimp size variation problems. They are not getting 7 gm size even in 100 days crop. EHP plays major role in the failure of aqua farming. To overcome EHP problem farmers should start working on soil preparation and it is important to sun dry the pond. Follow proper chlorination and ensure water disinfection. Give importance to biosecurity and probiotics application from day 1 of the culture itself. Apply Vitamin C feed mix in the feed.

Farmer should follow proper seed selection. And also follow biosecurity system like bird fence and crab fence around the pond. Farmer should maintain the farm records for proper feed management. If feed drops suddenly, check the animal condition and go for water analysis. Check the water quality parameters immediately and rectify the parameters which are beyond the optimum level. Weekly sampling should be followed. It will support the necessary application to the growth of shrimps. We can go for partial harvest instead of adding more aerators to the pond. After getting desired count we can go for final harvest. We

recommend to the farmers use feed mix, Bactocare, and Aquagest from 15 days onward. No need to binder only water mix. It will support required growth and increase the immunity to the shrimps.



Dr A. Arumugam,
Sales Manager – Aqua, Vesper Group

Dr A. Arumugam, Sales Manager – Aqua, Vesper Group, gave introduction about Vesper Group and its products for aquaculture such as: Pond Boost, Probiotic; Soil Boost, Psprobiotic; Aquagest, Feed Mix For Growth; Bactocare, Gut Probiotic; Resistol, Vitamin C; Aquakleen, Disinfectant; Iornmin 10 Kg, Bag 20 Kg/Ha; Oxy Life. DO Product; Liquid Iornmin, Increase the Moulting; and Gastraph. Ammonia Control.



K. Baskara Doss,
Technical Officer, Vesper Group

Mr K. Baskara Doss, Technical Officer, Vesper Group, thanked the farmers and wished

good crop with Vesper products in the current crop season. Farmers got their doubts cleared during the interaction with the experts and the company executives.

Eager group of farmers enquire products details, farming practices

An eager group of farmers standardly inquired about advanced shrimp and fish farming methods and passionately picked the brains of experts to learn farming practices. Farmers understood the products usefulness and the application methods, farmers are satisfied with our products and got the product awareness, said a note from the company.



A view of farmers in Vesper meeting held at Velankanni, on 25 August 2026



GIZ returns as Gold Sponsor for the World Aquaculture Tanzania 2026

The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH will participate in WA26T/AFRAQ26 in Dar es Salaam, Tanzania, as a Gold Sponsor, sharing experiences and insights from its broad portfolio of projects working to unlock the potential of Africa's aquatic resources for sustainable food, jobs, investment and resilient livelihoods.

Different Projects – One Vision

The Gold Sponsorship is supported by three projects implemented by GIZ on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ) and co-funded by the European Union (EU): the Global Programme Sustainable Aquatic Food (GP SAF), ProsperAzul in Mozambique, and STAWIBLUU in Tanzania. Working in different contexts, they share a common vision: to strengthen sustainable aquatic food systems and blue economies while creating economic opportunities and protecting aquatic and coastal ecosystems.

The Global Programme Sustainable Aquatic Food (GP SAF) works to make fisheries and aquaculture more sustainable and inclusive, strengthening small-scale producers and value chains while promoting sustainable management of aquatic

resources.

ProsperAzul supports Mozambique in developing a climate-smart and inclusive blue economy, combining investment and access to finance with sustainable fisheries and aquaculture value chains and the conservation of marine and coastal ecosystems.

In Tanzania, STAWIBLUU focuses on blue economy entrepreneurship and sustainable private investment, bringing together public and private actors and supporting selected mariculture value chains including seaweed, sea cucumbers, mud crabs and Artemia.

Beyond these three initiatives, GIZ colleagues from Ghana's Employment and Skills for Development in Africa (E4D) programme and Nigeria's Global Programme Agricultural Finance (GP AgFin) will also join AFRAQ26. Their work highlights two further dimensions that are essential for a thriving aquaculture sector: creating employment and business opportunities, and improving access to finance for emerging producers and enterprises.

Together, the GIZ projects represented at AFRAQ26 demonstrate a holistic approach to aquaculture and blue economy development – connecting sustainable production and value chains with entrepreneurship,

employment, investment and finance.

As part of its engagement at AFRAQ26, GIZ will also host a dedicated side event bringing together experts and partners to discuss how these different dimensions can work together to unlock the potential of Africa's aquaculture sector. The session will provide a platform for exchange on practical approaches, experiences and opportunities for collaboration.

“AFRAQ26 is an excellent opportunity to bring together different stakeholders and perspectives on how Africa's aquatic resources can contribute to food security, sustainable businesses and resilient livelihoods. Our work shows that successful transformation requires sustainable production, strong value chains, investment, innovation and access to finance to go hand in hand,” says Pierre Guillibert, Head of Global Programme “Sustainable Aquatic Food”, GIZ.

GIZ looks forward to connecting with partners, experts and businesses at AFRAQ26 and exploring opportunities to advance sustainable aquatic food systems and blue economies across Africa.

World Aquaculture Tanzania 2026 (WA26T), which is the 5th Annual International Conference

and Exposition of World Aquaculture Society and African Chapter of the World Aquaculture Society (AFRAQ2026) is being hosted by the Government of the Republic of Tanzania. The event will take place in Dar es Salaam, TANZANIA, from December 1-4, 2026, at the Julius Nyerere International Convention Centre (JNICC) - a world class conference and exhibition facility in Tanzania. Since 2022, the WAS has successfully hosted the Annual Aquaculture Africa Conferences (AFRAQs) in Egypt (2022), Zambia (2023), Tunisia (2024) and recently Aquaculture Safari, Uganda (2025). AFRAQs typically attract a diverse group of participants from nearly 100 countries - ranging from aquaculture professionals, producers, researchers, policymakers, industry representatives, development partners, students and various other stakeholders. Nearly 2000 participants are expected at WA26T. The event will feature prominent plenary speakers, cutting-edge research presentations, an exhibition showcasing innovations in the aquaculture sector and much more. Attendees will have the opportunity to network, share knowledge, and collaborate on addressing key challenges and opportunities facing both African landscape and the global aquaculture industry.

