

Grow-out farming technology for Indian Pompano in marine floating cage

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Marine cage culture is widely recognized as one of the promising intensive culture methods for finfish. The Indian pompano, *Trachinotus mookalee*, has recently been introduced as part of species diversification approach for enhancing marine fin fish production through mariculture. The species is considered as a suitable candidate species for cage culture because of its amenability to captive breeding, adaptability to different culture conditions, tolerance to wide range of salinity, fast growth rate and high consumer preference. Captive breeding and large-scale seed production technology for the species was standardized under All India Network Project on Mariculture at Visakhapatnam Regional Centre of ICAR-Central Marine Fisheries Research Institute (CMFRI), during the year 2016-17. Following this, marine cage culture technology was also developed, standardized and

demonstrated among fishermen, fisheries societies and small entrepreneurs with financial support from National Fisheries Development Board (NFDB), Government of India under Blue Revolution scheme and Pradhan Mantri Matsya sampada Yojana (PMMSY) in different states. The standard steps involved in cage culture of the species are explained below

Cage site selection

Indian pompano being a tropical species, the selected site should meet the following criteria: Water temperature: 26-30°C, water depth 6-10m, continuous water movement for sufficient dissolved oxygen, away from polluted waters and industry run offs and easy site access, with jetty facilities.

Cage structure

With the objective of better stability against adverse weather conditions in the sea, especially on the north east coast and also to provide congenial environment for the cultured fish, certain specifications are recommended. Circular shaped HDPE cages of 6.0 meter diameter inner collar and 8 meter diameter outer collar pipes are supported by 8.0 numbers of base pipe, vertical and diagonal supports each are to be used. HDPE braided nets are suitable with following specification: Outer nets of 7.0m diameter and 4.0m depth, 40mm mesh of 3.0mm twine thickness; Inner nets of 6.0m diameter and 4.5m depth with 25.0mm mesh. Bird net of 80mm nylon mesh is preferred. The cage structure is stabilized in the sea with the help of mooring systems supported by 2-3 tonnes capacity cement blocks/gabion boxes/ anchor systems with the help of mooring chain (long link alloy steel chain of 14mm diameter with 22 tonnes shearing strength), D-shackles and swivel. Ballast pipes help to maintain the cage structure intact in proper shape against the water movement. In order to provide sufficient space for fish movement, the inner net has to be tied with two ballast pipes at bottom and middle and outer net with single ballast pipe at the bottom.

Nursery rearing

Usually, size of the fish fixed for stocking is 20 to 25g

and it takes nearly 10 months to attain the market size of 750-850 g. However, the culture duration can be reduced if bigger size (up to 100g) fish is stocked. Hence, nursery culture of Indian pompano is considered important for reducing the culture duration. Two types of nursery systems are suitable for Indian pompano with respect to cage culture: Flow-through based FRP or concrete tank culture and Recirculating Aquaculture System (RAS) based nursery systems. Artificial floating pelleted feed with high nutrient (45% Crude Protein & 10% Crude Fat) is recommended in nursery systems. These nursery facilities should be established near cage site for ease of fish transportation and reduce fish mortality while shifting to grow-out cages. The nursery reared fish seeds are transported to cages either in oxygen filled polythene bags or in containers supported with oxygen. The suitable transportation strategy is depending on the distance and size of the fish. The fish size above 10.0 g is recommended to shift via containers supported with pure oxygen (~10 ppm) for better survival after stocking.

Grow-out culture

After reaching the cage site, the transported juveniles should be slowly released for acclimatizing. The optimum stocking density suggested is 25 numbers/m³, and thus, 6 meter cage with 4 meter net depth will have to be stocked with 2500 -2750 numbers of fish seed. Artificial floating pelleted feed with high nutrient (40% Crude



Fig. 1. Cage culture site for Indian Pompano off Visakhapatnam Coast



Fig. 2. Indian pompano nursery rearing in concrete cement tank

Protein & 10% Crude Fat) is recommended in grow out systems. To avoid feed wastage while feeding via meshes of inner cage net, feed mesh (small mesh (1.0mm) net) of 1.0 meter depth should be attached in the inner cage net at water and air interface. For better feed digestion and assimilation, a minimum time gap of 3 to 4 hours should be given between two feeding schedules, thus the feeding frequency should be decided accordingly. In grow out culture, fish growth should be monitored fortnightly and feeding rate to be adjusted based on the weight gain after every sampling. Based on several demonstrations, if the fish fingerlings of 20 to 25g are stocked at 25 numbers per m³, then it takes nearly 10 months to reach the size of 750-850g, whereas if it is stocked at 100g size, it takes 5 to 6 months to reach the same size. The fish growth and optimum feeding rate is given in the Table.1.

