Lead Article

India's first mussel hatchery established by ICAR-CMFRI under the Pradhan Mantri Matsya Sampada Yojana

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The Pradhan Mantri Matsya Sampada Yojana (PMMSY) project titled 'Development of Pilot-Scale Open-Sea Eco-Mussel Farms in India – A Blue Growth Project', with a total sanctioned fund of ₹152 lakhs, represents an important step towards strengthening sustainable aquaculture and promoting the blue economy in India. The main objective of the project was to develop pilot-scale open-sea mussel farming systems supported by hatchery-produced seed, thereby increasing production, improving value addition and supply chains thus creating livelihood opportunities, and thereby reducing fishing pressure on this important mollusc in their wild habitats. Under this initiative, the ICAR-Central Marine Fisheries Research Institute established a mussel hatchery at Vizhinjam during 2025–26. Although primarily designed for mussel seed production, the facility has been developed as a multi-species hatchery capable of producing seed of green mussel (*Perna viridis*), brown mussel (*Perna indica*), edible oyster (*Crassostrea madrasensis*), pearl oyster (*Pinctada fucata*) and clam (*Paphia malabarica*). A notable achievement is the successful hatchery production of Asian green mussel and Indian brown mussel, which has not been realised earlier at this scale. This addresses a major constraint in bivalve farming, namely the dependence on seasonal and location-specific wild seed availability.

The hatchery is supported by a well-planned infrastructure covering all stages of seed production. The laboratory is equipped for routine as well as advanced operations, including strip spawning of oysters, induced spawning, and scope for future work such as ploidy manipulation. A dedicated broodstock conditioning facility has been developed with separate tanks for mussels, oysters

and clams. These systems can be operated under recirculating aquaculture system (RAS) or controlled flow-through mode, with provision for continuous feeding using mixed microalgal cultures. Temperature regulation is ensured through an integrated chiller system, which is critical for maturation and spawning.

A key component of the hatchery is the photobioreactor-based microalgal production unit for large-scale culture of feed organisms such as *Isochrysis, Nannochloropsis, Chaetoceros, Pavlova, Dicrateria* and *Tetraselmis*. These algae are provided at different larval stages, either individually or in combination, depending on size and nutritional requirements. Another significant achievement was the expansion of the photobioreactor system, which increased the microalgal production capacity to more than 1,500 litres per day, ensuring a reliable supply of live feed for hatchery operations. This system ensures reliable feed availability and supports continuous larval rearing and spat production.

Photobioreactor based microalgae production

Laboratory set-up in the hatchery

Broodstock facility

Larval rearing section in the hatchery

Seawater filtration facilities

Larval rearing is carried out in multiple systems, including 2-tonne and 5-tonne FRP tanks for static rearing and cylindro-conical tanks for higher-density culture under flow-through conditions. Additional tanks are available for the production of shell-attached spat in edible oysters. Micronursery systems with upwelling and downwelling designs have also been established for efficient spat rearing and conditioning.

Seawater quality management has been given due importance. The system includes provision for chlorination (or ozonation), followed by dechlorination, foam fractionation, cartridge filtration and UV treatment before use in rearing systems. This multi-stage treatment ensures a stable and contamination-free environment for larval development.

Seed Production and Field Application

During its initial phase of operation, the hatchery produced approximately 15 million clam seeds, 1.4 million mussel seeds and 0.1 million oyster seeds. These have been distributed to stakeholders, particularly in Maharashtra, supporting farming activities and strengthening seed availability. The seed production during the last quarter of 2025 is summarised below:

Species	D-shape larvae produced	Spat produced	Utilization
Green mussel (*Perna viridis*)	3.7 million	1.2 million	Transferred to nursery and supplied to farmers
Brown mussel (*Perna indica*)	1 million	0.2 million	Used for farming after nursery rearing
Clam (*Paphia malabarica*)	30 million	15 million	10 million used for ranching in Ashtamudi
Oyster (*C. madrasensis*)	0.6 million	0.1 million	Supplied to farmers

As part of resource enhancement, 10 million hatchery-produced clam seeds were ranched in Ashtamudi Lake at the request of Department of fisheries, Govt. of Kerala, following encouraging results from earlier releases. Fishermen have reported noticeable improvements in the fishery, indicating the effectiveness of hatchery-based interventions.

Down-weller Room with clam spat in silos

Clam fishermen participating in the clam ranching programme in Ashtamudi Lake

Distribution of the clam spat for ranching in Ashtamudi Lake, Kollam, Kerala by Dr. K. K. Appukuttan (Retd.) Former Head of Molluscan Fisheries Division in ICAR-CMFRI

Packed yellow-foot clam spat

Field Technology and Innovations

A galvanised iron (GI) raft suitable for semi-protected marine environments was designed and deployed at Thankassery Bay, Kollam. A major bottleneck in open-sea mussel farming has been the availability of suitable floats. Under this project, mussel floats were developed indigenously, reducing dependence on imports and lowering the cost of farming systems. Using these floats, longline farming trials have been initiated, including at Kanyakumari, demonstrating the feasibility of open-sea mussel farming under Indian conditions.

Mussel raft at Thankassery Bay, Kollam

Mussel harvest from raft

Long line fabrication with indigenously developed floats

Tying of the seeded branch lines on the mussel long line unit

Mussel Long line deployed at Kanyakumari

Stakeholder engagements and visits

The progress of the project has been reviewed by senior officials from the Government of India and allied agencies. Neethu Prasad, Joint Secretary, Department of Fisheries, Government of India, along with Bijay Kumar Behera, CEO, National Fisheries Development Board, visited the Vizhinjam Regional Centre and reviewed the hatchery and associated facilities. The team appreciated the progress and the potential for wider adoption.

Ms. Neethu Prasad, Joint Secretary, Dept. of Fisheries, Govt. of India visited the hatchery

Ms. Chelsasini V., Director of Fisheries, Govt. of Kerala, visited the hatchery

At the state level, Smt. Chelsasini V., Director of Fisheries, Government of Kerala, along with other officials, visited the hatchery to discuss the development of similar facilities at Kannur. Discussions also included the possibility of establishing a bivalve depuration unit in Kasaragod district with technical support from ICAR-CMFRI, which would help improve product quality and market value. Shri George Kurian, Hon' Minister of State for Fisheries, Government of India, also visited the facility and reviewed the progress of the project.

Shri George Kurian, Hon'ble Minister of State for Fisheries, Government of India, during his visit to the hatchery.

Future Prospects

Beyond seed production, the hatchery provides a platform for advanced work such as the development of triploid and tetraploid oysters, which can improve growth performance and yield. The combination of hatchery-based seed production, field nursery systems and open-sea farming technologies represents a significant step towards establishing a reliable and scalable bivalve aquaculture sector in India. With continued support and field validation, this approach can contribute substantially to coastal livelihoods, resource sustainability and the overall growth of the blue economy.

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