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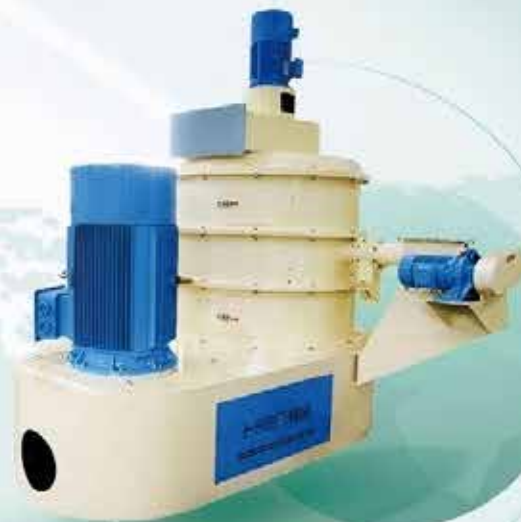
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The Genetics Behind the Brooder

Why the future of Indian shrimp farming may begin before the PL reaches the pond

By Dr Nitin Pipralia, Aquaculture Consultant

For a shrimp farmer, the most visible questions are usually about the pond. How is the water? Is the shrimp eating properly? Is growth on track? What is the survival rate? Can the crop reach the desired harvest size?

But there is another question that is much less visible—and perhaps even more important: Where does the genetic potential of that shrimp come from?

The foundation of a shrimp crop does not begin only when PL is stocked into the pond. It begins much earlier, inside the hatchery, with the selection and management of broodstock.

As Indian shrimp farming expands across increasingly diverse environments—from the coastal systems of Andhra Pradesh, Tamil Nadu, Gujarat, Odisha and West Bengal to the inland farming areas of **Rajasthan, Haryana and Punjab**—the genetics behind the seed is becoming an increasingly important part of the production conversation.

India's farmers are already demonstrating that shrimp can be cultured in environments very different from traditional coastal farming areas. Inland systems may involve saline or brackish groundwater, different soil characteristics, high summer temperatures, variable alkalinity and ionic balance, and significant seasonal fluctuations.

This raises an important question: Can the genetic background of the shrimp help it perform more consistently under these different farming conditions?



Dr Nitin Pipralia

“The future of shrimp farming will not depend only on how we manage the pond; it will increasingly depend on what genetic potential we bring into the pond through the seed.”

The Brooder Is Where the Journey Begins

The brooder is more than simply an adult shrimp used for reproduction. It is the starting point of a genetic journey that ultimately reaches the farmer's pond.

Modern shrimp breeding programmes use selective breeding to improve commercially important characteristics such as growth, survival, feed efficiency, robustness and performance under disease or environmental challenges.

However, faster growth alone does

not necessarily mean better farm performance. A shrimp that performs exceptionally well under one set of conditions may not necessarily perform in the same way under another.

This is particularly relevant for India, where shrimp farming environments can vary considerably between regions.

The real objective of breeding is therefore not simply to produce a bigger shrimp. It is to develop animals with a combination of traits that can contribute to predictable, economically useful farm performance.

SPF and SPR — Two Terms Farmers Should Understand

SPF — Specific Pathogen Free

SPF describes a health status with respect to specified pathogens. It does not mean that the shrimp is genetically resistant to disease. An SPF animal can still be susceptible to a pathogen if exposed to it.

SPR — Specific Pathogen Resistant

SPR refers to animals that have been genetically selected for improved performance or survival when exposed to a specified pathogen or disease challenge.

The two concepts are therefore different. A breeding programme may combine high health standards with genetic selection for particular traits, but farmers should understand exactly what a hatchery means when it uses terms such as SPF, SPR, disease resistance or disease tolerance.

The important question is not simply “Is it SPF?” The question should also

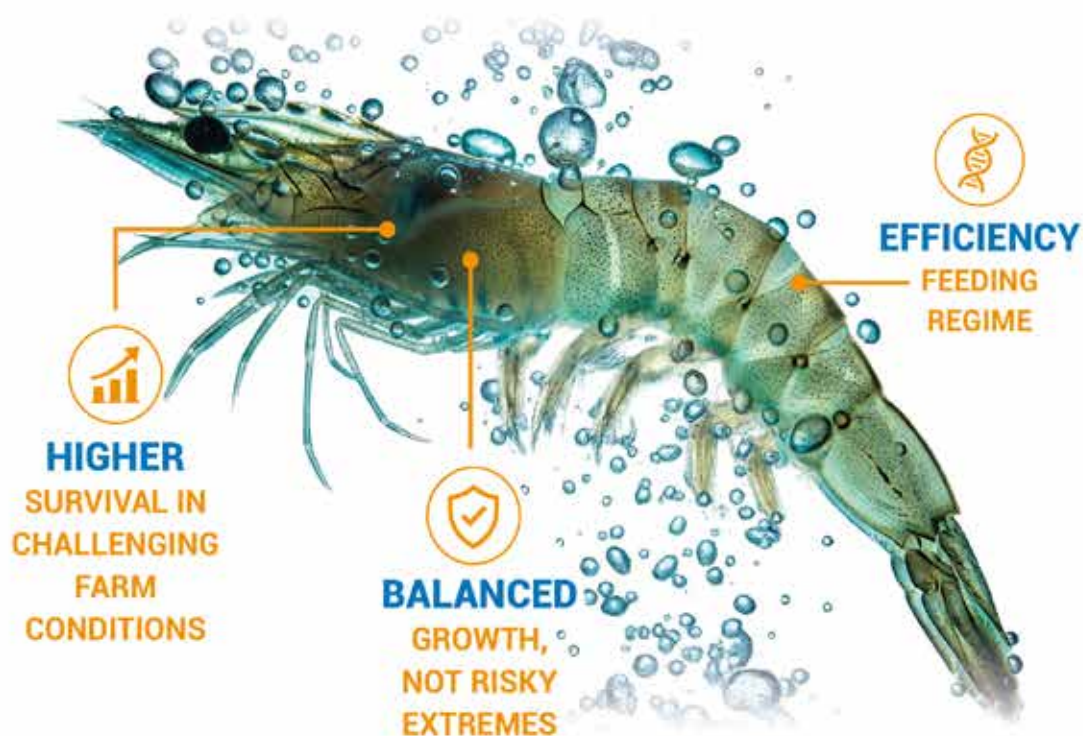


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be: “What genetic traits have actually been selected, and what evidence supports the claim?”

