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India's Seafood Exports hit ₹72,325 crore, an all time record in FY 2025-26

Aquaculture industry is taking better shape time to time and growing; It will be organised well

The GIFT Tilapia Processing & Export initiative presents a transformative model to shift India's Tilapia sector from low-value, whole-fish marketing to high-value, export-oriented processing. Despite the specie's strong production potential, over 99% of tilapia in India is sold unprocessed, which limits farmer income and global competitiveness.

Dear Readers,

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

I happened to meet Mr K. Narahari Reddy, Founder & Managing Director, Fedora Sea Foods Pvt Ltd at his office in Nellore recently and found it appealing to converse with him. 'Narahari Reddy says that he is happy to see Aquaculture industry is growing. We had faced lot of problems in the process of introducing Vannamei in India some 15 years ago. The industry would not have come up to this thriving stage had we depended on Tiger alone those days. Aquaculture sector may be facing ups and downs now and then, but this sector will not go. People, we are all there to take care of this industry. People will not allow the industry to suffer, all of us will lift it up. Though we face hurdles in the initial years of aquaculture sector, the industry is taking better shape time to time and growing. Aquaculture sector is getting organised well and it will be established well in the near future'. We need more people with such commitment to take this industry forward resolving its issues.

Again it was a good experience for me to meet two knowledgeable hatchery promoters at Pondicherry Dr Jose Kutty and Dr Joshi K Shankar. They are working to strengthen their hatchery operations with better ideas and technology. At a broader level, the group aims to position itself not just as a seed producer, but as a knowledge-driven organization that contributes to the overall development of aquaculture industry. Continuous improvement, responsible growth, and farmer-centric thinking will remain at the core of its future roadmap, they believe. They said at hatchery level stress tests are also performed to evaluate the robustness of the seed and its ability to withstand handling, transport, and environmental changes. Further, advanced diagnostic methods such as PCR testing are used to screen for major pathogens, ensuring that only disease-free seed is supplied to farmers. In the coming years, the group aims to further enhance its production capabilities through the adoption of advanced hatchery technologies, improved biosecurity systems, and better broodstock management practices. Strengthening in-house maturation systems and optimizing operational efficiency across all units are also key priorities.

India's seafood industry has reached a historic milestone. According to provisional data released by the Marine Products Export Development Authority, the country's seafood exports touched an all-time high of ₱ 72,325 crore (US$ 8.28 billion) in FY 2025 - 26. Export volumes also reached 19.32 lakh metric tonnes, showing strong global demand for Indian marine products. The biggest growth driver continued to be frozen shrimp, which contributed ₱ 47,973 crore, accounting for more than two-thirds of total export earnings. Shrimp exports also grew by 4.6% in volume and 6.35% in value, proving its dominant role in India's seafood basket. The United States remained India's largest seafood market with imports worth US$ 2.32 billion. However, shipments to the US declined due to tariff-related challenges.

India's marine fish production in 2025 reached 35.7 lakh tonnes, a slight 3% increase over 2024 landings, according to an assessment by the ICAR-Central Marine Fisheries Research Institute released recently. Tamil Nadu surged to the top position,

Contd on next page

NRS GROUP

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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overtaking Gujarat with 6.85 lakh tonnes, while Gujarat slipped to second place after a 15% decline, largely due to adverse weather, extended fishing bans, and cyclonic disturbances. Kerala remained in third position, with a marginal 2% increase in marine fish landings. CMFRI's annual marine fish landing estimates showed that Indian mackerel remained the most landed resource in the country at 2.70 lakh tonnes, followed by cephalopods at 2.57 lakh tonnes and oil sardine at 2.53 lakh tonnes. Cephalopods and threadfin breams recorded 25% and 55% growth respectively - both reaching decadal-high levels. Pelagic fish dominated the catch with a 54% share, followed by demersal resources, crustaceans, and molluscs. Among major states, Karnataka recorded an impressive 44% surge in landings following a steep decline in 2024. Maharashtra also posted a strong growth of 18%. Oil sardine rebounds in Kerala. A major highlight of Kerala's marine fish landings in 2025 was the increase of Indian oil sardine, which emerged as the top resource with 1.68 lakh tonnes (13% increase over 2024), marking a decadal high.

Recently in a television programme in leading Bengali News Channel DD Bangla titled 'Krishi Darshan', vastly experienced Dr Shib Kinkar Das, Professor, Department of Aquaculture, Faculty of Fishery Sciences, West Bengal University of Animal and Fishery Sciences, Kolkata had discussed about important steps which freshwater fish farmers in rural West Bengal must follow while practicing mixed fish farming or composite fish culture. According to Dr Das, before the 1970s, in rural West Bengal, mixed carp farming in farmers' ponds was only done with the three fishes Rohu, Catla and Mrigal. But later on, three more fishes were introduced from China, which are Grass carp, Silver carp, Common carp. Farmers also stocked young ones of Labeo bata, Puntius javanicus and freshwater prawn in this farming system, i.e., mixed fish farming or composite fish culture. Before stocking of fish fingerlings, pond has to be prepared properly. Many ponds in rural West Bengal are not dewatered for 5-10 years, but should be done at least once in four years for the sake of good fish culture and fish production.

Marine hatchery industry in India are in a fragile condition like a glass house is because of the following: Most of the Indian coast line water is highly polluted and most of the hatcheries use 18th century practices for treating water before using it in the hatchery. They should adopt modern water treatment systems to get rid of all pathogens present in the incoming water for the hatchery. Indian marine hatcheries mostly refers to shrimp hatchery that is a low-level technology without much complications. However, this itself is struggling because of non-hygienic culture conditions. Whereas marine fish hatchery is much more complicated and species specific.

Mr Vegesna Ramesh, Executive Partner, Raveendra Commercial Corporation, Bhimavaram said, when raw material prices are increased the feed companies are increasing feed prices, but when there is a decrease in raw material prices, the feed companies are not decreasing feed prices. Soya prices in the last year was 55 and came down to Rs 32 a kilo with Rs 22 gap, but feed companies did not reduce feed prices at that time. Due to high lease rate farmers are going for high density stocking without proper and sufficient pond preparation leading to problems. There should be resting time for preparation of the pond for the stocked seed to grow healthily without diseases, and to have successful crop.

In the Articles section, **GIFT Tilapia: Powering India's Next Wave of Domestic and Export Growth** authored by S. Thamizhanthi, M. Subashini and S. Felix discussed that the GIFT Tilapia Processing & Export initiative presents a transformative model to shift India's tilapia sector from low-value, whole-fish marketing to high-value, export-oriented processing. Despite the species' strong production potential, over 99% of tilapia in India is sold unprocessed, which limits farmer income and global competitiveness. In essence, this model repositions GIFT tilapia as a premium, export-ready protein, unlocking new income streams for farmers, employment opportunities for youth, and a strategic pathway for India's aquaculture export growth. India's aquaculture sector has long been anchored by shrimp exports, yet a quiet transformation is underway with the rise of GIFT tilapia. Despite its proven advantages, tilapia in India is still largely confined to domestic markets, sold mostly as whole fish with minimal value addition.

Another article titled, **Reusing with Purpose: Sustainable Guppy and Aquatic Plant Culture in a Discarded Fridge** authored by Swarali Pachkudve, Harshvardhan Shetye and Sejal Pachkudave said that a novel low-cost aquaculture system using a repurposed refrigerator demonstrates circular resource utilization. Integrated plant – fish system ensures natural biofiltration, supporting Guppy fish (Poecilia reticulata) growth and rapid reproduction. Low-input design enables fry production within one week with minimal dependence on external aeration and filtration. Economically viable and scalable model with added benefits of mosquito larval biocontrol and sustainable household aquaculture. In a world where everything comes at a cost, starting even a small entrepreneurial project can feel like a challenge. Determined to take a more resourceful and sustainable approach, we decided to experiment with fish farming, starting not with expensive equipment, but with what most would consider trash.

Another article titled, **Seahorse** authored by Sealciya Devi, R. and B.R. Sona says that Seahorses belong to the genus Hippocampus with 41 species globally, including 7 species in India and 6 in Tamil Nadu. They exhibit unique morphology, including an upright posture, bony plates instead of scales, and a prehensile tail. Seahorses have a distinct reproductive system where the male carries and incubates eggs in a brood pouch. They play a major role as flagship species for marine conservation, highlighting issues like bycatch and habitat destruction. Tamil Nadu is a hotspot for seahorse fisheries, especially in Ramanathapuram and Rameswaram regions. Major threats include non-selective fishing methods (trawling, drag nets), illegal trade, and habitat loss.

Readers are invited to send their views and comments on the news, special feature and articles published in the magazine which would be published under "Readers Column". Time to time, we shall try to update you on various aspects of Aquaculture sector. Keep reading the magazine Aqua International regularly and update yourself. Wish you all fruitful results in your efforts.

M.A.Nazeer
Editor & Publisher
Aqua International

People will not allow Aquaculture industry to suffer, all of us will lift it up:

K. Narahari Reddy

'We had faced lot of problems in the process of introducing Vannamei in India some 15 years ago. The industry would not have come up to this thriving stage had we depended on Tiger alone those days. We are all there to take care of this industry. People will not allow the industry to suffer, all of us will lift it up'.

Says K. Narahari Reddy, Managing Director, Fedora Sea Foods Pvt Ltd talking to M.A. Nazeer, Edtor, Aqua International

Nellore: I feel happy to see that Aquaculture industry is growing. We had faced lot of problems in the process of introducing Vannamei in India some 15 years ago. The industry would not have come up to this thriving stage had we depended on Tiger alone those days, said Mr K. Narahari Reddy, Founder & Managing Director, Fedora Sea Foods Pvt Ltd.

Aquaculture sector may be facing ups and downs now and then, but this sector will not go. People, we are all there to take care of this industry. People will not allow the industry to suffer, all of us will lift it up, stated Mr Narahari Reddy.

Though we face hurdles in the initial years of aquaculture sector, the industry is taking better shape time to time and growing. Aquaculture sector is getting organised well and it will be established well in the near future, he added.

