

Aquaculture Spectrum

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Improved nursery rearing method for Asian seabass fingerlings as an additional income generation activity

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Farming of commercially important brackishwater and marine finfish is steadily growing due to the increasing demand for high value fish in domestic and export markets. Increased awareness among the consumers about proven health benefits on consuming marine finfish also lead to higher level consumption and demand. Hence, marine finfish culture in open seas, backwaters and lagoons is one of the fastest

growing sub-sectors of aquaculture in the world. India is bestowed with a vast coastline of 8,118 km with an Exclusive Economic Zone (EEZ) of 2.02 million km². The marine capture fishery is dominated by the socio-economically backward small-scale fishers living near the seashore. Stocks of high valued marine finfish are declining due to over-exploitation or environmental degradation. Hence, to increase the fish production and





Asian Seabass – *Lates calcarifer*

to support the livelihood of the fishermen living in the coastal areas, marine and brackishwater fish farming is taken up as an important activity.

Breeding and seed production technologies for various commercially important finfish have been standardized by the ICAR institutes including CIBA and CMFRI. The most common cultivable candidate species of marine finfishes includes the Asian seabass (*Lates calcarifer*), milkfish (*Chanos chanos*), grey mullet (*Mugil cephalus*), groupers (*Epinephelus* spp.), cobia (*Rachycentron canadum*), carangids; silver pompano (*Trachinotus blochii*) and Indian pompano (*T. mookalee*), snappers (*Lutjanus* spp.), rabbit fish (*Siganus* spp.) and sea breams (*Lethrinus* spp., *Sparus* spp.). Commercial scale seed production of many high value marine finfishes is technology oriented and expensive due to the high costs involved in the establishment of hatchery facilities. Further, it also involves complicated larval rearing process involving culture of high-quality live feeds, their nutritional enrichment, feeding protocols, grading, water quality management, nursery rearing and health management. Similarly, nursery rearing is another phase in the seed rearing process, through which stockable size fingerlings for cage or pond culture are produced which increases the survival rate in the grow-out phase and reduces the culture period.

Commercially important Asian seabass culture is one of the most practiced and profitable sector of fish farming in the brackish and marine waters. It has good flesh texture, taste, high market value and demand. Due to euryhaline nature, seabass can be reared both in freshwater and saltwater conditions.

Asian seabass grows rapidly up to 1.2 to 1.5 kg size within a culture period of 12 months in freshwater and brackishwater environments. It is a carnivorous fish and highly cannibalistic in nature and attack the smaller size fishes leading to low survival rate in the farming

systems. Hence, stocking of uniform size fingerlings in the cage or pond-based culture systems and periodic grading is essential to get better growth and survival. However, the hatcheries supply seabass seeds of 1.0 to 1.5 cm size, which is too small for stocking in the growout systems. Rearing them for few more months with continuous feeding and periodic grading will ensure the supply of desired size fingerlings of 10.0 to 15.0 cm size for grow-out farming. Nursery rearing of sea bass fry can be carried out in three different systems; 1) FRP/ cement tank-based systems, 2) in earthen/ HDPE sheet lined ponds 3) happas installed in backwaters/lagoons.

Nursery rearing in FRP/ cement tank-based systems

Nursery rearing of seabass fry can be undertaken in indoor FRP/cement tanks with adequate aeration and water exchange. Seabass fry can be stocked around 1000 – 1500 numbers/m³. After proper quarantine, the fish fry has to be acclimatized and stocked in the tanks. Formulated slow sinking / floating pellet feed of appropriate size has to be used for feeding at least 3 times/day. Fecal matter and uneaten feed settled in the bottom has to be siphoned out at periodic intervals. Optimal water quality parameters have to be maintained through appropriate water change and aeration.

Nursery rearing in earthen/ HDPE sheet lined ponds

Nursery rearing of Asian seabass fry can be done in the culture site itself in small ponds. For easy management most preferred size is 200 - 500 m² ponds with water holding at least 70 - 80 cm. Ponds should have provision of inlet and outlet fitted with small mesh net. Ponds are well prepared and predators and pests are eradicated. After filling water to a depth of 40 - 50 cm,

fertilization is carried out with Ammonium sulphate, Urea and Super phosphate or raw cow dung to grow phytoplankton and zooplankton, at least two weeks prior to stocking. When the pond water is rich with natural algae growth, freshly hatched Artemia nauplii can be introduced. Seabass fry acclimatized to pond conditions are stocked @ 20 - 30 nos./m². At least 30% water is exchanged daily. Supplementary feeding has to be done with formulated feed four times daily @ 30 % body weight (wet feed) in the 1st week and subsequently reduced gradually to 25%, 20% and 15% daily for the 2nd, 3rd and 4th week respectively. Excess feeding should always be avoided in order to maintain

optimum pond environment. At the end of four weeks of rearing, around 40 - 50% survival can be achieved and the size of the juvenile fish will be 5 - 10 gm in weight.