The Global Genetics Programmes

The international shrimp industry has invested heavily in genetic improvement.

Among the programmes and organisations known in the commercial shrimp genetics sector are SIS, SyAqua, Blue Genetics, Benchmark Genetics / Kona Bay, and API — American Penaeid, Inc.

Although their breeding histories, structures and commercial offerings differ, the broader objective is similar: to use systematic breeding and selection to improve traits that matter economically in shrimp production.

For farmers, however, the name of a genetic programme should not be the only consideration. What matters is understanding the line, selected traits, generation, health status, traceability and evidence of farm performance.

SIS

Selective breeding has been central to the SIS approach, with emphasis on commercially important traits such as growth and farm performance. The broader lesson for farmers is that genetic improvement should be evaluated as a continuing process rather than simply as a brand name. The value of a genetic line ultimately has to be considered in relation to the farming environment in which it is used.

SyAqua

SyAqua has developed shrimp breeding programmes incorporating quantitative genetics and advanced breeding technologies. Modern programmes increasingly use family-based selection, genetic evaluation and genomic tools to identify animals with desirable production characteristics. Such approaches can help breeders move beyond simple visual selection and make genetic decisions based on measurable performance.

Blue Genetics

Blue Genetics, associated with the Groupe Grimaud breeding network, has developed shrimp genetic programmes focused on commercially important characteristics. Its breeding work has included lines selected for growth and lines associated with improved resistance or robustness. For the farmer, the important point is to understand what particular line is being supplied and what trait it has been selected for.

Kona Bay / Benchmark Genetics

Kona Bay has a long history in shrimp breeding and broodstock development. The programme is now associated with Benchmark Genetics, which operates breeding programmes designed to improve

commercially relevant shrimp characteristics while maintaining high health standards. Genetic improvement programmes such as these demonstrate how shrimp farming has gradually moved from simply selecting healthy broodstock toward increasingly structured genetic selection.

API — American Penaeid, Inc.

American Penaeid, Inc. (API) is another name associated with the development and supply of improved shrimp genetics. As with other breeding programmes, the farmer should look beyond the programme name and understand the specific genetic material, health status, selected traits and production evidence associated with the broodstock or seed being supplied.

A Practical Comparison of Major Genetics Programmes

Programme	Broad focus	Traits / areas of interest	What farmers should ask
SIS	Selective breeding and commercial farm performance	Growth, survival, robustness and economic traits	Which line and generation? What farm data support the performance claims?
SyAqua	Advanced selective breeding	Growth, survival, disease-related performance and other quantitative traits	What traits were selected and how were they evaluated?
Blue Genetics	Genetic improvement and broodstock development	Growth and resistance/robustness-related traits	Which genetic line is being supplied?
Benchmark / Kona Bay	Structured shrimp breeding and broodstock programmes	Growth, health, robustness and farm performance	What is the broodstock origin and health status?
API	Improved shrimp genetics and broodstock	Commercial production traits	What genetic programme, generation and performance evidence are available?

Important: These programmes are not directly interchangeable simply because they all involve shrimp genetics. Their breeding histories, lines, selection objectives and commercial products can differ. Farmers should obtain current technical and traceability information from the hatchery or programme supplying the seed.

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“Genetics sets the potential of the shrimp, but the farmer creates the environment in which that potential becomes performance.”

Growth Is Important — But Growth Alone Is Not Enough

For years, shrimp farmers have naturally focused on growth. A shrimp that reaches harvest size quickly can potentially reduce culture duration and improve production economics.

But farm profitability is influenced by much more than growth. Farmers also need to consider survival, feed conversion, disease pressure, culture duration, stocking density, environmental stability, market size, harvest timing, selling price and production cost.

A line that grows quickly but performs poorly under stressful pond conditions may not necessarily deliver the best economic result.

This is why modern shrimp genetics increasingly looks at multiple traits rather than one trait in isolation.

The Indian Farmer Needs a Different Conversation

India is not one shrimp-farming environment. The farming conditions of coastal Andhra Pradesh may be very different from those of Gujarat. And both may be very different from inland shrimp farming in Rajasthan, Haryana or Punjab.

In inland areas, farmers may have to deal with brackish or saline groundwater, soil salinity, high alkalinity, ionic imbalance, extreme summer temperatures, different water sources, seasonal changes and different pond construction and water-management practices.

These conditions create a strong case for looking beyond a simple question such as: “Which shrimp grows fastest?”

The more useful question may be: “Which genetic characteristics are appropriate for my farming conditions?”

Questions Every Farmer Should Ask the Hatchery

1. Where does the broodstock come from?
2. Which genetic programme or line does it belong to?
3. What traits have been selected?
4. Which generation is being supplied?
5. What is the SPF status, and for which specified pathogens?
6. If SPR is claimed, against which pathogen or challenge?
7. What evidence supports the genetic-performance claim?
8. Is broodstock and seed traceability available?
9. Has this genetic material been evaluated under farming conditions comparable to mine?
10. What health and quality checks were performed before PL dispatch?

These questions can help farmers move from buying seed based mainly on brand recognition to making a more informed assessment of genetics + health + quality + suitability.

Genetics Cannot Replace Good Farming

Even the best genetic material cannot compensate for poor farm management.

Good genetics must be supported by proper pond preparation, correct stocking density, careful acclimation, appropriate feeding, adequate aeration, stable water quality, biosecurity, health monitoring and timely corrective management.

Genetics provides potential. Management converts that potential

into production.

This is why the future of shrimp farming should not be presented as a choice between genetics and management. It is about combining both.

The Next Generation of Shrimp Seed

The future seed package may increasingly contain much more information than simply a hatchery name and PL count.

A farmer could eventually expect a clearer chain of information:

Broodstock Source → Genetic Programme → Genetic Line → Selected Traits → Generation → Health Status → Pathogen-Specific Resistance Information → PL Quality → Traceability

Such information could make seed selection more transparent and help farmers understand why one seed source may be more appropriate for a particular farming environment.

From the Brooder to the Farmer

The shrimp farmer ultimately sees the final result in the pond. But the genetic story behind that result begins much earlier.

It begins with the broodstock.

“For Indian shrimp farming, genetics should not be viewed simply as a choice of faster-growing shrimp. The real opportunity is to develop and select animals that can perform consistently in the diverse environments where Indian farmers are now producing shrimp.”