Mr K. Narahari Reddy had taken up aquaculture in 1990 first with Shrimp farming in Nellore and today he is doing it in 500 acres own farm. He has two hatcheries – Fedora Sea Foods with 200 million seed production at Mypadu

K. Narahari Reddy, *Managing Director, Fedora Sea Foods Pvt Ltd*

per year and Blue Park Aquatics with 150 million seed production annually.

Narahari Reddy started Shrimp feed manufacturing factory in Nellore in 2015 on the name of Fedora Sea Foods Pvt Ltd in collaboration with Pingtai Enterprise Co. Ltd, Taiwan with 100,000 metric tonnes of feed production capacity.

In 2021, he started Shrimp processing plant with a processing capacity of 25,000 metric tonnes and exporting processed Shrimp to Japan, Middle East, China, UK etc.

Fedora Sea Foods group mission is "To operate efficiently while maintaining our uncompromising principles, providing superior quality seafood products and nourishing a sustainable ecosystem."

Mr Narahari Reddy applauded the work of Mr M. Dileep Kumar, COO, Fedora Sea Foods Pvt Ltd and his team in promoting the company's shrimp feed and other products in the industry.

Fedora Group Activities:

- Shrimp Farming in 500 Acres.
- Two Hatcheries with 350 million seed production annually.
- Shrimp feed production of 50,000 tonnes annually.
- Shrimp Processing Plant with 15,000 tonnes annually.
- Exporting Shrimp products to Japan, Middle East, China, UK etc.

India's Seafood Exports Cross ₹72,000 crore-New All Time Record Achieved

India's seafood industry has reached a historic milestone. According to provisional data released by the Marine Products Export Development Authority (MPEDA), the country's seafood exports touched an all-time high of ₹72,325.82 crore (US$ 8.28 billion) in FY 2025–26. Export volumes also reached 19.32 lakh metric tonnes, showing strong global demand for Indian marine products.

The biggest growth driver continued to be frozen shrimp, which contributed ₹47,973.13 crore, accounting for more than two-thirds of total export earnings. Shrimp exports also grew by 4.6% in volume and 6.35% in value, proving its dominant role in India's seafood basket.

The United States remained India's largest seafood market with imports worth US$ 2.32 billion. However, shipments to the US declined due to tariff-related challenges. This drop was balanced by strong growth in other markets such as China, European Union, Southeast Asia, and Japan. Exports to China rose 22.7% in value, while the EU recorded 37.9% growth in value.

Other products like frozen fish, squid, cuttlefish, dried seafood, surimi, fishmeal, and fish oil also showed positive momentum, indicating diversification beyond shrimp.

India's top five seafood export ports Vizag, JNPT, Kochi, Kolkata, and Chennai handled nearly 64% of total export value, highlighting their importance in the supply chain.

This achievement reflects India's rising strength in global seafood trade and growing competitiveness across multiple markets.

Matsya Mela concludes with a call for integrated fisheries hub in Lakshadweep

Kochi: Matsya Mela concluded on a high note at Kavaratti with a call for establishing an integrated fisheries hub in Lakshadweep. The hub is aimed as a single-window platform to streamline marketing, strengthen the fisheries value chain, and enhance the income and livelihood security of island fishing communities.

Experts and stakeholders highlighted that the proposed fisheries hub would focus on organised fish marketing, common landing and handling facilities, cold storage and cold-chain infrastructure, value addition units, and export facilitation, enabling Lakshadweep to unlock the full potential of its tuna-based fisheries and emerging mariculture sectors.

Stakeholders emphasised the need for regular

and scientific fish catch data estimation for the Archipelago as the foundation for sustainable fisheries management.

Another major recommendation was the identification of suitable sites for cage fish farming in Lakshadweep waters, considering environmental carrying capacity, ecosystem health, and climate resilience. Scientists underlined the scope of cage farming, seaweed cultivation, and ornamental fisheries as diversified livelihood options that can complement capture fisheries and reduce pressure on natural stocks.

The mela also stressed the importance of citizen science initiatives, enabling closer linkages between fishing communities and scientific institutions for data collection, stock assessment, and ecosystem monitoring. Speakers noted that coordinated efforts among fishers, researchers, cooperatives, entrepreneurs, and the administration are essential for translating scientific knowledge into community-driven management practices.

Krishi Vigyan Kendra (KVK) Lakshadweep of the ICAR-Central Marine Fisheries Research Institute (CMFRI) took the lead to organise the mega event in association with the Fisheries Department of Lakshadweep. Lakshadweep Fisheries Director K Buzar Jamhar, CMFRI Director Dr Grinson George and Lakshadweep KVK Head Dr P N Ananth among others spoke at the valedictory session.

India's marine fish catch increases 3% in 2025: CMFRI

• All India production reaches 35.7 lakh tonnes
• Kerala records 6.24 lakh tonnes with 2% increase
Oil sardine rebounds in Kerala

Kochi: India's marine fish production in 2025 reached 35.7 lakh tonnes, a slight 3% increase over 2024 landings, according to an assessment by the ICAR-Central Marine Fisheries Research Institute (CMFRI) released on Thursday.

Tamil Nadu surged to the top position, overtaking Gujarat with 6.85 lakh tonnes, while Gujarat slipped to second place after a 15% decline, largely due to adverse weather, extended fishing bans, and cyclonic disturbances. Kerala remained in third position, with a marginal 2% increase in marine fish landings.

CMFRI's annual marine fish landing estimates showed that Indian mackerel remained the most landed resource in the country at 2.70 lakh tonnes, followed by cephalopods at 2.57 lakh tonnes and oil sardine at 2.53 lakh tonnes. Cephalopods and threadfin breams recorded 25% and 55% growth respectively—both reaching decadal-high levels. Pelagic fish dominated the catch with a 54% share, followed by demersal resources, crustaceans, and molluscs.

Among major states, Karnataka recorded an impressive 44% surge in landings following a steep decline in 2024. Maharashtra also posted a strong growth of 18%.

Oil sardine rebounds in Kerala

A major highlight of Kerala's marine fish landings in 2025 was the increase of Indian oil sardine, which emerged as the top resource with 1.68 lakh tonnes (13% increase over 2024), marking a decadal high. At the same time, threadfin breams and cephalopods registered significant growth of 27% and 16%, respectively. Kerala's marine fish catch reached 6.24 lakh tonnes in 2025 with a 2% increase over 2024, accounting for around 17% of India's total marine fish production. Resources such as threadfin breams, cephalopods and oil sardine increased in landings while scads, penaeid shrimps and ribbon fish decreased in Kerala. Oil sardine, Indian mackerel, anchovies, threadfin breams and penaeid shrimps were the top five resources landed in Kerala in 2025.

Heavy rain and a cargo shipwreck caused the loss of fishing days in May and June in the southern districts of the state. Ernakulam district contributed the highest share (29%) followed by Kollam (25%) and Kozhikode (18%). Among landing centres, Neendakara in Kollam emerged as the top contributor with around 70,000 tonnes followed by Munambam with almost 64,000 tonnes.

"Favourable environmental conditions played a crucial role in supporting the revival of small pelagic fish stocks during the period. This ecological advantage was further reinforced by regulated fishing pressure, leading to the necessary time and space for recovery", said Dr Grinson George, Director of CMFRI.

Economic value

Marine fish landings generated an estimated ₹69,254 crore at landing centres across the country (up 10.45%) and ₹97,702 crore at the retail level (up 8.43%), indicating strong market demand. In Kerala, the total value at the landing centre level was estimated at ₹12,665 (up 17.8%) and ₹16,681 (up 11.1%) at the retail centre level. National marketing efficiency improved to 70.88%, with Kerala recording the highest marketing efficiency (72.83%).

The Fishery Resources Assessment, Economics and Extension Division of the CMFRI estimated the annual marine fish landings of the country through its online data collection system.

CMFRI Director Dr Grinson George, Heads of Research Divisions Dr J Jayasankar, Dr Shoba Joe Kizhakudan, Dr K S Sobhana, Dr Josileen Jose, Dr VVR Suresh and Dr Krupesha Sharma attended the press conference.

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* COMPOSITION:

Bacillus spp. > 1x 10^{11} cfu/kg	15%
(Bacillus subtilis, Bacillus amyloliquefaciens, Bacillus licheniformis)	
Carrier (rice bran, corn gluten)	75%
Moisture	10%

* STORAGE:

Keep at dry, well-ventilated condition. Avoid direct sunlight exposure and use as soon as possible once opened for best quality.

* DIRECTION OF USE:

No cultivation is needed. Apply Nuri BSL with water-soluble bag near to the working water wheel or pour into the pond evenly. Recommend apply Uni-Light PSB together with Nuri-BSL on sunny day to achieve a clear pond more efficiently.

UNI-LIGHT PSB Funtion:

- Decompose pond bottom
- Inhibit the growth of *Vibrio* spp.
- Purification of water quality

BSL Dosage:

/10,000 m² Quantity	10 - 30 pl/m² tiger prawn or < 80 pl/m² Vannamei	For >30 pl/m² tiger prawn or > 80 pl/m² Vannamei	For > 150 pl/m² Vannamei
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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Prof. S. K. Das discusses important steps in composite fish culture

Recently in a television programme in leading Bengali News Channel DD Bangla titled 'Krishi Darshan', vastly experienced Dr Shib Kinkar Das, Professor, Department of Aquaculture, Faculty of Fishery Sciences, West Bengal University of Animal and Fishery Sciences, Kolkata, had discussed about important steps which freshwater fish farmers in rural West Bengal must follow while practicing mixed fish farming or composite fish culture.