Nursery rearing in backwaters/ lagoons

Many nursery operators rear seabass fingerlings in the conventional earthen ponds by feeding with low value fishes and shrimps, which is an unsustainable activity. Hence, an improved scientific rearing method was developed by the Fish Culture Division of ICAR

Hapas installed inside the crab fencing



- CIBA for seabass fingerlings in a backwater-based nursery rearing with formulated feed. This technology has been promoted under the Scheduled Caste Sub Plan (SCSP) programme of ICAR - CIBA to create additional livelihood avenues for the rural coastal fisherwomen. Three fisherwomen groups, each consisting 12 members from Kottaikadu Village, Cheyyur Taluk, Chengalpattu District, Tamil Nadu involved in oyster collection activity were trained in the Fish Culture Division Hatchery of ICAR- CIBA Muttukadu Experimental Station. In the backwaters of Kottaikadu Village, a crab fencing of 10-meter width and 60-meter length (mesh size 25mm) was installed by involving fisherwomen Self Help Groups (SHGs). Hapas of 2-meter length x 1.5-meter height x 1-meter width were installed inside the crab fencing and 12,000 numbers of seabass fingerlings of 1.5 - 2.0 cm length and 0.50 - 1.50 grams weight were stocked @300 nos./hapa.



Nursery rearing Hapas and floating PVC cages

The fishes were fed ad libitum twice/thrice a day with formulated nursery rearing feeds as shown in the Table 1.

Length of the fish (cms)	Weight of the fish (Grams)	Feed size (mm)	Crude protein (%)	Crude fat (%)	No. of feeds/day
< 1	<0.5	0.3 - 0.5 Slow sinking	57	15	4
1 - 3	<1.0	0.8 - 1.0 Slow sinking	52	10	4
4 - 6	2.0 - 3.0	1.0 - 1.2 Floating	52	10	3
7 - 9	5.0 - 8.0	1.2 - 1.5 Floating	52	10	3
10 - 12	10.0 - 12.0	1.5 - 1.8 Floating	52	10	3

Table 1 Feeds and Feeding frequencies for Seabass fry and fingerlings

Grading of the seabass fingerlings was done on a weekly basis and after rearing for 48 days, the fishes attained a marketable size of 10.52 cm length and 13.50 grams weight. The average daily growth was 0.24 grams during this period. The Fish Culture Division scientists and staff of ICAR - CIBA extended technology support for site selection, procurement of materials, transportation, acclimatization and stocking of fish fingerlings; onsite training on grading and feeding; health management and marketing. The survival rate of seabass fingerlings was 93.30% and these were sold @ Rs.40/piece. Currently, these fisherwomen are continuing this activity as an additional income generation activity.

Based on the nursery rearing activities taken up in the backwaters, the unit economics of capital and

operational cost per year has been worked out and given below: -

Economics of operation

- Stocking of seabass fingerlings @ 15,000/cycle x 5 cycles (Maximum 60 days/cycle) = 75,000
- Survival @ 80% (4-5-inch size fingerlings) = 60,000
- Sale Price @ Rs.40/fingerling
- Gross Revenue = Rs. 24.0 Lakhs
- Gross Revenue - expenditure: Rs.11.38 Lakhs (25% repayment of capital + 100% of operational expenses)
- Net Profit/year = Rs. 12.62 Lakhs

Sl. No.	Particulars	Cost in Rs. Lakhs
	Capital cost	
1	Cost of Crab fencing 20-meter x 60 meters including net, casuarina poles and installation	1.50
2	Cost of Hapas 2m x 1.5m x 1.0 m - 50 Nos. including materials and installation expenses	1.50
3	AC/DC Air Pump	0.20
4	Grading accessories	0.20
5.	Miscellaneous items	0.10
	Sub Total	3.50
	Recurring cost	
1	Cost of Asian Seabass fingerlings @8/seed (15,000 seeds/cycle x 5 cycles)	6.00
2	Cost of nursery rearing floating pellet feed	3.00
3.	Labour Charges for grading, hapa cleaning etc.,	1.00
4.	Seed Packing & transportation expenses	0.40
5.	Feed supplements, management chemicals etc	0.10
	Sub Total	10.50
	Grand Total	14.00



Seabass fingerlings ready for sales

Fishermen/women self-help groups and individual entrepreneurs can take up this activity to support the growing demand for the pellet feed weaned seabass fingerlings. Similarly, the nursery rearing of seabass can be taken up in a pond-based system by installing catwalk up to middle of the pond and erecting hapas on both the sides of it. By adopting scientific nursery rearing protocols, this activity can be taken up as a profitable business venture.