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“The farmer sees the result in the pond, but the genetic story of that result begins much earlier—with the broodstock. Understanding that connection is the next step towards more predictable and sustainable shrimp production in India.”

It continues through breeding, selection, maturation, hatchery management, nauplii production, larval rearing and PL quality.

By the time the PL reaches the farmer, much of its genetic potential has already been determined.

As Indian shrimp farming expands into increasingly diverse environments, the importance of matching genetics with geography and farming conditions is likely to become an increasingly important part of technical decision-making.

The future may therefore depend on an integrated approach:

Better Genetics

Better Seed Quality

Better Biosecurity

Better Pond Management

**Better Genetics + Better Seed Quality
+ Better Biosecurity + Better Pond
Management**

= More Predictable Shrimp Production

**The farmer may see the crop in the pond.
But the story begins much earlier.**

It starts with the brooder.

— Dr Nitin Pipralia
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Leading Machinery Suppliers for Aquafeed Manufacturing: Global Options for Fish and Shrimp Feed Production

R. Dinesh, Dr M.G.R. Fisheries College and Research Institute, Tamil Nadu Dr J. Jayalalithaa Fisheries University, Ponneri, Tamil Nadu, India

Highlights

The article presents an overview of leading aquafeed machinery manufacturers from Asia, Europe, and the Americas that supply equipment for fish and shrimp feed production. It highlights the key technologies and equipment used in modern aquafeed manufacturing, including grinding, mixing, pelleting, extrusion, drying, cooling, and packaging systems. The article compares regional strengths, noting the cost-effective and large-scale solutions offered by Asian manufacturers and the advanced automation and extrusion technologies provided by North American and European companies. It emphasises the importance of selecting suitable machinery based on production capacity, feed type, energy efficiency, and after-sales support to enhance feed quality and operational performance. The article serves as a practical guide for aquaculture entrepreneurs, feed mill operators, investors, and industry stakeholders seeking reliable equipment solutions for sustainable and profitable aquafeed production.

Introduction

The rapid growth of aquaculture worldwide has driven strong demand for high-quality aquafeed, which requires specialized manufacturing equipment capable of producing floating, sinking, and specialty feeds with precise nutritional profiles. Modern aquafeed production demands reliable machinery for grinding, mixing, extrusion, pelleting, drying, cooling, and packaging to ensure efficiency, product consistency, and cost-effectiveness. Several established companies across Asia, the Americas, and Europe specialize in this sector, offering solutions ranging from individual machines to complete turnkey feed plants. These

suppliers cater to various production scales, from small operations to large industrial facilities. Here are a few prominent ones:

Asia

1. **Cremach:** Cremach is an Indian company known for its expertise in manufacturing and supplying feed mill equipment. With a strong presence in the domestic and international markets, the firm offers an extensive product range that includes mixers, grinders, pellet mills, and complete feed plant solutions.
2. **FAMSUN (Muyang):** Based in China, FAMSUN is a leading supplier of aquafeed processing equipment. They offer comprehensive solutions for fish and shrimp feed production, including extruders, pellet mills, dryers, and packaging systems.
3. **Idah:** As a well-known Taiwanese company, Idah has been a service provider to top aquafeed firms worldwide for over four decades. They manufacture a wide range of aquafeed equipment and solutions, such as pellet mills, extruders, dryers, coolers, and other auxiliary machinery. In 2023, California Pellet Mill (CPM) acquired IDAH, combining American pelleting expertise with Taiwanese extrusion and aquafeed leadership to strengthen global offerings.
4. **Jiangsu Liangyou Zhengda Co., Ltd. (FDSP):** This Chinese company specializes in feed manufacturing equipment, including aqua feed processing machinery. Their offerings include extruders, pellet mills, hammer mills, and other equipment for aquafeed production.
5. **Jiangsu Yongli Machinery Co., Ltd.:** Yongli Machinery of China focuses on designing and manufacturing

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aquafeed machinery. They provide extruders, pellet mills, and ancillary equipment for aquafeed processing.

6. Richi Machinery: Richi Machinery based in Henan Province of China specialize in the manufacture of pellet making equipment. They produce a range of machinery for shrimp feed production, including pellet mills, hammer mills, and related auxiliary equipment.
7. ZhengChang: A Chinese company excelling in feed machinery, ZhengChang specializes in equipment for aquafeed manufacturing. They supply a variety of extruders, pellet mills, and other processing machinery tailored to the aquafeed industry.

Americas

1. California Pellet Mill (CPM): CPM is a leading manufacturer of pelleting equipment, including pellet mills for aquafeed production. They provide complete equipment solutions designed to meet the specific demands of aquafeed processing applications.
2. Extru-Tech Inc.: Based in the US, Extru-Tech is renowned for its extrusion technology used in producing aquafeeds. Their product range includes extruders, cookers, and other related equipment for aquafeed production.
3. Insta-Pro International: Insta-Pro, headquartered in the United States, specializes in extrusion and expelling technology for feed and food processing. They focus on enhancing nutritional value and efficiency in their extruders and other equipment for aquafeed production.
4. Wenger Group: Wenger, a US-based company, manufactures extrusion cooking systems for aquafeed production. They offer extruders, dryers, and ancillary equipment to produce high-quality aqua feeds, providing customized solutions for floating, sinking, and specialty feeds.

Europe

1. Amandus Kahl: A German-based company, Amandus Kahl manufactures pellet mills, extruders, and other equipment for

aquafeed production, catering to both small-scale and industrial-scale processing needs.

2. Andritz Group: A leading European supplier, Andritz offers a wide range of aquafeed production equipment, including extruders, pellet mills, dryers, and coolers, providing comprehensive solutions for both floating and sinking feed production.
3. Bühler Group: Headquartered in Switzerland, Bühler is a major supplier of processing equipment for various industries, including aquafeed. Their offerings include extruders, pellet mills, dryers, and other machinery designed for efficient and high-quality aquafeed production.
4. Cletral: Based in France, Cletral is a global leader in twin-screw extrusion technology. They provide extruders, dryers, coating systems, and complete processing lines for producing quality fish and shrimp feeds.
5. Pelleting Technology Netherlands (PTN): PTN, a Dutch company, manufactures machinery for the animal and aquafeed industry. They offer pellet mills, extruders, and other equipment specifically

designed for aquafeed production.