According to Dr S.K. Das, before the 1970s, in rural West Bengal, mixed carp farming in farmers' ponds was only done with the three fishes Rohu, Catla and Mrigal. But later on, three more fishes were introduced from China, which are Grass carp, Silver carp, Common carp. Farmers also stocked young ones of Labeo bata, Puntius javanicus and freshwater prawn in this farming system, i.e., mixed fish farming or composite fish culture. Before stocking of fish fingerlings, pond has to be prepared properly. Many ponds in rural West Bengal are not dewatered for 5-10 years, but should be done at least once in four years for the sake of good fish culture and fish production. During pond renovation, after dewatering, the deposited unhygienic, black, bottom silt should be scrapped off and removed. This 'Pank' (in Bengali) should not be more than 1 feet or 1.25 feet in depth. In rural West Bengal,

Prof. S. K. Das

most of the fish farmers apply minimum amount of chemical fertilizers. Only seldom urea and SSP are used when pond water turns dull or faded - green or blue-green colour not found.

Raw cow dung should be applied in ponds @ 10 tonnes per hectare (250 decimal), but it should never be applied when fishes are present. It starts decomposing in water, lowers the pH, dissolved oxygen (DO) content, alkalinity - which are harmful for fishes. During post-stocking period, raw cow dung can be partially decomposed or composted before applying, can be dumped in small heaps over pond embankment which will slowly be washed down into pond. Or, it can be kept inside perforated gunny bags in submerged state in pond. In case of lime application, an interval of 6 days should be kept in between application of lime and organic manure or lime and inorganic fertilizer. When lime is applied on the 6th-7th day of manure application, the latter quickly breaks down into inorganic nutrients required for pond water and soil, made available for phytoplankton production.

During pond preparation, lime is applied @ 250-300kg per hectare in South 24 Parganas and most of the other districts where pond pH lies in between 7.0-7.5. But red lateritic soil exists in Bankura and Purulia, which is acidic, hence 350-400kg lime is applied. In post stocking period, 4-6kg lime should be applied every month per 33 decimal pond - otherwise pond water will turn acidic, colourless, deficient of nutrients, disease symptoms even may appear on fish body. Case of excessive phytoplankton (bloom) it is not good, a scum may appear on pond surface – it will utilize the DO during late evening and night hours and on next day morning, DO level in pond will be at its minimum, a very bad situation. Fishes will gasp for air. After a few days, the thin mat or scum will deteriorate, rottening smell will eject, water will turn acidic and turbid, total alkalinity is reduced. It is also a harmful condition for fishes.

Furthermore, in profitable integrated farming, on the embankments on four sides, banana, areca nut and coconut saplings can be planted as long term crops, and also short-height crops like turmeric, Citronella grass, ginger. If only a few growing fishes starts dying due to cause unknown, then few banana stems can be chopped into pieces and put into the pond to increase pond pH and alkalinity. Leafy foliage vegetable crops will be the best in integrated farming with fishes, green bottlegourd scaffold can be made over pond slope, Colocasia sp, pumpkin may also be done. The thick and high amount of black silt scrapped off from pond bottom and deposited over embankment consists high amount of nutrients, which is used beneficially for vegetable production (without any fertilizer). If pond bottom contains sufficient amount of sand, if it is more slopy having very less silt content, then freshwater prawn juveniles can be stocked along with carp fingerlings to facilitate their easy walking behaviour over bottom soil. Care should be taken so that excessive nutrients are not produced in pond, otherwise algal deposition will occur over body of prawns, their exoskeleton turns thick, will not be able to moult, that will hamper in its body growth. Market price of such algae-deposited prawns will fall, will be unappealing to consumers. Coconut tree branches should be kept in semi-submerged state in pond, algae-type green slimy layer or periphyton develops over it which is good food matter for prawn juveniles.

Feeding to fishes is done in lesser rate during winter months but is increased from spring and pre-summer, @ 4-5kg for every 100kg fishes daily in morning hours after sun rises. Bag feeding method can be practiced. Commercially-available pelleted feed may be used, but growing fishes accept natural food matter and farm-made

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Deepak NexGen Feeds receives Best Management Award from A.P. Govt

Recognition to the Good Work: *The Andhra Pradesh State Government has presented the Best Management Award to the management of Deepak NexGen Feeds Pvt Ltd on the occasion of May Day on May 1, 2026. The Chief Minister of Andhra Pradesh Chandrababu Naidu felicitated Deepak NexGen Feeds Director Chaitanya Vasu at a function held in Pamidimukkala near Vijayawada and presented the award and congratulated him.*

The Chief Minister of Andhra Pradesh Chandrababu Naidu felicitating Chaitanya Vasu, Director, Deepak NexGen Feeds.

Chaitanya Vasu, Director, Deepak NexGen Feeds receiving trophy from the Chief Minister of Andhra Pradesh Chandrababu Naidu.

Vikram deals with small and marginal farmers, and growing

B.Ram Vikram,
Managing Partner, BVS Enterprises

Palakollu: Mr B. Ram Vikram, Managing Partner, BVS Enterprises, distributor for Skretting Feeds of GAMMA Vannamei and OPTILINE Extruded feed for Palakollu and its surrounding areas has got a sale of 2000 tonnes feed sales annually. Started business in aquaculture with Skretting feeds, Vikram says he is doing well with his shrimp feed business. Started business in 2022 with 600 tonnes of feed in the first year, Vikram has developed it to 2000 tonnes sale now. He is also selling healthcare and other products of different companies.

The young entrepreneur, Mr B. Ram Vikram said, I deal with more of small farmers who are doing shrimp culture in 2 to 10 acres, I found the farmers are doing farming carefully following the procedures in farming activity. Aquaculture is a good farming activity and it will remain and develop further.

Took inspiration from Father Babji My father Mr B.V. Satyanarayana (Babji), Managing Director of BVS Enterprises is an enthusiast in aquaculture farming and doing shrimp

B.V. Satyanarayana,
Managing Director, BVS Enterprises

farming for over 27 years with both Tiger and Vannamei. I took inspiration from my father and taken up shrimp feed distribution business, and found the activity fruitful and profitable. I am dealing with 65 happy farmers for feed, said Vikram. Vikram did his M.B.A. in marketing

Looking for Skretting support
I am looking for long term collaboration with Skretting to ease technology in Auto Feeders which will benefit the company, the dealer and the farmers, he stated.

We are the first dealer to have exclusive Skretting experience centre in India, he added.

He is trying to bring awareness among farmers to maintain good farming practices in shrimp farming. Sai Aqua Feeds and Needs has branches at Bhimavaram, Narsapur and Veeravasavaram.

A 3-Acre shrimp farmer K. Ram Murthy turns into feed dealer at Veeravasavaram

Veeravasavaram: A 3 acres shrimp farmer in Veeravasavaram Mr K. Ram Murthy has taken up shrimp feed dealer ship and wants to become a prominent dealer for feed in the state of Andhra Pradesh. Mr K. Ram Murthy, Proprietor, Sai Aqua Feeds and Needs is the dealer for Devi Seafoods Ltd for Vannamei and Tiger feeds in Veeravasavaram in West Godavari district, Andhra Pradesh. He is also dealing with medicines of different companies.

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pulverized dust-type feed can mostly be used. During continuing 3-4 days of cloudy weather, may be after a supercyclone, then feeding is stopped (if sunlight doesn't fall on pond). Total 1000nos major carp fingerlings (3-4 inch) are stocked in every 33 dec pond in general, harvested after 10-12 months. But in present times, in 'multiple stocking multiple harvesting' method, 15000 fingerlings can be stocked in every 33 dec, partially harvested in ever 2-3 months period, stocked fishes are thinned and again newly stocked – total production amount becomes more at the end of one year. News communicator Subrato Ghosh heard this discussion of eminent aquaculture expert Dr S. K. Das and learnt new ideas.

PhyGeno Unveils PhyMune: The Future of Plant-Based Immune Health in Livestock

PhyGeno, a division of Avitech Nutrition, has recently launched PhyMune – a plant-derived immunomodulator designed to optimise health and resilience in poultry/ livestock. PhyMune was launched on 14th April, 2026 during the company's Quarterly Sales meeting.

PhyMune enhances the innate immune system, allowing livestock to better navigate environmental stressors and disease challenges.

PhyMune:

- Regulates key immune pathways whilst enhancing both innate and adaptive immune systems
- Improves vaccine -induced antibody production for stronger disease protection
- Supports consistent body weight gain and higher production efficiency (EPEF)
- Reduces the impact of stress-related immunosuppression in commercial poultry systems.

PhyMune provides a much needed natural solution to address the growing and imminent threat of disease in modern poultry/livestock production systems.

Fragile Indian Marine Hatcheries

Marine hatchery industry in India are in a fragile condition like a glass house is because of the following:
- Most of the Indian coast line water is highly polluted and most of the hatcheries use 18th century practices for treating water before using it in the hatchery. They should adopt modern water treatment systems to get rid of all pathogens present in the incoming water for the hatchery.
- Indian marine hatcheries mostly refers to shrimp hatchery that is a low-level technology without much complications. However, this itself is struggling because of non-hygienic culture conditions. Whereas marine fish hatchery is much more complicated and species specific.
- Marine fish hatchery technology is lagging behind in India because of the lack of reliable live food production systems and lack of nutritional quality of the feed they use. Furthermore, the research institutes keen in publications rather than doing joint ventures with commercial farmers to develop/optimise technology for various high value marine fish species.
- Live feed production systems are very fragile in most of the hatcheries subjected to environmental stress and occupy vast area in a hatchery. Capital investment also very high. The success of a marine fish hatchery depends on its ability to establish high intensive automated and environmentally controlled live food production systems for commercial ventures saving lots of hatchery space and capital investment. Until then the hatcheries will remain as a fragile glass house.

Dr Charles M. James

About the Author
James is the MD/CEO of 'Farm Ocean Technologies India Pvt. Ltd.,' www.farmoceantech.com and providing technical back up for developing commercial aquaculture projects in several countries including Togo (West Africa), Port Sudan (E. Africa), Sri Lanka, Maldives, Kuwait and in India. As a consultant, involved in the establishment of hatchery and farming of hard and soft-shell mud crabs, shrimp and marine fish. He is a GLG group technical participating member and has provided technical advices to their clients relevant to aquaculture industry. He is providing services towards establishment of commercial multi-species hatcheries and farming systems for the government as well as private sector.