Cage maintenance

Cage culture of Indian pompano is at lead for 10 months, and the cage structure should be managed well with net exchange, cage frame cleaning and periodic checking of mooring systems. The cage net is prone to settlement of barnacles, algae and silt accumulation depending on the season and the location of the cages. The net should be exchanged at least once in two months to avoid net damage. Cage frame which is prone to accumulation of barnacles requires monthly cleaning. Cage mooring which keeps the entire cage structure in position and mooring chains requires monitoring at least once in a month. The mooring system specified for the cages will remain without much of a problem for a minimum of two years, and then slowly it starts eroding and may have to be changed.

Table 1. Fish growth and feeding at different growth stages in grow-out

DOC	Fish Size (g)	Feed Size (mm)	Feeding Rate	Frequency (times/day)
0-30	25 -50	1.2 to 1.8	8-7%	4-5
30-120	50-100	1.8 to 3.0	6-5%	4
120-180	100-300	3.0 to 4.0	5-4%	4
180-210	300-500	4.0 to 6.0	4-3%	3
210-300	500-750	6.0 to 7.0	2.5%	3
300-360	750-1100	7 to 10.0	2%	2



Fig. 3. Indian pompano grow-out culture in floating marine HDPE cages

Fish management

The cage cultured fish should be periodically checked for its feeding and health status by fortnightly sampling. Daily observations on feeding behavior, which is a good indicator for the health status of the fish is helpful. The major diseases associated with marine cage fish farming are vibriosis by certain species of *Vibrio* bacteria and parasitic infestations by ecto-parasites. Fish affected by vibriosis, moves to the water surface and its eyes and fins become reddish in colour. In parasitic infestations, visible ulceration appears on the external surface and parasites attached on the body surface can be noticed, which ultimately kills

the fish. Vibriosis in fish is controlled by the use of probiotics and medicated feeds. Parasite infestations can be controlled by freshwater dip treatment or using medicated feed with Praziquantel.

Fish harvest and marketing

While harvesting, the fishes are removed with the help of a hand scoop net from the cages. Immediately after harvest, washing in clean water and chill killing is recommended to maintain the freshness and quality of the harvested fish. Harvested fishes are packed in plastic trays or thermocole boxes by adding layers of ice at the bottom and top of the fish. The cultured fish can be



Fig. 4. Cleaning of cage frames



Fig. 5. Harvest of Indian pompano

harvested based on the demand, and most preferably during the lean fishing or the trawl-ban season. The states like Kerala, West Bengal, Andhra Pradesh, Tamil Nadu, Karnataka, Maharashtra and Goa have good market demand for Pompanos. Some of the selected buyers are Maxwell exporters, Kochi, Kerala; MATSYAFED, Kerala; West Bengal Fisheries Development Corporation, Kolkata, West Bengal.

Economics

The total operational expenditure and profit for culture of the fish in a battery of 10 cages is given in the Table 2. Culturing the fish for 10 months at the stocking of 25/m³ will support the farmer with net profit of approximately ₹16.9 lakhs with an average minimum price realization of ₹325/kg at farm gate. The farm gate price varied with market demand and maximum of ₹380/kg was realized for domestic marketing.

Table 2. Cost and revenue data of cage culture

Head of expenses	Cost ₹ (lakh)
Depreciation value on cage and accessories with an average life of 10 years for cage frame, five years for cage mooring and nets (Cost of cage and accessories including installation: ₹300,000/unit) and depreciation is ₹43,000/unit/year	4.3
Cost of 32,500 numbers of pompano seeds @ ₹20/seed (including nursery rearing expenses)	6.5
Cost of 35.7 t of extruded pelleted feed (Survival 85%; Average Body Weight 750 g at harvest) @ FCR 1:1.70 @ ₹100/kg	35.70
Labour charges @ ₹30,000/ month for 10 months	3.00
Boat hiring and fuel charges @ ₹6000/ month for 10 months	0.60
Charges for net exchange @ 500/person for 3 persons, five times in the production cycle for each cage	0.75
Miscellaneous expenditure feed medicines and probiotics	0.5
Total Expenditure	51.35
Total income	68.25
Production of 21 tonnes @ 85% survival with harvest size of 750g at selling price of ₹325/kg	
Net profit: (Total Income-Total Expenditure)	16.90

Best Management Practices (BMP) for cage culture of Indian pompano

The following important BMP must be implemented while practicing grow-out culture in floating marine cages for better production and economic returns.

Cage should be installed where the water movement is adequate for getting optimum concentration of dissolved oxygen and for washing away the accumulated waste generated from cultured fish

- Fish fingerlings of > 30g should be stocked to obtain maximum survival
- Feed mesh of 1mm mesh size should be attached with inner cage net for avoiding feed wastage
- Inner cage net should be additionally supported with a middle ballast pipe for maintaining the round shape and for avoiding net folding.
- Feed should be broadcasted slowly in cages to ensure that all the fishes get the required feed and for avoiding feed wastage.
- Periodical monitoring of fish, cage net and other cage system is essential.
- Continuous observation for vibriosis and parasitic infestation to ensure the fishes are free from the disease, and immediate treatment of infected fishes.
- Demand based fish harvest is recommended for better profit.