6. Van Aarsen International: Located in the Netherlands, Van Aarsen specializes in feed milling equipment delivering solutions for aquafeed processing. Their product range includes extruders, pellet mills, hammer mills, and other machinery for producing fish and shrimp feed.

Conclusion

The aquafeed machinery market features a diverse range of suppliers with proven expertise across regions. Asian manufacturers often excel in cost-effective, large-scale solutions, while North American and European companies frequently lead in advanced extrusion technology, automation, and energy-efficient designs. When selecting equipment, businesses should consider factors such as production capacity, feed types (floating vs. sinking), local service support, energy efficiency, and total cost of ownership. Partnering with the right supplier can significantly improve product quality, operational efficiency, and competitiveness in the growing aquaculture sector. For the latest specifications or customized solutions, direct consultation with these manufacturers is recommended.

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Practice of mullet farming in brackishwater impoundments in West Bengal

Subrato Ghosh, Kalighat, Kolkata – 700026, West Bengal, Email: subratoffa@gmail.com



Some Liza macrolepis harvested from pond

Highlights:

Mulletts are very much suitable for sustainable brackishwater finfish aquaculture in coastal West Bengal. The species *Liza parsia*, *L. tade*, *L. macrolepis* – all are oily fishes, cultivable, their cooked meat bears good flavour and are definitely very good in taste. These are farmed in traditional polyculture system in gher(s) and bheri(s) with compatible other species of brackishwater finfish and shellfish. *L. parsia* and *L. macrolepis* are cooked whole-bodied in Bengali households, transversely cut pieces of *L. tade* are used for cooking. Mullet farming in West Bengal is presently depended upon seed from wild waters for stocking. Small-scale brackishwater finfish farms have been established in North and South 24 Parganas districts of West Bengal but mostly cultured in association with other finfishes and shrimps in improved traditional method. Information gathered from on-site conversation with few medium-scale progressive brackishwater finfish farmers of Basirhat-II, Sandeshkhali-2, Minakhan, Gosaba, Kulpi, Canning-1 CD Blocks on farming of these three economically-important fish species, size and cost of seeds at stocking, body weight of

fish at harvest, duration of culture and related water body management practices in brief is presented in this communication.



Marketable-sized Penaeus monodon

Introduction

The mulletts *Liza parsia* ('disi parsey'/'pukurur parsey' in Bengali vernacular), *Liza macrolepis* ('rupali parsey'/'cheena parsey'/'tamri parsey') and *Liza tade* ('aadh bhangon'/'bhangna'/'bhangon'/'gol bhangon') can be cultivated in brackishwater areas where tiger shrimp *Penaeus monodon* is farmed in modified-extensive (improved extensive) method, are important

candidate species for brackishwater aquaculture in polyculture system along with *P. monodon* and also *Macrobrachium rosenbergii*. Brackishwater catfish *Mystus gulio* and *Oreochromis niloticus* may be stocked (the latter only in very small amounts) in same culture system. Polyculture of *P. monodon* with mulletts has proven to be an effective alternative to semi-intensive brackishwater *P. monodon* monoculture. Mulletts are not carnivorous fishes, are herbivorous (or may be said omnivorous) in their food and feeding habit. These have both good market demand and consumer preference, fetches good price when sold, good in taste and possess very less number of intramuscular spines, unlike Indian major carps.

L. parsia grows to about 6-7 inches in 12 months, have been found to attain body weight of 50-65gm in one-and-a-half years in well maintained brackishwater aquaculture ponds. Its body is silvery having a grayish tint. It is found in nearshore Bay of Bengal, in Hooghly-Matla estuary and tidal rivers of Indian Sundarbans region. Its early stages (seeds) are available in good amounts in naturally-occurring flowing water bodies of this region. It can be cultivated in freshwater ponds also, adapts itself to freshwater



Few Liza tade harvested from polyculture pond



Big-sized Liza parsia

easily. It is an important component of brackishwater aquaculture in estuarine wetlands, i.e., semi-saline and saline bheri(s) (large less-deep man-made water bodies for brackishwater aquaculture) in North and South 24 Parganas districts of West Bengal, particularly in Sandeshkhali, Dhamakhali, Sorberia, Canning, Kathalberia areas. It is a highly preferred species of mullet landed mainly in saline zone of Hooghly estuary including Sundarbans mangrove areas. As foodfish, L. tade fetches more price than L. parsia and L. macrolepis, attains higher body weight and large size. It grows well in both freshwater and brackishwater aquaculture ponds, its flesh is considered very good in quality and taste. It has been found to achieve body weight of 200-220gm in 10-12 months and 260-265gm in 18 months period in brackishwater culture ponds and gher (bheri). It grows to about 1.5 feet in body length.

L. macrolepis is also an important foodfish, shiny in appearance, cultivated in brackishwater ponds in North 24 Parganas and South 24 Parganas districts, attains a larger body size in comparison to L. parsia. It is caught in the lower-most part of Hooghly estuary, caught in Frazerganj area particularly during the winter months. Middle portion of body of L. parsia and L. macrolepis is thicker than L. tade, whereas head portion of L. tade is smaller and depressed than other two species, body is more elongated and slimmer (slender). Caudal fin of L. tade is only marginally forked, but is little more forked in case of L. parsia and L. macrolepis. Structure of caudal fin/tail fin in its posterior end is different in L. tade. At 5-7 inches stage, L. parsia and L.

macrolepis will grow further no more (10-20nos will weigh 1kg at adult size) but for L. tade, it is fingerling or juvenile stage and will gain more length and weight (500-700gm).

In the stockable-size stage (15-60mm), i.e. seed, both 1st dorsal and 2nd dorsal fins of L. parsia are white with slightly dark border. But 1st dorsal fin of L. tade is fairly dark, and its 2nd dorsal fin is darker than 1st dorsal. Considering pectoral fin, at this stage, it is white for L. parsia but it is slightly dark with a black spot at the base for L. tade. According to Dr D. Kaippilly, early fingerlings of L. tade bear a steel blue blotch at the base of its pectoral fin.