Aquaculture is a good food industry, it will grow and get established soon: Vegesna Ramesh

'We are growing up with CPF India for 30 years with strong binding and we do not want CPF to loose the market'

Bhimavaram: Due to good Shrimp raw material prices farmers are active and happy and the farmers are preparing for the coming crop in West Godavari district in Andhra Pradesh, said Mr Vegesna Ramesh, Executive Partner, Raveendra Commercial Corporation, Bhimavaram, Andhra Pradesh.

According to Mr Ramesh, Raveendra Commercial Corporation (RCC) has sold 37,000 tonnes of CPF feed in financial year 2025 - 2026 in West Godavari and Krishna districts, and he is expecting still better supply of feed in this year. RCC achieved Prawn trading with raw material of 275 crore in the last year. 99.5% of his business is of CPF shrimp feed and other healthcare products. He is also dealing with the products of Himalaya and Virbac. Besides this he is also dealing with unique products like virus test kits and water cleaning.

Vegesna Ramesh, Executive Partner, Raveendra Commercial Corporation, Bhimavaram.

RCC is supplying feed and other products to 700 farmers in East, West and Krishna districts in A.P.

Raveendra Commercial Corporation has achieved a turn over of 305 crores in 2025 - 26.

RCC has 16 sub dealers in the market

Vegesna Ramesh said that 2010 - 2018 were the golden years for aquaculture sector in the country. 2019 - 2022 were the worst years for him and for CPF. CPF's sales in India came down to 30% due to internal issues. Later they corrected the things and now working to come back to their previous best position in the market. We are growing up with CPF India for over 30 years with strong binding and we do not want CPF India to loose the market, he stated.

Industry will be fine in 2026. Only the issue I see is that number of feed companies in the country is growing leading to excess feed production and to unhealthy competition.

Presently, shrimp raw material prices are good with Rs 270 per 100 count. Upto Rs 250 it is ok. If the price goes below that sustainability will become difficult, he told.

My observation is that in 2010, Vannamei price was Rs 200 per 100 count and feed rate was Rs 42 per kilo. Today 100 count shrimp is marketed at Rs 250 – 270 with feed rate at Rs 86 per kilo. Input cost gone up by 100%, he said.

Due to high lease rate farmers are going for high density stocking without proper and sufficient pond preparation leading to problems. There should be resting time for preparation of the pond for the stocked seed to grow healthily without diseases, and to have successful crop.

When raw material prices are increased the feed companies are increasing feed prices, but when there is a decrease in raw material prices the feed companies are not decreasing feed prices, said Ramesh. Soya prices in the last year was 55 and came down to Rs 32 a kilo with Rs 22 gap, but feed companies did not reduce feed prices at that time.

RCC has 17 branches and 65 employees in the three districts of East, West and Krishna.

Though now a days margins in the business have come down with higher over heads, he said that aquaculture sector would have ups and downs now and then, but it's a food industry and will grow and will get established soon in future, he stated.

RCC has been the Distributor of CPF India Pvt Ltd for over 30 years (since 1996) for CP feed. Raveendra Commercial Corporation received best feed Dealer / Distributor in India Award from Aqua International some eight years ago.

Aqua International Editor M.A. Nazeer greeting Vegesna Ramesh during his visit to Ravindra Commercial Corpn at Bhimavaram on April 24.

White Spot Disease Can Be Controlled with Proper Pond Management

Bhimavaram: Shrimp farmers can effectively control white spot disease and achieve better yields by strictly following proper pond management protocols, says M. Venkadachalam, Senior Vice President (Sales & Marketing), CPF India Pvt. Ltd., who has over 32 years of experience in the aquaculture sector.

He emphasized that shrimp farming has a strong future if farmers adopt disciplined practices. By following recommended protocols, farmers can achieve up to 40 count production within 90 days and improve profitability.

Back to Basics Approach
Venkadachalam advises farmers to return to the "Back to Basics" approach, a principle promoted by CPF India in the mid-1990s. He noted that only a limited number of farmers currently follow proper pond management practices, which is a major reason for disease outbreaks.

Common Mistakes by Farmers

- Do not prepare ponds properly before stocking
- Skip the required gap between crop cycles
- Ignore basic biosecurity measures

White spot disease has been a recurring issue since 1994, but it can be controlled through:

- Proper water treatment
- Maintaining biosecurity
- Ensuring adequate crop gaps
- Selection of good seed

M. Venkadachalam,
Sr V.P., Sales & Marketing, Central Zone,CPF India

Importance of Crop Planning

For successful shrimp farming, farmers should:

- Maintain a two-month gap between crops
- Dry ponds thoroughly
- Prepare soil properly before restocking

Suggested crop cycles:

- First crop: December / January to March
- Second crop: July to October

Maintaining a dry period in April & May helps reduce disease risks significantly.

Following these schedules can ensure continuous shrimp production throughout the year in Andhra Pradesh.

Market Insights

India's shrimp feed market is estimated at around 18 lakh tonnes, while shrimp production stands at approximately 12 lakh tonnes.

- South Zone (Tamil Nadu, Karnataka, Andhra Pradesh) has a major share.
- Central Zone (Krishna, Godavari regions) is a key production hub.
- North Zone (Odisha, West Bengal) also contributes significantly.

Experience and Industry Role

Venkadachalam, with a background in Marine Biology, began his career in 1994 and has since played a significant role in promoting scientific shrimp farming practices across India.
He started his career as a technician at a farm in CP Aquaculture, now became Senior Vice President, (Sales & Marketing), and continuing his services in the same company for the past 32 years.

Farmers in West Bengal and Odisha are drying ponds from October to January, and they are getting good results in the crop, he stated.

Conclusion

Strict adherence to pond preparation, bio-security, and crop scheduling can significantly reduce disease risks and improve farmer profitability. A disciplined and scientific approach is essential for sustainable shrimp farming in India, he stated.

Aqua International taking initiative to form Young Entrepreneurs in Aquaculture Forum / Club

Dear Young Entrepreneurs in Aquaculture sector,

I am happy to inform you that Aqua International, the 32 year old English monthly, is taking initiative to promote "Aquaculture Young Entrepreneurs Forum / Club" during Aquaculture Expo 2026 scheduled to be held on 12 &13 January 2026 at Bhimavaram, Andhra Pradesh, India. The objective of this Forum / Club is to bring young entrepreneurs from different segments of Aquaculture industry in India and overseas like Farmers, Hatcheries, Feedmillers, Processors, Health & Nutrition, Equipment, Traders etc. together on a common platform, make relationship, friendship, exchange of views & ideas, and share knowledge in the interest of all and work for the well being and effective development of aquaculture sector in India.

Youngsters entrepreneurs in Aquaculture sector can register their names in the Forum / Club at a Counter to be created for the purpose in the Expo premises at Kotla Function Hall, Undi Road, Bhimavaram, Andhra Pradesh.

Young entrepreneurs together should give a message that they are not the Competitors, they are the Colleagues of aquaculture industry to organise and to promote aquaculture sector in the country. The youngsters will also support the seniors in their efforts for this industry. We invite the young entrepreneurs to spread this message and invite young entrepreneurs to join the Forum / Club on June 12 & 13 during the Expo at Bhimavaram.

I look forward to your communication and participation.

Regards,
M.A. Nazeer,
Editor, Aqua International,
E: info@aquainternational.in;
nrspublications@gmail.com

Jay Jay Group completes 3 decades, going further strong

At a broader level, Jay Jay Group aims to position itself not just as a seed producer, but as a knowledge-driven organization that contributes to the overall development of the aquaculture industry. Continuous improvement, responsible growth, and farmer-centric thinking will remain at the core of its future roadmap.

Dr Jose Kutty and Dr Joshi K Shankar, Promoters and Managing Directors of Jay Jay Group of Hatcheries

They were born in different cities in Kerala, studied together their Master's degree in fisheries in the same university, and further strengthened their academic and managerial expertise with an MBA. They started their career in one company Shriram Marine Harvest Ltd, Poompuhar, Tamil Nadu as Hatchery Manager and Deputy Manager.

They never had an issue of ego, superior or inferior feelings against each other in their long career and life sofar. They understand each other and going smoothly and successfully in their business. On any aspect in their business activitiy, they discuss and take correct decisions which is helping the company to grow – that is Dr Jose Kutty and Dr Joshi K Shankar, Promoters and Managing Directors of Jay Jay Group of Hatcheries. Their next generation, Dr Ashwin Antony and Dr Divin George, sons of Dr Jose Kutty; and Mr Aravind Joshi, son of Dr Joshi Shankar, are also working in the same line like their parents and strengthening the company further.

M.A. Nazeer, Editor, Aqua International, had an exclusive interview with both of them. Excerpts:

About the Company and its Promoters

Dr Jose Kutty and Dr Joshi K Shankar, the Managing Directors of Jay Jay Group of Hatcheries, bring together a strong blend of academic excellence and extensive industry experience in aquaculture.

Dr Jose Kutty was born in Kochi, while Dr Joshi K Shankar hails from Thiruvananthapuram. Both pursued their higher education at Kerala University of Fisheries and Ocean Studies, Kochi, where they completed their Master's degree in Fisheries. They further strengthened their academic and managerial expertise with an MBA, followed by doctoral qualifications, reflecting a strong commitment to both technical depth and strategic leadership.

Their professional journey is built on a combination of scientific knowledge and practical industry exposure, which has enabled them to develop deep expertise in hatchery operations, broodstock management, and shrimp seed production. This well-rounded background has played a crucial role in shaping the steady growth and credibility of Jay Jay Group over the years.

Both families are now settled in Pondicherry, and the business has evolved into a multi-generational enterprise, with the second generation actively entering and contributing to its growth. This transition reflects a strong foundation, along with a continued commitment to professionalism, quality, and long-term vision.

Hatchery production capacity and units situated in India

Jay Jay Group of Hatcheries was established in 1995 with a clear and focused vision - to provide farmers with reliable, high-quality shrimp seed. What began as a modest initiative has, over the years, grown into a well-recognized and trusted name in the aquaculture industry.

