



CAGE MANAGEMENT

Management involves cleaning and maintenance of minor damages to the net, cage frame and other accessories through regular monitoring. Net change is recommended if the net gets clogged due to fouling or when the fish grows bigger. During culture, inner grow-out net with mesh size of 18 mm, 22 mm and 40 mm can be exchanged for better growth and efficient water exchange. Behaviour of the stocked fish has to be observed regularly to act when emergencies occur. In case of occurrence of any disease timely intervention has to be done.

HARVEST

Once the sea bass has attained marketable size (>750g), harvesting can be done. In cage farming, harvesting is simple and less labour intensive compared to harvesting in ponds. Sophisticated harvesting mechanisms are not required in cages. The cage can be towed to a convenient place and harvest can be carried out with less manpower. Harvesting can be done in a single lot or in batches based on demand and market price.

ECONOMICS

The success of open water cage culture has proven by the efficient economic returns it offers to the farmers. The details are given in the following table.

Particulars	Amount(₹)
Capital investment	
Cage frame , Nets, Floats Mooring & Freezer	85,000
Depreciation (20%)	17,000
Interest on FC (12%)	10,200
Annual Fixed cost (A)	27,200
Operational costs	
Licence fee	1,500
Fish Seed (1500 sea bass and 500 pearl spot)	67,500
Hapa	2,000
Feed (Trash fish/ Pellet)6000 kg@₹25/kg and 134 kg pellet feed@₹ 50/kg	1,56,700
Labour 2 hrs/day@₹100 for 7months	42,000
Harvesting and miscellaneous expenses	20,000
Total operational cost (B)	2,89,700
Total cost (A+B)	3,16,900
Production (Kg) (1500 kg seabass & 67 kg pearl spot)	1567
Cost/ kg of fish (₹)	191
Price/ kg of fish (₹)	400
Gross revenue (@₹400/ kg of fish)	6,26,800
Net profit	3,09,900

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CO-CULTURE OF ASIAN SEA BASS AND PEARL SPOT IN OPEN WATER CAGES IN KERALA



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Cage farming involves rearing of fishes in a net cage mounted on a floating frame, installed in an open water body by mooring using anchors/ poles, and other accessories like ropes, buoys etc. with feeding and 24 h water exchange.

1. SITE SELECTION

Selection of suitable site is the most important criteria in cage culture because it determines investment, running cost, final production and the ultimate success of the farming.

1. Cage site should be free from any sources of pollution (industrial, agricultural or domestic)
2. The depth at the site should be minimum 3.5 m to keep the net cages well above the bottom (minimum clearance of 50 cm) and allow water exchange from all sides and bottom of the nets.
3. A minimum flow rate of 0.5m/sec will be ideal.
4. Tidal amplitude from 0.5 to 1.5 m.
5. Water quality parameters such as temperature, salinity, pH, suspended solids and algal blooms influence the growth and survival of the cultured fish.
6. Bottom characteristics also have some role in site selection as sandy and rocky bottom is more ideal than muddy bottom.
7. Weather at the farming site can impact both the cage structure and farmed fishes.

2. CAGE STRUCTURE AND MOORING

Indigenously fabricated Galvanized Iron (GI) cage frames of rectangular/ square dimensions 4 m x 4 m; 6 m x 6 m; 8 m x 4 m or 4 m x 2 m are used for farming Asian sea bass in open waters. Two nets required for a cage culture unit are; one to hold the fish and the other a protection net for the fish during grow-out culture. The nets are of High density polyethylene (HDPE) twisted twine of 1.5 mm thickness with 28-40 mm mesh (outer protection net) and HDPE 1.5 mm twisted 18- 40 mm mesh (inner grow-out net) based on the size of the stocked fish. To protect the fish from the attack of birds a bird protection net of 60 – 80 mm mesh is provided at the top of cage. A ballast pipe frame at the bottom of net cage is provided to maintain the shape of the inner net. Square mesh is recommended for cage nets instead of diagonal mesh to avoid escape and gilling of undersized fishes and also for better water exchange through the nets.

For mooring the cages, poles or anchors are used depending upon the site selected. Mooring is done at opposite sides or at all four sides to keep the cage in place. Mooring is done in such a way that the cages will have only vertical movements during tidal flow. Side wise movement is possible depending on the length of the rope tied between the poles and the cage.

SEEDS

L. calcarifer seeds are available in Rajiv Gandhi Centre for Aquaculture (RGCA) at Sirkali, Tamil Nadu and at Kochi, Kerala and in Central Institute of Brackishwater Aquaculture (ICAR-CIBA), Chennai. Wild collected seeds are also available for farming. Stocking size of the seeds for the grow-out culture in cages should be > 10 cm and smaller seeds require nursery rearing for 30-45 days prior to stocking into cages.



Nursery rearing in hapas in ponds/ cages: Sea bass fry measuring < 10 cm (usually 3-5 cm) are stocked in nylon hapa measuring 2 x 1 x 1.5 m erected either in pond or tied inside the cage. About 2,000-3,000 fry can be raised to fingerling size (> 10cm) in a hapa in 45 days. The fry are fed *ad libitum* with micro particulate high protein nursery feeds or minced shrimp/ fishes 3-4 times a day. Periodic grading (every 4-7 days) is done to sort fishes of varying sizes and stocked in different hapas to prevent cannibalism. Clogging of the hapa has to be taken care to allow free flow of water and remove the waste accumulated in the bottom of the net.

STOCKING IN CAGES & GROW- OUT

In a 4 x 4 x 3 m³ cage 1500 numbers of Asian sea bass *L. calcarifer* and 500 numbers of pearl spot *Etroplus suratensis* (5-6 cm) can be stocked (@30- 35 fish/m³). It is advantageous that both the species grow complimentary without any competition in feeding. Stocking pearl spot would be beneficial in cleaning the net by grazing the algae attached to nets, thereby preventing net clogging. The grow-out period for *L. calcarifer* in open water cages is standardized as 6- 8 months when the fish attains >750 g mean weight. Pellet feeds with high protein (37-40%) or chopped low value fishes can be fed to the stock thrice a day @10% in the first three months. After attaining 100 g, feeding is reduced to 8% and on attaining >600 g it is further reduced to 5% of the biomass. Care should be taken to feed slowly so that each and every fish would get the feed.