Systematic farming of mullets exclusively without other finfishes and shellfishes

At Rampur village, under Bermajur-2 Gram Panchayat, Sandeshkhali-2 CD Block, North 24 Parganas, seeds (8-14mm) of L. parsia, L. macrolepis and L. tade are separately stocked, total amounting to 40,000-50,000nos for every 0.12-0.13 ha water area in dug-out earthen chambers. These are nurtured and fry/advanced fry of mullets are produced in next 60-75 days. Advanced fry are harvested and stocked in large brackishwater bodies (production units) called 'gher' (large dyked low-lying area near the banks of tidal rivers/creeks) and reared upto adulthood/table-size. Soil fertility of the brackishwater nursery ponds is improved by applying 500kg poultry manure/ha (1 hectare = 250dec) initially, 100kg/ha of the same every month, and urea and Single Super Phosphate each @ 60kg/ha/month. Ponds are drained-off, sun-dried and raked after every crop. For every 1000nos seeds stocked, 100-150gm

of high quality wheat flour is used as feed daily for first three weeks, broadcasted over water surface. Thereafter 500gm is used everyday. Pulverized ground nut oil cake (@ 2.5kg/0.04 ha) is used once in a week. From 10-14mm size, at harvest from nurseries, L. tade reach 72mm size, each of L. parsia and L. macrolepis 36-48mm (2.5-3.0gm) with 75-90% survivability.

In grow-out phase of culture, fry/advanced fry of mullets of above-mentioned size are stocked in gher @ 7000-8000nos./0.13 ha and rear in combination. Natural planktonic food matter is brought in through 20-30% water exchange during lunar/moon cycles. Supplementary feed mixture (maize powder/rice bran and groundnut oil cake) is used infrequently. Mullet accept dry powdered feed. In next 6-8 months of stocking, harvesting is done and L. tade has been found to attain marketable size of 800-900gm, L. macrolepis 100-200gm and L. parsia 40-80gm. Water in gher is influenced by high tide and low tide but that in well-managed 'nursery chambers' remain stagnant. In gher(s), tidal influence persists and finfish production is largely dependent on natural fertility of water and soil. In gher(s), L. macrolepis attains 150-225gm body weight and harvested during July-August. Mixture of mustard oil cake and wheat flour is also used as alternative to the previously-mentioned feed mixture, and two crops are produced in a year from one water body. The terms 'bheri', 'gher', 'nona gheri' often hold the same meaning; many of which are located on banks of the tidal rivers Bidyadhari and Hooghly in West Bengal, individually 5-20



Macrobrachium rosenbergii

bigha or more in water spread area, 5-18ppt salinity. All such water bodies have sluice gates with shutters to control tidal water supply inside for brackishwater finfish and shellfish polyculture. Among all edible finfishes and shellfishes, the three species of mullets form the dominant group here.

Polyculture of mullets with prawn, shrimp and other finfishes

At Karanjali Gram Panchayat, Kulpi CD Block, South 24 Parganas, riverine *L. macrolepis* was stocked at 24mm size and *L. tade* 48mm (seeds of the latter bought by farmer at Rs 5/piece) in 2.1 ha brackishwater polyculture water body near Bhagirathi river (Hooghly river). Home-made formulated fish feed using plant-based ingredients was used. After 180 days of culture duration, *L. macrolepis* and *L. tade* grew upto 50-75gm and 300-350gm respectively. Author has observed that mullet farming in polyculture system is also practiced in modified-extensive method in small bheri(s) (22dec - 2.4 ha in area) in Belpukur Gram Panchayat along with *Labeo catla*, *Mystus gulio*, *Penaeus monodon*, *Macrobrachium rosenbergii*, *Metapenaeus brevicornis*.

At Canning town near Matla river in same district, in a 5.3 ha brackishwater body (medium-saline bheri, which is a man-made impoundment), *L. tade* of about 72mm was stocked @ Rs 6-7/piece in January-February. Seeds of *L. parsia* 24mm enter along with tidal water from previous year's December – it is harvested in next November at 30-40gm body weight. *L. tade* is harvested at 400-500gm size in next 11-12 months of stocking. Routinewise water exchange is done, no

supplementary feed applied. Natural periphyton type food matter for fishes grew over submerged aquatic weeds and submerged aquatic grass. Inorganic fertilizers and mustard oil cake were applied in such large water body before seed stocking during water body preparation.

At Minakhan Gram Panchayat and CD Block, North 24 Parganas, in 0.13 ha well-maintained 3-species polyculture water body, *L. parsia* was stocked @ 3nos/sq.mt, 24-36mm, bought @ Rs 4/piece; *L. tade* 2nos/sq.mt, 48-72mm, bought @ Rs 12/piece. Commercially-available formulated mullet pelleted feed that costs Rs 45/kg was applied. At the end of five months, *L. parsia* grew upto 40gm. *P. monodon* was also stocked (PL-20, 12-18mm) and reared as the 3rd aquaculture species. In another water body of same area of another farmer, riverine paddy-grain sized *L. parsia* was stocked @ 200nos/0.13 ha in March, bought @ Rs 1000-1500/kg. At the end of the year, it reached 30-50gm, harvested in December-January when plot was dewatered. In the same plot, *L. tade* 72mm, bought @ Rs 7-10/piece was stocked @ 50nos/0.13 ha during March April, and harvested in next year's January at 400-500gm size. It was sold @ Rs 200-250/kg. Home-made (farm made) fish feed was used daily. In this 2nd water body, species under culture included *P. monodon*, *M. rosenbergii*, mud crab *Scylla olivacea*, *M. brevicornis*, *M. monoceros*, *L. parsia*, *O. mossambicus*, *L. tade* and Indian major carps.

Naturally-occurring early stages of the three species of mullets can be bought from fish seed markets at Dhamakhali, Sorberia, Basanti, Ghatakpur, Canning, Sonakhali, Kakdwip, Namkhana, Frazerganj in these two districts. The 24-36mm stage of *L. parsia* is available from 15th March onwards. When *L. parsia* 4-6cm and *L. tade* 8-10cm was stocked in 3:1 ratio, in next five months, with proper management and application of supplementary feed, *L. parsia* grew upto 100-110gm and *L. tade* 500gm. Author has mentioned some of his observations

at farmers' field in Vol. 27(2) and April-June 2023 issue of Aquaculture Asia.