Today, the group operates seven hatcheries, with six located across Tamil Nadu and one in Nellore. These units are strategically positioned in key aquaculture regions, enabling the company to maintain close proximity to major farming clusters while ensuring access to optimal environmental conditions for hatchery operations.

With a strong emphasis on quality

and consistency, Jay Jay Group has steadily expanded its capabilities over the years. The combined production capacity of its hatcheries now stands at approximately 3 billion seeds per year.

Rather than pursuing rapid expansion, the group has focused on sustainable growth - strengthening infrastructure, maintaining strict biosecurity standards, and consistently delivering high-quality seed. This approach has helped Jay Jay Group build long-term trust among farmers and establish a solid presence in the industry.

Category of seed production

Jay Jay Group of Hatcheries primarily produces Litopenaeus vannamei (Vannamei shrimp) seed, which has become the mainstay of the Indian aquaculture industry due to its consistent performance, higher survival rates, and overall commercial viability.

The group's journey, however, began with Penaeus monodon (Black Tiger shrimp). In the early years, before the introduction of Vannamei in India, Jay Jay Group was actively involved in the production of Tiger shrimp seed, building a strong foundation in hatchery operations and larval rearing.

Continuing that legacy, the group has reintroduced SPF (Specific Pathogen Free) Tiger shrimp seed into its portfolio, aligning with the growing interest in diversification and the revival of Tiger shrimp culture, particularly in premium and niche markets.

Dr Ashwin Antony, M.S., *elder son of Dr Jose Kutty,is Director, Jay Jay Group*

By combining its early experience in Tiger shrimp with current advancements in hatchery practices, Jay Jay Group is able to offer both reliability and adaptability, catering to the evolving needs of the aquaculture industry.

Broodstock import

Jay Jay Group of Hatcheries has established in-house maturation facilities across all its hatcheries, enabling greater control over broodstock management and consistency in seed production.

The group regularly imports broodstock in a planned and phased manner, bringing in approximately 300 - 400 pairs every alternate month to ensure continuity in production cycles and maintain optimal genetic quality.

In terms of sourcing, Jay Jay Group primarily relies on internationally reputed broodstock suppliers such as SyAqua and Shrimp Improvement Systems. These companies are known for their advanced genetic programs and strict biosecurity standards, which align with the group's commitment to producing high-quality, disease-free seed.

Dr Divin George and Mr Aravind Joshi, *sons of Dr Jose Kutty and Dr Joshi Shankar. Aravind Joshi is the Business Strategist, Jay Jay Group*

By combining reliable sourcing with strong in-house maturation capabilities, Jay Jay Group ensures a stable and consistent supply of robust broodstock, forming the foundation for quality seed production.

Annual seed production and supply

Jay Jay Group of Hatcheries has developed a strong production base over the years, with an annual seed production capacity of approximately 3 billion post-larvae. This scale reflects the group's consistent focus on infrastructure, operational efficiency, and quality-driven growth.

The group supplies shrimp seed across a wide geographic spread in India, catering to both established and emerging aquaculture regions. Key markets include Andhra Pradesh, Tamil Nadu, Gujarat, Odisha, West Bengal as well as growing markets such as Kerala, Haryana, Punjab, and Rajasthan. This wide presence reflects the group's ability to cater to diverse farming conditions and regional requirements.

Seed exports to overseas

In addition to its strong domestic footprint, Jay Jay Group has also been expanding into international markets. The group has supplied shrimp seed to the Middle East, including countries such as Bahrain, United Arab Emirates, and Lebanon, based on specific project requirements.

While expanding its reach, the group continues to prioritize consistency and farmer trust, ensuring that every batch of seed meets the same standards of quality across all markets.

How many hatcheries are importing Broodstock regularly? What is the rule of law for broodstock import by any hatchery in India and supply healthy shrimp seed continuously?

In India, only a limited number of well-established and compliant hatcheries are involved in the regular import of broodstock. This is primarily because broodstock import is a highly regulated process that requires strict adherence to biosecurity protocols, infrastructure standards, and regulatory approvals.

The import of broodstock in India is governed by authorities such as the Coastal Aquaculture Authority (CAA), which has laid down clear guidelines to ensure that only Specific Pathogen Free (SPF) broodstock enters the country. Hatcheries must have approved quarantine facilities, maintain detailed documentation, and follow stringent health

certification procedures before and after import.

Globally as well, responsible broodstock import follows a similar framework – emphasizing traceability, disease-free certification, and controlled breeding environments. Continuous monitoring, regular testing, and strict biosecurity measures are essential to prevent disease outbreaks and ensure the long-term sustainability of shrimp farming.

Jay Jay Group aligns closely with these regulatory frameworks and best practices, ensuring that broodstock sourcing and handling are carried out with the highest level of responsibility. This disciplined approach is critical in maintaining the health and quality of shrimp seed supplied to farmers.

As seed is the vital input in successful aquaculture, what do you say on the role of hatcheries in quality seed supply?

In aquaculture, seed is not just an input – it is the foundation on which the entire crop depends. The quality of seed directly influences survival, growth, disease resistance, and ultimately farm profitability. In this context, the role of hatcheries becomes absolutely critical.

Jay Jay Group of Hatcheries places strong emphasis on maintaining strict biosecurity protocols across all its operations. From controlled hatchery environments to the use of SPF (Specific Pathogen Free) broodstock and imported SPF polychaetes as feed, every stage of the production cycle is carefully managed to minimize risk and ensure consistency.

Equally important is the role of people and infrastructure. The group is supported by a highly qualified and experienced technical team, capable of managing complex hatchery processes with precision. This is complemented by modern infrastructure and well-designed systems that enable the production of high-quality, uniform, and robust seed.

Consistency and reliability remain at the core of operations. Through continuous monitoring, quality checks, and adherence to best practices, Jay Jay Group ensures that the seed supplied meets the expectations of farmers across cycles.

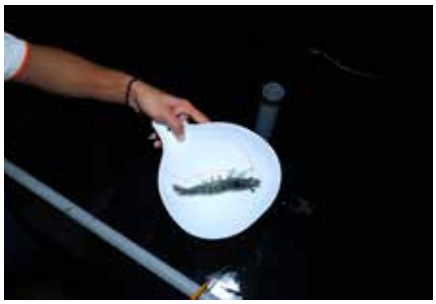
In essence, hatcheries are not just suppliers, but key contributors to the success and sustainability of aquaculture. By combining

science, technology, and disciplined execution, they play a decisive role in shaping the future of the industry.

What is the size of seed market in India ? What is the share of Jay Jay Group in it ?

The shrimp seed market in India is one of the largest in the world, driven predominantly by the widespread adoption of Litopenaeus vannamei farming. The total annual demand is estimated to be in the range of 80 – 100 billion post-larvae, reflecting the scale and intensity of aquaculture activity across the country.

Within this large and competitive landscape, Jay Jay Group of Hatcheries has established a strong and consistent presence. With an annual production capacity of around 3 billion seeds, the group holds a meaningful share of the market, built steadily over the years through reliability, quality, and long-term relationships with farmers.



Rather than focusing solely on market share, the group's approach has been centered on sustainable growth and maintaining high standards in seed production. This has enabled Jay Jay Group to retain farmer trust and remain a preferred supplier in key aquaculture regions.

What is the percentage of Vannamei & Tiger shrimp seed used presently in India ? Which one do you think is more advisable for farmers?

At present, Litopenaeus vannamei (Vannamei shrimp) dominates the Indian aquaculture sector, accounting for approximately 90 – 95% of the total shrimp seed usage in the country. Its widespread adoption is largely due to its faster growth, higher stocking densities, better survival rates, and overall economic viability for farmers.

On the other hand, Penaeus monodon (Black Tiger shrimp) constitutes a smaller share, typically around 5 – 10%, and is cultivated in more selective or niche farming conditions. Despite its lower volume, Tiger shrimp continues to hold strong value in premium export markets.

In terms of advisability, Vannamei remains the preferred choice for most farmers, especially those looking for consistent and predictable results. However, Tiger shrimp can be a viable alternative in specific conditions – particularly where farmers have experience, lower stocking densities, and access to the right quality seed, such as SPF broodstock.

Jay Jay Group believes that while Vannamei will continue to lead the industry, a gradual and well-managed diversification into Tiger shrimp can add value and resilience to the sector in the long run.

It seems, seed segment is going into the hands of a few companies / hatcheries in India. How do you see shrimp seed production and supply system in the near future?

The observation that the seed segment is gradually consolidating is largely accurate. Over the years, increasing emphasis on quality, biosecurity, and regulatory compliance has naturally led to the emergence of a smaller number of well-organized and professionally managed hatcheries gaining a larger share of the market.

This trend, to some extent, is beneficial for the industry. Larger and more structured hatcheries are often better equipped to invest in

advanced infrastructure, maintain stringent quality control, and adopt improved genetic and biosecurity practices. This can lead to more consistent and reliable seed supply for farmers.

However, it is equally important that the industry remains inclusive. Smaller and mid-sized hatcheries that maintain good practices and deliver quality seed should continue to have a place in the ecosystem. A healthy balance between scale and diversity is essential to ensure resilience in the supply system.

Looking ahead, the shrimp seed production and supply system in India is likely to become more quality-driven, technology-oriented, and regulated. Traceability, genetic improvement, and disease management will play an increasingly important role. Hatcheries that focus on transparency, consistency, and long-term farmer relationships are expected to remain strong and relevant in this evolving landscape.

In your view, what should be the role of hatcheries in aquaculture industry for the benefit and growth of the industry?

Hatcheries play a central and defining role in the aquaculture value chain. Their responsibility extends far beyond the production of seed – they are, in many ways, the starting point that determines the success and sustainability of the entire farming cycle.

For the long-term growth of the industry, hatcheries must position themselves as partners to farmers rather than just suppliers. This involves not only delivering high-quality, disease-free seed, but also providing technical guidance, sharing best practices, and helping farmers adapt to changing environmental and market conditions.

