

washing in clean water and chill killing is suggested 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 harvested based on the demand, and most preferably during the lean fishing or the trawl-ban season. The most potential states for marketing the fish are Kerala, West Bengal, Goa, selected pockets in Andhra Pradesh, Tamil Nadu, Karnataka and Maharashtra. Some of the selected buyers are MATSYAFED, Kerala; West Bengal Fisheries Development Corporation, Kolkata.



Economics

The total operational expenditure and profit for culture of the fish in a battery of 10 cages is given in Table 2. Culturing the fish for 10 months at the stocking of 25 nos/m³ will support the farmer with net profit of approximately Rs 16.9 lakhs with price realization of Rs 325/kg.

Sl. no	Head of expenses	Cost (lakhs)
1	Depreciation value on cage and accessories with an average life of 10 years for cage frame, five years for cage mooring and nets (Cost for cage accessories & installation): INR. 300,000/unit) and depreciation is INR 43,000/unit/year	4.3

Sl. no	Head of expenses	Cost (lakhs)
2	Cost of 32,500 numbers of pompano seeds @ INR 20/seed (including nursery rearing expenses)	6.5
3	Cost of 35.7 t of extruded pelleted feed (Survival 85%; Average Body Weight 750 g at harvest) @ FCR 1:1.70 @ INR 100/kg	35.70
4	Labour charges @ INR 30,000/month for 10 months	3.00
5	Boat hiring and fuel charges @ INR 6000/month for 10 months	0.60
6	Charges for net exchange @ Rs.500/person for 3 persons, five times in the production cycle for each cage	0.75
7	Miscellaneous expenditure, feed medicines and probiotics	0.5
8	Expenditure: (Sl no: 1-7)	51.35
9	Total income: Production of 21 tonnes @ 85% survival with harvest size of 750g at selling price of INR 325/kg	68.25
10	Net profit: (9-8)	16.90

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

- Cage should be installed where the water movement is adequate for optimum water quality parameters.
- Fish fingerlings of >25g should be stocked to obtain maximum survival.
- Feed net of 1 mm 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 shape and avoiding net folding.
- 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.

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Introduction

Indian pompano (*Trachinous mookalee*), is considered as a suitable candidate species for cage culture for its excellent culture traits such as quick adaptability to different culture conditions, tolerant to wide range of salinity, fast growth rate, pleasant appearance and high consumer preference. At Visakhapatnam Regional Centre, Central Marine Fisheries Research Institute (CMFRI), under Indian Council of Agriculture Research (ICAR), researchers have succeeded in breeding and sustained seed production for the species. Cage culture technology for the species was subsequently standardized and demonstrated in different parts of the country under Blue Revolution Scheme with financial support from National Fisheries Development Board (NFDB), Government of India. Various steps involved in cage culture of the species are explained in the brochure.

Cage site selection

The selected site should meet the following criteria: water temperature: 26-30°C, water depth 6-10 m, continuous water movement for sufficient dissolved oxygen, away from polluted waters and industry run offs and finally easy accessibility with jetty facilities.

Cage structure

Circular shaped HDPE cages of 6 meter dia inner collar and 8 meter dia outer collar pipes are supported by 8 base, 8 vertical and 8 diagonal supports. HDPE braided nets are suitable with following specification; outer nets of 7 m dia and 4 m depth, 40 mm mesh, 63 ply, 3 mm twine thickness; inner nets of 6 m dia and 4.5 m depth, 25 mm mesh; bird net of 80 mm nylon mesh are preferred. The cage structure is stabilized in the sea with help of mooring systems supported by 2 tonne capacity cement blocks/gabion boxes/anchor systems. The anchors are connected to cage with the help of mooring chain (long link alloy steel chain of 14 mm dia with 22 tonne 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 also outer net with single ballast pipe at the bottom.



Nursery rearing

Optimum size of the fish for stocking in cage is 20 to 25g. Thus, nursery culture is considered as an important aspect in cage culture of the fish for reducing the culture duration. Two types of nursery systems are suitable for Indian pompano with respect to cage culture:

1. Flow-through based FRP or concrete tank culture
2. Recirculating Aquaculture System based nursery systems

The nursery reared fish seeds are transported to cages either in oxygen filled polythene bags or in containers supported with oxygen.



Grow-out culture

The optimum stocking density suggested is 25 nos/m³, and thus, 6 meter cage with 4 meter net depth will have to be stocked with 2500 numbers of fish seed. Artificial floating pelleted feed with high nutrient (40% Crude Protein & 10% Crude Fat) is

recommended in grow out systems. While feeding, feed should be broadcasted in the middle of the cage and to avoid feed wastage, feed mesh net should be attached in the inner cage net. For better feed digestion and assimilation, a minimum time gap of 3 hrs 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, the fish fingerlings stocked at 25g takes nearly 10 months to reach 750-800g in size, whereas fish stocked at 100g takes 5 to 6 months to reach the same size. The fish growth and optimum feeding rate is given in the Table 1.

DOC	Fish Size (g)	Feed Size (mm)	Feeding Rate	FF (times/day)
0-30	25-50	1.2 to 1.8	8%	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

(Note: FF – Feeding frequency)



Cage management

Cage culture of Indian pompano requires minimum of one year for getting marketable size fish, thus the cage structure should be managed well with net exchange, cage frame cleaning and mooring checking.

The cage net is prone to barnacles, algal and silt accumulation and the rate of accumulation is depending on the season and the locations. However, the net should be exchanged at least once in two months to avoid net damage. Cage frame is prone to barnacle's accumulation and thus requires monthly cleaning. Cage mooring helps to keep the entire cage structure in position, thus the mooring chain requires continuous monitoring, at least once in a month. The specified mooring system for the cages will remain without much problem for minimum of two years, and thereafter based on the conditions, the chain needs to be changed.



Fish management

The cage cultured fish should be monitored for feeding and health status during every feeding and also at the time of fortnight sampling. The major diseases associated with cage farmed Indian pompano are vibriosis by selected species of Vibrio bacteria and parasitic infestations by ecto-parasites. Fish affected by vibriosis, exhibits the symptoms of moving on the water surface and eyes, fins become reddish in colour. This could be controlled by the use of probiotics and medicated feeds. In parasitic infestation, a visible ulceration appears on the external surface and also parasitic attachment can be noticed on the body surface. The infestation can be controlled by freshwater dip treatment or using medicated feed with Praziquantel.

Fish harvest and marketing

Harvesting of cage cultured fish is easier than any other culture methods. The fishes are harvested with the help of hand scoop net. Immediately after harvest,