In a 1.02 ha bheri in Minakhan Gram Panchayat, *L. tade* was bought by farmer @ Rs 10/piece, 7.5cm size; *L. parsia* Rs 1500/kg, 15-24mm size; *L. macrolepis* Rs 600/kg, 4.8cm size. Stocking was done in this water body, which comprised 1.5kg *L. parsia* seeds, 8kg *L. macrolepis*, 600nos *L. tade*. There was giant freshwater prawn and little amount of *Oreochromis niloticus* also in this brackishwater polyculture water body. In next 7-8 months, *L. parsia* attained 20-30gm and *L. macrolepis* 50-70gm. *L. tade* attained 300gm body weight in 8-10 months, which reaches upto 500gm in same period in larger water bodies. Harvested *L. parsia* was sold in local markets @ Rs 200-280/kg, *L. tade* 300gm size @ Rs 250-320/kg. Much smaller-sized riverine *L. parsia* seeds (4000-5000nos per kg) are also available in local markets, which costs Rs 1000/kg when bought. Dr D. Kaippilly and two other authors of Department of Aquaculture, KUFOS, Kerala have pointed out that mullets form an important part of brackishwater polyculture system to manage and control detritus matter and improve sediment quality of water body. Mulletts require no or much less fish meal in their diets, consume left-over feed of *P. monodon* or 'Lab-Lab' in polyculture system.

In a tide-fed experimental farm pond, at 16-17ppt water salinity, a study was conducted by Scientists of ICAR-Central Institute of Brackishwater Aquaculture Kakdwip Research Centre, West Bengal. Nursery-reared *L. tade* fingerlings 10.3cm in size were stocked @ 10000nos/ha in monoculture system, and those have been found to attain 215-235gm body weight individually in 240 days of culture duration. Formulated floating-type pelleted feed (with 29.7% protein) was applied twice daily, there was provision of aeration in pond. Highest body growth of *L. tade* was observed at this stocking density. A higher Benefit: Cost ratio was obtained when *L. tade* fingerlings were stocked @ 20000nos/ha.



Sub-adult Liza tade

Additional information on food and feeding and seed collection

From a Bengali publication of ICAR-CIBA Kakdwip Research Centre on brackishwater finfish and shellfish culture, we come to know that Scientists of this institute have prepared a formulated feed for *L. parsia* for grow-out culture; it comprise fish meal 40%, soyabean oil cake 7%, mustard oil cake 10%, wheat flour 20%, rice bran 20%, Mineral mix 1%, Vitamin mix 0.5% and Guar gum powder 1.50%. From an article authored by Dr J. Syama Dayal and other Scientists of this institute and published in Vol. 64(4) of Indian Journal of Fisheries in 2017, we have been informed about a formulated feed that is used for polyculture of mullets in brackishwater ponds – composition of ingredients includes fish meal 10%, Acetes shrimp 7%, grinded prawn head 8%, soyabean meal 18%, groundnut oil cake 12%, gingelly (sesame) oil cake 7%, broken rice (boiled) 7%, wheat flour 17.5%, rice bran 8%, fish oil 1.5%, Lecithin (phospholipids) 1%, Vit-Min mix 2% and Binder (starch) 1%. Crude protein in this feed has been estimated to be 33.4%.

If rice polish is applied as the only feed source for growing *L. parsia*, it will be nutritionally inadequate as it will contain only low protein and high fibre. Feed preparation of *L. tade* is done as like that of Indian major carps, can also be cultured in association with Ompak pabda. As food, it accepts cut pieces of soft submerged aquatic weeds, benthic algae. Suspended detritus, algae, plankton and decaying organic matter is brought in by incoming tidal water, which settles down. Little amount of fish meal obtained from small-sized, 'not consumed' estuarine fishes may be added in *L. tade* formulated feed to increase protein level.

During December to March every year, tiny stages 8-12mm of *L. parsia* are collected in triangular-shaped shooting nets or 'Behundi jaal' in Hooghly estuary in and around Kakdwip and Mollakhali, Gosaba, Rangabelia, Bakkhali villages in South 24 Parganas, the net is dragged along

edges of creeks, also set during high tides. Seeds of *L. tade* 10-20mm in size can be collected in this estuary from June. In coastal Bay of Bengal, downstream Matla river and Hooghly-Matla estuary, matured and gravid *L. parsia* females have been observed in fairly good numbers in two winter months from December-beginning till January-end of next year. From entire Matla river, Canning and Bidyadhari rivers, at Canning, Roydighi, Godakhali and Kultali areas, fish seed collectors by profession in Sundarbans region capture the 8-12mm stage of *L. parsia* during mid-December till mid-March of next year. As soon as summer sets in, in warmer river water, *L. parsia* seeds will no more be found. *L. parsia* seed collectors also get seeds in stretches of rivers at Canning Port, Mollakhali, Moukhali, Gosaba, Rangabelia, Namkhana, Bakkhali, Muipith, Kumirmari, Kalinagar, Kochuberia, Kakdwip, Amlamethi regions (villages) in South 24 Parganas.

West Bengal Fishery Department's initiative

In the three coastal districts of West Bengal Purba Medinipur, South 24 Parganas and North 24 Parganas where brackishwater sector is an important area of commercial aquaculture, particularly in the brackishwater CD Blocks of each district, the developmental Project titled 'Swarna Matsya Yojana' is being implemented by Directorate of Fisheries, Government of West Bengal and formulated by the Department of Fisheries. One of the schemes under Swarna Matsya Yojana Project is 'Polyculture of tiger shrimp with mullets'. Government assistance (contribution) to selected fish farmer beneficiaries is provided in terms of inputs like good quality *P. monodon* seed (PL 15-20), *L. tade* seed (1-2 inch on av.), *L. parsia* seed (1-2 inch on av.) and paddle wheel aerator. Total amount as Government assistance is Rs 75,000 per unit; each unit is 1 hectare of farmer's brackishwater aquaculture area. Beneficiary's contribution include other inputs like lime, Urea, Single Super Phosphate, shrimp feed, mullet feed, prophylactic

agents to control fish and shrimp diseases – which beneficiaries will have to arrange on their own. Coastal fishermen and fish farmers in general of three coastal districts may avail this opportunity and may contact Fishery Extension Officer at their nearest Block office or higher-level officers at District Fisheries office.