Quality and consistency must remain the core focus. This requires continuous investment in broodstock improvement, biosecurity systems, staff training, and scientific hatchery management practices. At the same time, hatcheries must uphold transparency and accountability, ensuring that farmers have confidence in the seed they are purchasing.

Another important role is promoting sustainability. Responsible hatcheries can influence better farming practices by encouraging optimal stocking densities, disease prevention strategies, and environmentally conscious approaches.

In essence, the future of aquaculture depends on how responsibly hatcheries operate. By acting as knowledge-driven, quality-focused, and farmer-centric institutions, hatcheries can significantly contribute to the stability, growth, and global competitiveness of the industry.

How to check the seed for quality at hatchery level?

Ensuring seed quality at the hatchery level involves a combination of scientific testing, observation, and strict process control. It is not a single-step verification, but a

continuous evaluation carried out throughout the larval rearing cycle.

At a fundamental level, seed quality is assessed through physical observation – active swimming behaviour, uniform size, and proper gut fullness are considered key indicators of healthy post-larvae.

In addition to visual assessment, Jay Jay Group of Hatcheries conducts detailed microscopical and bacteriological tests within its hatcheries to monitor larval health and detect any potential issues at an early stage. These scientific evaluations play a crucial role in maintaining consistency and ensuring the overall quality of the seed.

Stress tests are also performed to evaluate the robustness of the seed and its ability to withstand handling, transport, and environmental changes.

Further, advanced diagnostic methods such as PCR testing are used to screen for major pathogens, ensuring that only disease-free seed is supplied to farmers.

By combining scientific testing with practical experience and strict quality control protocols, Jay Jay Group ensures that the seed produced is healthy, uniform, and reliable helping farmers achieve better performance and reduced risk in their operations.

What are your future plans and targets?

Jay Jay Group of Hatcheries envisions its future growth as a balance between expansion, innovation, and sustainability. Rather than pursuing rapid scale alone, the group's focus remains on strengthening its core – delivering consistent quality and building long-term trust with farmers.

In the coming years, the group aims to further enhance its production capabilities through the adoption of advanced hatchery technologies, improved biosecurity systems, and better broodstock management practices. Strengthening in-house maturation systems and optimizing operational efficiency across all units are also key priorities.

Another important area of focus is diversification. With the reintroduction of SPF Tiger shrimp seed alongside Vannamei, the group plans to support a more balanced and resilient aquaculture ecosystem, catering to both volume-driven and premium market segments.

Jay Jay Group is also gradually expanding its presence in international markets, particularly in the Middle East, catering to countries such as Bahrain, United Arab Emirates, and Lebanon, based on specific requirements. The focus remains on selective expansion while maintaining strict quality standards.

At a broader level, the group aims to position itself not just as a seed producer, but as a knowledge-driven organization that contributes to the overall development of the aquaculture industry. Continuous improvement, responsible growth, and farmer-centric thinking will remain at the core of its future roadmap.

Besides hatcheries, what are your other activities?

In addition to its core hatchery operations, Jay Jay Group has gradually expanded into allied activities that support the broader aquaculture ecosystem. These initiatives are aimed at creating a more integrated approach to shrimp farming, rather than functioning solely as a seed supplier.

The group is involved in aquaculture-related trading and supply of essential inputs required for hatcheries and farms, ensuring that farmers have access to reliable and quality resources. It also actively engages in technical support and guidance, sharing practical insights with farmers to help improve productivity and farm management practices.

Through its associated ventures, such as Jay Jay Aqua Technologies, the group is working towards strengthening its presence in the aquaculture value chain by offering products and solutions tailored to industry needs.

These activities reflect Jay Jay Group's broader vision of contributing holistically to the aquaculture sector – by not only producing quality seed, but also supporting farmers and stakeholders at multiple levels of the industry.

Please mention top 10 Hatcheries producing superior quality and large volume shrimp seed in India?

India has a strong and competitive hatchery sector, with several well-established players contributing significantly to the production of high-quality shrimp seed. Over the years, a number of hatcheries have built a solid reputation based on consistency, biosecurity practices, broodstock quality, and farmer trust.

Rather than identifying specific names, it is important to note that the leading hatcheries in the country are those that maintain strict quality standards, invest in advanced infrastructure, and follow responsible production practices. These hatcheries play a crucial role in supporting the growth and stability of the aquaculture industry.

The sector today is shaped by a mix of large-scale organized players and well-managed mid-sized hatcheries, all of whom contribute to meeting the growing demand for quality seed across the country.

From an industry perspective, continued focus on quality, transparency, and sustainability among all hatcheries will be key to ensuring long-term success and global competitiveness of Indian aquaculture.

What is the advice and message you have to fellow hatcheries, the farming community, and other stakeholders of the industry?

Jay Jay Group of Hatcheries believes that the future of aquaculture lies in collective responsibility and long-term thinking. For an industry that is highly dynamic and sensitive to biological and environmental factors, consistency, discipline, and collaboration are more important than ever.

For fellow hatcheries, the emphasis must always be on quality over quantity. Maintaining strict biosecurity, sourcing reliable broodstock, and ensuring transparency in operations are essential not only for individual success but for the credibility of the industry as a whole.

For the farming community, the focus should be on adopting best management practices, using quality seed, and avoiding shortcuts that may offer short-term gains but lead to long-term risks. Sustainable farming practices, proper pond management, and timely technical guidance can make a significant difference in overall productivity and profitability.

For all stakeholders, including suppliers, technicians, and regulators, a coordinated approach is key. Open communication, knowledge sharing, and a commitment to continuous improvement will help the industry navigate challenges and unlock new opportunities.

Ultimately, the growth of aquaculture depends on trust – between hatcheries and farmers, between producers and markets, and within the ecosystem as a whole. By working together with responsibility and integrity, the industry can continue to grow stronger and more resilient in the years ahead.

Jay Jay Group of Hatcheries team at an occasion

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Hengrun HR Series Extruder

Suitable for all kinds of floating & sinking aquatic feed
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GIFT Tilapia: Powering India's Next Wave of Domestic and Export Growth

S.Thamizhanthi, M.Subashini and S.Felix
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Farm- Reared GIFT Tilapia

Highlights:

The **GIFT Tilapia Processing & Export** initiative presents a transformative model to shift India's tilapia sector from low-value, whole-fish marketing to high-value,export-oriented processing. Despite the species' strong production potential, over 99% of tilapia in India is sold unprocessed, which limits farmer income and globalcompetitiveness.In essence, this model repositions GIFT tilapia as a premium, export-ready protein, unlocking new income streams for farmers, employment opportunities for youth,and a strategic pathway for India's aquaculture export growth.

Introduction

India's aquaculture sector has long been anchored by shrimp exports, yet a quiet transformation is underway with the rise of GIFT tilapia. Despite its proven advantages, tilapia in India is still largely confined to domestic markets, sold mostly as whole fish with minimal value addition. This traditional approach limits profitability and prevents the sector from tapping into lucrative global seafood markets. Moving from a "pond to plate" approach—where fish is processed, packaged, and branded—can significantly elevate the value of India's tilapia industry and position it for export success.

Understanding GIFT Tilapia

GIFT tilapia, derived from selective breeding of Oreochromis niloticus, represents a major advancement in aquaculture genetics. Developed with the support of WorldFish, this strain is known for its rapid growth, improved feed efficiency, and adaptability to diverse farming systems such as ponds, cages, and biofloc units. These characteristics make it particularly suitable for commercial-scale farming and export-oriented production. Its firm flesh and mild flavor also align well with international consumer preferences, especially in fillet form.

The Indian Context

In India, tilapia production has expanded steadily over the past decade, particularly in southern states. However, the market structure remains underdeveloped. Most farmers sell their produce as fresh whole fish in local markets, often at fluctuating prices that do not reflect the species' true economic potential. The absence of a robust processing ecosystem, coupled with limited cold chain infrastructure, has constrained the industry's growth. In contrast, countries such as China and Indonesia have built strong processing and export systems, allowing them to dominate global tilapia trade.

Skinless-GIFT Tilapia Fish in the market

Panel Discussion
Experts - Farmers Interaction Meet

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Invitation

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Skinless GIFT tilapia Preparation in a processing plant

Global Demand and Market Dynamics

International demand for tilapia is driven primarily by convenience and quality. Consumers in major importing regions such as the United States, Europe, and the Middle East prefer ready-to-cook or ready-to-eat formats, including skinless boneless fillets and frozen value-added products. The global tilapia market continues to expand, with processed products accounting for a significant share of trade. For India, this presents a clear opportunity to move beyond raw fish exports and enter higher-value segments. With competitive production costs and a growing aquaculture base, the country is well positioned to capture a share of this expanding market.

Processing: The Game Changer

Processing is the critical link that connects farm production to global markets. By converting whole fish into fillets, frozen portions, or ready-to-eat products, the value of tilapia can increase multiple times. Processing also enhances shelf life, ensures food safety, and reduces post-harvest losses. More importantly, it opens access to international markets that demand standardized, high-quality products. A well-developed processing sector can create employment opportunities, particularly in rural areas, while supporting the growth of ancillary industries such as packaging, logistics, and cold storage.

Skinless GIFT Tilapia preparation machines

To fully realize the export potential of GIFT tilapia, significant investments are needed in infrastructure and technology. Modern processing plants equipped with automated filleting lines and compliant with international standards such as HACCP are essential. Equally important is developing an efficient cold chain network to maintain product quality from farm to export destination. Quality assurance systems, including traceability and residue monitoring, must be strengthened to meet stringent import regulations. Organizations such as the Marine Products Export Development Author play a vital role in facilitating export certification, promoting infrastructure development, and supporting market access for Indian seafood products.