Assistance from Government of India

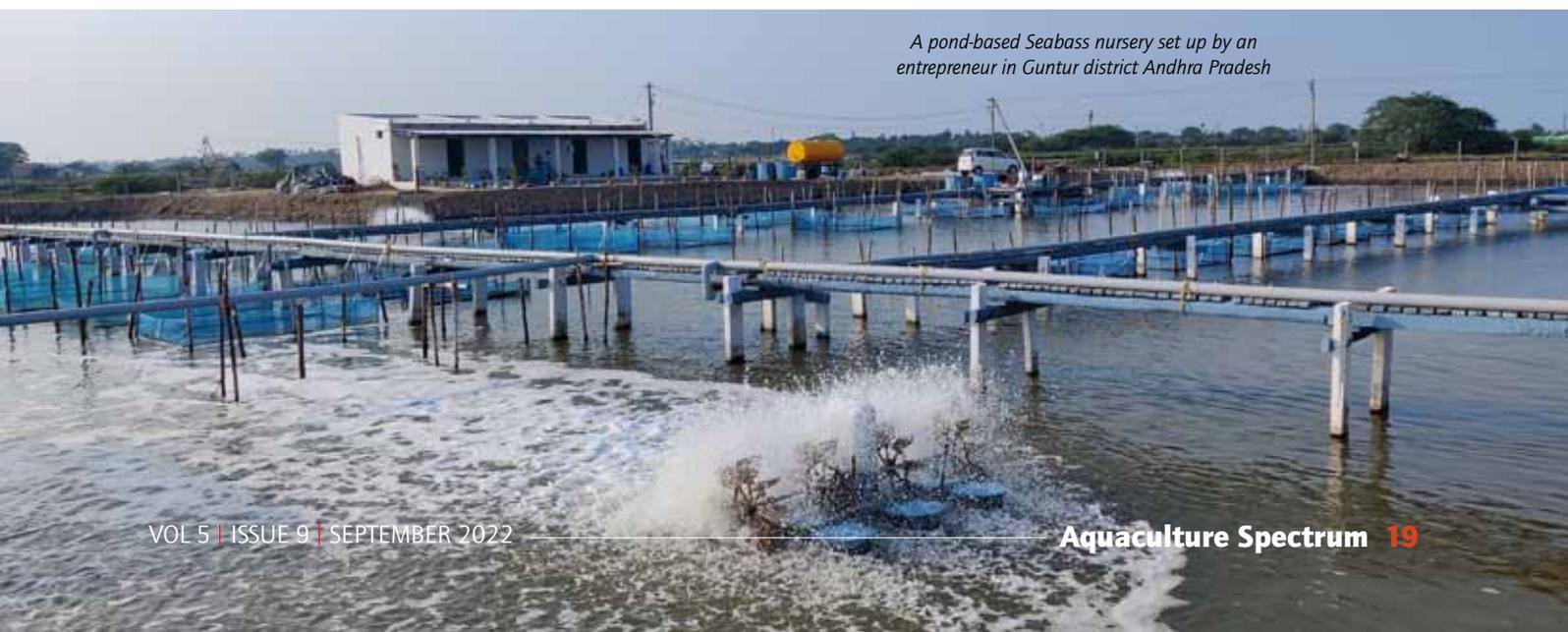
To take up the seabass nursery rearing activity in a higher scale, the Pradhan Mantri Matsya Sampada Yojana (PMMSY) of Department of Fisheries, Government of India supports with subsidy assistance. As per this scheme a marine finfish nursery can be set up at a cost of Rs.15.00 Lakhs with a production capacity of 2 Lakhs fingerlings/ year. Financial assistance in the form of 40% subsidy will be extended to the farmers, fishers and entrepreneurs and 60% subsidy assistance for women and SCST beneficiaries.



Sale of seabass fingerlings for farming

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A pond-based Seabass nursery set up by an entrepreneur in Guntur district Andhra Pradesh