Very good to eat

During my school days 1985 to mid 1995, on my request my late father often used to bring *L. tade* 500-600gm or *L. parsia* 4-5 inch in size from market at home every week, my mother cooked light curry of cut round pieces of *L. tade* or whole-bodied *L. parsia* with spices (mildly spicy), cumin, ginger, teared (slit) green chilli, sun-dried pulses dumplings, sliced brinjal and potato – it was so good to eat with rice. I still love eating it, even more than light curry prepared from cut pieces of *Labeo rohita* and *Labeo catla*. Presently I find that *L. parsia* and *L. tade* are much less available in our local fish market and *L. macrolepis* is more available.

L. tade or *L. parsia*, when cooked as two separate well-known dishes at Bengali homes with mustard oil, turmeric, black mustard paste, poppy seed paste, red chilli powder, garlic, black cumin seeds, coriander leaves as thick curry (gravy), is very good to eat and a delicious fish-based recipe in West Bengal everywhere - in cities, sub-urban areas, towns and villages. Another preparation out of mullets may be using mustard oil, red chilli powder, chopped tomatoes, finely sliced onion, cumin, turmeric. Before cooking, every time, the alimentary tracts, i.e., fish entrails (including the thickened top-shaped gizzard-like stomach) of 6-8nos of raw dead-but-fresh medium-to-big sized *L. parsia* and *L. macrolepis* are completely removed when bought at home from fish market. When it is fried in little amount of mustard oil with turmeric powder and common salt, it bears a very good flavour and this concentrated oil (in addition to body oil obtained after frying whole fish having entrails removed) bears very good taste when eaten with hot rice.

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EXHIBITION • PANEL DISCUSSION

Opinion of some other farmers

Some farmers opine that *L. tade* can be farmed in combination with *Rhinomugil corsula*, *P. monodon*, *M. gulio* and *M. rosenbergii*. About 30-35% protein content in supplementary feed is required for good growth of *L. tade* in brackishwater polyculture ponds, monoculture is non-profitable. At least 100cm water depth in pond is required. Small-sized seeds of *L. tade* may be collected from tidal rivers of Sundarbans and nearby estuaries during July-September every year, which may be transported to pond site for stocking. In some ponds, it had attained 300-400gm in 18-22 months of culture; feed was applied as dry mixture of rice polish or deoiled rice bran, maize dust, wheat flour byproduct, pulverized groundnut oil cake. Banana leaf coloured water is ideal for *L. tade* farming, it can be done in freshwater ponds with Indian major carps.

In addition to ponds, *L. tade* can be cultured in brackishwater gher(s), brackishwater canals in polyculture system. When feed is broadcasted over pond, it arrives and eats in mass. Supplementary pelleted feed meant for non-air breathing, cultivable, medium-sized freshwater catfishes and *Heteropneustes fossilis* can be given to growing *L. tade*, it readily accepts and grows faster. Pond water should not be excessive green. Once harvested, adult ones are quickly send to fish markets. Seeds of *L. parsia* may be obtained from creeks, canals and tributaries of major rivers of Sundarbans. In gher(s) meant for *M. rosenbergii*, *L. parsia* has shown good growth when stocked @ 1000-1200nos/33 dec of 1-2 inch size. Stocking should be increased to 1500-2000nos in ponds having 6 feet depth. Floating-type catfish pelleted

feed should be applied in every afternoon in *L. parsia* ponds as 2nd installment of daily feed. *L. parsia* is a surface feeder in culture systems; urea and Single Super Phosphate are applied every month to enhance phytoplankton production. *L. parsia* should not be cultured with monosex *Tilapia* and *Pangasianodon hypophthalmus* because the latter two have fast (quick) feeding habit, unlike *L. parsia*. According to few experienced farmers, *L. parsia* 24-36mm in size if stocked during February-April will attain 4-6 inch in size in next eight months period in polyculture plots. *L. tade* if stocked at 0.75-1.5 inch size during early rainy season will attain 9.5-10 inches in length upto the end of next season.

Raw cow dung heaped at four corners of grow-out polyculture pond embankment is applied in small amounts every month but completely avoided during April to June as water temperature becomes high and it causes Dissolved Oxygen depletion drastically. In mullet polyculture water bodies, good quality Calcium carbonate is added to water and applied @ 3-4kg/33 dec every month to kill pathogenic micro-organisms, if any. Simple arrangement of water pump and perforated PVC pipe supplies Dissolved Oxygen in ponds - proper DO level facilitates good growth of mullets, when maintained. About 50-80nos of *L. tade*, 5-7 inch in size, may be stocked in every 40 sq.mt water area in polyculture system in freshwater or brackishwater ponds. It has been found to attain 1200-1500gm at the end of next one year culture period. Fish farmers who own *L. tade* grow-out ponds and gher(s) buy stockable-sized young ones of 40-50gm size (5-7 inch, i.e., 125-175mm) @ Rs 40-50/piece.

End note

I possess much interest in mullets. During February 2011 – December 2012, as SRF in a Govt of India Research Project at ICAR-CIFRI, Barrackpore, I had worked on determination of maturity stages of both oocytes and ovary of naturally-collected *L. parsia* and *L. macrolepis* adults-cum-matured ones in successive months of the year. I estimated oocyte diameter under microscope and percentage of presence of different maturity stages of oocytes in ovary(s) of female fishes (mullet, *Hilsa ilisha*) round the year. I visited few medium-scale brackishwater finfish farms in North and South 24 Parganas during October 2022 – May 2025. Mullet farming in well-maintained brackishwater impoundments in integrated finfish and shellfish culture system in coastal West Bengal holds good potential, and can improve lives and livelihood of agriculture- and capture fishery-dependent people in villages, besides fish farmers by profession. Brackishwater aquaculturists in West Bengal will be able to prosper further in mullet farming with West Bengal Government's support. In Government of India's Vision 'Vikshit Bharat 2047', in order to meet the fish demand in brackishwater sector, our country's annual brackishwater aquaculture production (amount) have to be increased from the present annual 0.9 million tonnes to 3.0 million tonnes in year 2047. In addition to *Lates calcarifer*, *P. monodon* and *Litopenaeus vannamei*, contribution of farmed marketable-sized mullet production from confined brackishwater aquaculture bodies under controlled condition from West Bengal and other coastal states is going to play a major role here.



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