Challenges and Strategic Interventions

While the prospects are promising, several challenges must be addressed to unlock the sector's full potential. Fragmented production systems make it difficult to ensure uniform quality and traceability. Farmers often lack awareness of international standards and best practices required for export markets. Inconsistent seed quality and regulatory complexities further complicate the landscape. Addressing these issues requires a coordinated approach involving capacity building, policy support, and industry collaboration. Cluster-based development models that integrate hatcheries, farms, processing units, and export channels can provide a viable pathway for scaling up the industry.

Skinless GIFT Tilapia fillets

The Way Forward

The future of India's tilapia sector lies in its ability to transition from a commodity-based system to a value-driven industry. This transformation will require not only infrastructure investment but also a shift in mindset among stakeholders. Emphasis must be placed on quality, consistency, and branding. Positioning Indian GIFT tilapia as a sustainable and traceable product can enhance its appeal in global markets. Public-private partnerships, research support, and targeted policy interventions will be critical in driving this transition.

Conclusion

The journey from pond to plate encapsulates the broader evolution of India's aquaculture sector. By embracing processing and value addition, GIFT tilapia can emerge as a significant contributor to seafood exports, complementing the country's established shrimp industry. The opportunity is substantial, but it demands strategic action, investment, and collaboration. With the right approach, India can not only meet domestic demand but also establish a strong presence in the global tilapia market, transforming a largely untapped resource into a major economic driver.

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Reusing with Purpose: Sustainable Guppy and Aquatic Plant Culture in a Discarded Fridge

Swarali Pachkudve, Harshvardhan Shetye and Sejal Pachkudave
- Janine M. Benyus, Biomimicry: Innovation Inspired by Nature (1997)
Corresponding author: shetyeharshvardhan31@gmail.com

Highlights:

A novel low-cost aquaculture system using a repurposed refrigerator demonstrates circular resource utilization.

- Integrated plant–fish system ensures natural biofiltration, supporting Guppy fish (Poecilia reticulata) growth and rapid reproduction.
- Low-input design enables fry production within one week with minimal dependence on external aeration and filtration.
- Economically viable and scalable model with added benefits of mosquito larval biocontrol and sustainable household aquaculture.

Figure 1. Preparation of the repurposed refrigerator for aquaculture setup

In a world where everything comes at a cost, starting even a small entrepreneurial project can feel like a challenge. Determined to take a more resourceful and sustainable approach, we decided to experiment with fish farming, starting not with expensive equipment, but with what most would consider trash. What we discard too easily still holds possibilities for function, and perhaps for meaning. This project emerged from such a thought, a small experiment in sustainability that reimagined an object of everyday convenience as a vessel of ecological continuity. Instead of investing in new materials, we chose to culture guppies (*Poecilia reticulata*) and aquatic plants inside an old, unused refrigerator. By creatively reusing discarded materials like broken fridges, pipes, and containers, we not only cut costs but also reduce landfill waste giving forgotten items a second life with real value. What might appear as an act of improvisation was, in effect, a practical inquiry into circular design, an attempt to align resourcefulness with environmental responsibility and economic efficiency.

The choice of a refrigerator was not arbitrary. In conversation with a colleague working in aquaculture research, we were considering durable, low-cost options for a small aquaculture setup. The refrigerator, with its insulated and leak-proof body, seemed well suited to hold water long term. Once cleaned and sealed, it offered both structure and stability. Its existing drainage outlet, originally meant for defrost water, was easily adapted for waste removal, allowing for convenient water changes without disturbing the system. Compartments inside provided natural divisions for fry, simplifying management. These adaptations were simple yet effective; the refrigerator's physical design, once meant for preservation, now served regeneration.

> ***"Sustainability is not about inventing new things, but about discovering new relationships among the things we already have."***
>
> ***- Janine M. Benyus***

From a sustainability perspective, this act of reuse extended beyond function. It questioned how we relate to materials after their initial purpose ends. The plastic and metal body of the fridge, once a symbol of consumption, became a quiet critique of it, a reminder that waste is often a matter of perspective. By transforming a discarded appliance into a productive ecosystem, we demonstrated that ecological thinking can begin at the smallest scale, without the need for elaborate infrastructure. As Davis (1997) notes

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Figure 2. Aquatic plants introduced into the refrigerator-based system

of aquariums, technologies of display always shape the way we perceive nature. Here, that relationship was inverted: instead of displaying nature for consumption, we used technology to sustain it.

We purchased the refrigerator from a local scrap dealer. After thorough cleaning and drying few holes were observed inside the fridge that could potentially cause leakage. To address this, we sealed them using a waterproof sealing material and left it to dry again. We kept the original defrosting outlet pipe open to facilitate easy water changes and waste removal. A small extension pipe was attached to this outlet to direct the outflow efficiently. With these modifications, the fridge was now ready to be filled with the essential materials for setting up the system. The setup followed basic aquaculture principles. The base was layered with red soil mixed with cow dung to provide organic nutrients for plants, topped with washed sand to maintain water clarity. Small gravel pots were placed for rooted species such as *Hydrilla verticillata* (water thyme) and *Ludwigia sedioides* (water mosaic), alongside floating *Nymphaea* (water lily). These plants established a natural filtration network, supporting a stable nitrogen cycle and maintaining water parameters within ideal ranges. Their biological filtration reduced dependency on mechanical aeration or chemical additives, allowing the system to self-balance through microbial and plant activity.

After positioning the plants in the soil, we filled the tank up to 70% of its capacity with water. We then allowed the setup to stabilize for a week to let the plants establish themselves properly. During this period, the water also settled naturally. After one week, we observed significant plant growth, particularly the Mosaic Plants, which began to flower. The rapid growth of the plants within just a week was remarkable. Subsequently, six female and two male guppies were introduced in the tank. The choice of guppies was particularly fitting, as these small, hardy fish are not only known biological controllers of mosquito larvae but also exceptionally adaptable to varying environmental conditions, tolerant of high stocking densities, and prolific livebearers capable of rapid breeding even in confined spaces. Their peaceful nature, low maintenance requirements, and ability to thrive in low-tech systems make them ideal candidates for such integrated, small-scale aquaculture models—adding a quiet layer of both ecological and public health value to the system. All the fish were fully matured, and five of the females were ready to breed at the time of release. Initially, we attempted to feed them with homemade feed purchased from a local aquarium shop, but the fish were reluctant to eat it. We then switched to an online-sourced "Spirulina Fish Feed," which proved to be highly suitable and readily accepted by the fish. We feed them twice a day, which is sufficient since the tank also contains natural food sources such as algae. Care was taken to avoid overfeeding, which can lead to nitrogen buildup.

We initiated this trial during the monsoon season, a period naturally conducive to breeding in many tropical fish species, including guppies. Although the setup was indoors, the prevailing environmental conditions, moderate temperatures, high humidity, and frequent rainfall, served as indirect seasonal cues, aligning with the species' innate reproductive rhythms. The presence of dense aquatic vegetation further simulated natural habitats, providing shelter and microhabitats that promote breeding activity. Alongside this, careful maintenance of water quality, regular weekly exchanges, removal of decaying plant matter, and stable temperatures between 24–28 °C, created an optimal environment for reproduction. Within a week, 10–12 fry (guppy offsprings) were

Figure 3. Established system with growing aquatic vegetation and guppies (Poecilia reticulata)

observed in the tank. These were fed the same feed as the adults but finely crushed into smaller particles to facilitate consumption. The females have been giving birth regularly, and since the first observation of fry, the total number of offsprings has grown beyond count.

From an economic standpoint, the refrigerator-based guppy system demonstrates how sustainability and efficiency can converge through reuse and minimal investment. The total expenditure amounted to approximately ₹1,400, covering only the cost of the refrigerator, minor sealing work, aquatic plants, and broodstock, as other materials such as soil, sand, cow dung, gravel, and pots were freely sourced from the surroundings. Based on current observations, with six breeding females and two males, each female is expected to produce around twenty fry per brood, completing roughly three broods within a three-month cycle. This would yield an estimated 360 fry, of which about 70 % (≈250 juveniles) are anticipated to survive to saleable size. At a conservative price of ₹10 per fish, the projected gross return would be around ₹2,500 against an operating cost of roughly ₹900 for feed and routine maintenance, resulting in a notional net profit of about ₹1,600 per cycle. The culture is still ongoing, and these figures represent expected values intended to illustrate the economic efficiency of such a system, showing how minimal capital investment, combined with resource reuse and ecological design, can produce a viable, low-input aquaculture model even at the household scale.

The result was not merely a functioning aquarium but a compact, self-sustaining ecosystem, one that embodied the principles of low-input, circular aquaculture. Each component, substrate, plants, fish, and repurposed structure, contributed to a closed-loop cycle. The refrigerator, in this new role, illustrated that sustainability can be achieved not through constant innovation, but through reinterpretation. As Deleuze and Guattari (1987) might describe, such systems function as "machines of relation," where meaning and matter converge through interaction. Viewed within the broader context of aquaculture development, this design aligns with emerging sustainable paradigms that emphasize efficient resource use, environmental integration, and waste minimization, principles central to FAO's Blue Transformation vision. Beyond its ecological and economic merits, this system also offers a subtle contribution to public health. Guppies are known biological control agents of mosquito larvae, thereby indirectly reducing the potential breeding of vectors responsible for diseases such as dengue and malaria. In that sense, the system represents not only a small model of sustainable aquaculture but also a demonstration of how integrated biological processes can support environmental hygiene and community well-being. By reusing a discarded appliance to support aquatic life, the project situates itself within this movement, offering a practical, small-scale demonstration of what circular aquaculture can look like in practice.

In the end, the refrigerator stands as both a metaphor and a method: a reminder that innovation is not always the creation of the new, but the rethinking of the existing. What was once a vessel of consumption now supports life in quiet continuity, a small but tangible example of how sustainability begins not with technology, but with perspective.

NOTES:

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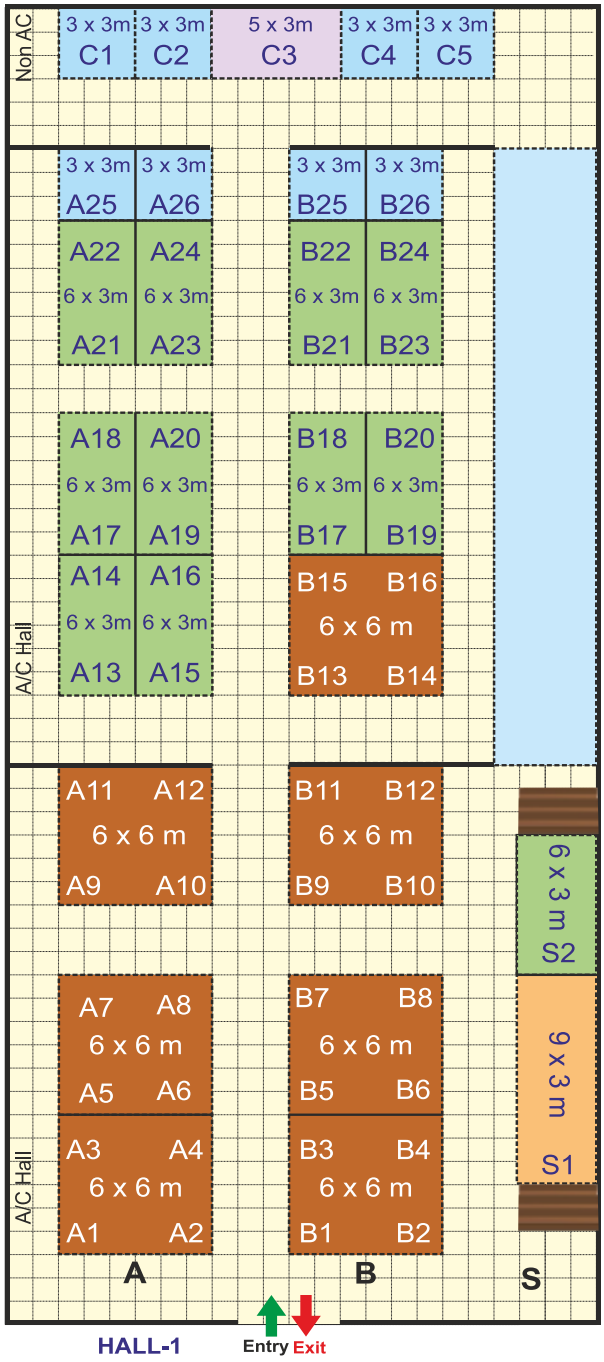

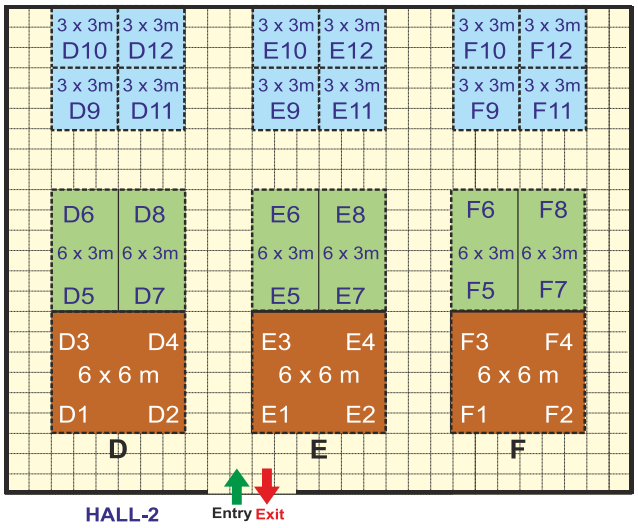

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Seahorse

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Highlights:

Seahorses belong to the genus *Hippocampus* with **41 species globally**, including **7 species in India** and **6 in Tamil Nadu**.

They exhibit **unique morphology**, including an upright posture, bony plates instead of scales, and a **prehensile tail**.

Seahorses have a **distinct reproductive system** where the **male carries and incubates eggs** in a brood pouch.

They play a major role as **flagship species for marine conservation**, highlighting issues like bycatch and habitat destruction.

Tamil Nadu is a hotspot for seahorse fisheries, especially in Ramanathapuram and Rameswaram regions.

Major threats include **non-selective fishing methods (trawling, drag nets), illegal trade, and habitat loss**.

Conservation measures include **legal protection under the Wildlife Protection Act and IUCN listing**, along with the need for **sustainable aquaculture and better fishery management**.

Introduction:

Seahorses, widely recognized as a unique genus among aquatic species, are exploited globally for traditional medicine, the aquarium trade, and the curio industry (1). They are considered flagship species for several marine conservation issues, including overexploitation, incidental bycatch, and habitat loss (2). Seahorses are teleost fishes belonging to the family *Syngnathidae* under the genus *Hippocampus*, with 41 species currently recognized worldwide. From this they are 7 species (*Hippocampus kuda, H. trimaculatus, H. spinosissimus, H. histrix, H. kelloggi, H. mohnikei and H. camelopardalis*) distributed in India and 6 species (*Hippocampus kuda, H. trimaculatus, H. spinosissimus, H. histrix, H. kelloggi, H. mohnikei*) in Tamil Nadu (15). Due to this unique body morphology, with horse shaped head, large eyes, cusvaceous tank and prehensile tail has made hem icon for the issue such as overfishing by catch or habitat destruction (3).

Morphology:

The body shape of seahorse resembles the head & necks because of their curved trunk vertically bend head & long snort (9). Unlike many other fish, seahorses are oriented in an upright position with a horse like head set at right angle to the body. Along the seahorse body, scales have been replaced by rectangular bony plates forming rings that encase the body in a semi-rigid skeleton. Brood pouch located on the male's ventral side that is used for reproduction is otherwise known as brood chamber (4). Unlike other animals, Seahorse has peculiar square prism shaped tail (5). This is due to the tail composed of sub dermal bony plates arrangement in articulating ring, which is the segments that overlap for controlled venstal bending & twisting (6). The Syngnathide fishes have a peculiar morphology of elongated snout, small hybrid, immobile pectoral girdle for pivot feeding (7).

Food and feeding:

Seahorse eats varied diet dominated by amphipods, decapods and mysids (2). They are slow swimmers yet capture evasive prey (copepods) using a technique known as the pivot feeding which involves rapid movement to overcome prey to escape capabilities (8). These are visually guided feeds that rely on a well-developed visual system and the tropical seahorse species has higher visual resolution compared to the species of temperature seahorses (4).

Breeding:

The seahorses attain its first maturity and starts breeding at an age of six months to one year (14). Seahorses show peculiar breeding behavior in that the male become pregnant, incubating the young in a brood pouch. Most seahorse species appeared to be monogamous within a single breeding cycle, the male accepting the eggs from only one female (2). Duration of the male pregnancy rang from approximately 9-45 days depending on species and water temperature (2). Males of most seahorse species produced about 100-300 young per pregnancy with a range of 5 to 2000 young per reproductive cycle (2). The new born size ranges from approximately 2-20 mm and reaches maturity within 4 months to 1 year (2). During the birth, the male frequently bend the body and flexed the tail forcing the juvenile to leave the brood pouch (10). The body contractions continued for 1-2hr and persisted even after juvenile birth. Immediately after leaving brood pouch, the juvenile swam directly to the water surface. No parental care was observed after juvenile birth and some male were ready to remate in the days after (10).

Seahorse reasources in india:

In India, Tamil Nadu is the Hotspot for seahorse fisheries. In Tamil Nadu, traditional hotspots for seahorse

fisheries in Ramanathapuram district (encompassing the central region, Rameswaram peninsula and part of southern region) persist with on-going capture and illegal trade to large number of seahorse (11). Five species of seahorse traded along the Tamil Naducoast viz. *Hippocampus histrix, H. kuda, H. trimaculatus, H. spinosissimus, H. kelloggi* (11). The maximum catch occurs in the central region followed by the Rameswaram peninsula and southern region (11).

Trade for seahorse:

Sea horses are mainly traded for export as traditional medicines, curios and aquarium fish (12). Between 2015 & 2017, fisheries and trade surveys were conducted along the south-east coast of India, in the state of Tamil Nadu historically known the hub for seahorse catches & trade (11). Fisheries reposted a decreasing availability of seahorses. Although seahorse capture had been banned, their bycatch has been not stopped yet, this decline in the population (11). There need to be shift in the management approach, moving from ban towards spatial and temporal restrictions and towards enforcing existing fishery regulations (11).

Threats:

Direct or indirect fishing can affect seahorse individuals, populations and species in a variety of ways. For example, field sampling showed that trawls that obtained *Hippocampus erectus* had the potential to injure or kill individuals, disrupt social structure by selectively capturing females, reduce reproduction by disrupting pair bonds, affect cohorts differentially and damage habitat by removing seagrasses (16). The majority of the seahorse caught in Tamil Nadu came from two non-selective fishing gears: trawls and drag nets. The trawls are used in the Rameshwaram peninsula and drag nets are use in central region of Ramanathapuram. Although exclusive, large-scale mechanised fisheries for seahorses do not exist, incidental by-catch from shrimp trawling and other forms of net fishing is an important contributor to the seahorse exploitation (17).

CONSERVATION:

All the seahorse species are listed under schedule 1 of India's wild life protection act, making all capture and trade of seahorse illegal in the more than 75 years since the ban, little work has been done to assess its effect on seahorse conservation. Among the seahorse species reported from India *H. spinosissimus*, *H. kuda* and *H. trimaculatus* are listed as vulnerable under IUCN Red List of Threatened species (IUCN, 2006) (17). Seahorses (all syngnathids) were included on the prohibited list of fishes as per Notification S.O.665 (E) of the Ministry of Environment and Forest, 2001 (17).

Conclusion:

Seahorses serve as flagship species for promoting mangrove conservation and reducing the impacts of trawling fisheries. There is a strong need to improve understanding and management of populations of heavily traded seahorse species, along with continuous monitoring of their vulnerability to emerging pollutants and climate change. Sustainable seahorse aquaculture can play a vital role in conservation efforts, while also supporting the development of reliable traceability tools to combat the illegal trade of these highly valued organisms (13).

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