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Farming of Pearlspot Etroplus suratensis in Open Water Cages

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SUMMARY

Pearlspot, Etroplus suratensis, is a high-value, non-tilapia cichlid, locally known as 'Karimeen' indigenous to southern Asia, including peninsular India and Srilanka. It has wide salinity tolerance and the unique feature of nesting and parental care. The ability to tolerate wide salinity ranges and omnivorous feeding habits makes them highly suitable for culture. It also has immense potential as ornamental fish. The culture is mainly done in Kerala, with the involvement of CMFRI. The commercial importance and the local preference led the state government of Kerala to declare pearlspot as the state fish. Pearlspot fetches a very high price as high as Rs.450/ - per Kg in Kerala. It is a delicacy that locals and many tourists prefer, leading to a spur in its aquaculture. The average culture period of Pearlspot is 6 - 8 months, where it grows around 130 – 150 g. CMFRI, Kochi promotes pearlspot culture in that state due to success in seed production and cage culture. Farmers in neighbouring states can harness the demand in Kerala for this prized fish by adopting this fish for culture.

INTRODUCTION

Global demand for fish is increasing year after year. In this regard, a vast gap in fish production foreseen in the future can be attained through aquaculture. Farmers in the country are looking for strategic approaches for improving the production from aquaculture systems. Improved production from aquaculture is planned to create livelihood options for the resource-poor sections of the society, with suitable candidate species such as Etroplus. Pearlspot culture in cages in freshwater systems is a viable option for small water bodies and small landholders. The culture of fishes in enclosures such as pens or cages in open water bodies ensures high production. When adopted judiciously, it can promote parallel enhancement of natural fisheries (Hu and Liu 1997; Welcomme and Bartley 1997). When planned according to local needs and resources, cage culture can be a successful tool for livelihood generation and poverty alleviation (Huchette and Beveridge, 2003).

Food and Feeding habits:

E. suratensis is primarily an omnivore. Diatoms, filamentous algae, higher aquatic plants, rotifers, insect larvae, cladocerans, copepods, other crustaceans, gastropods and detritus are the major dietary components of its diet. The young ones feed exclusively on zooplankton. Advanced fry feed on insect larvae, filamentous algae and other vegetable matters. Adults subsist mainly on filamentous algae, macro vegetation and planktonic organisms. Worms, shrimps and insect larvae also form a part of its food. Once the young reach 19 mm, they feed mainly on zooplankton; as growth progresses, they shift to filamentous algae such as spirogyra and vegetable matter (Alikunhi 1957). Understanding the feed habits would help in success in the culture of pearlspot.

Criteria of species selection for cage culture:

The features of pearlspot making it suitable for cage culture are,

- Omnivore feeding habit
- Hardy in nature
- Efficient food conversion ability
- Fast-growing
- Availability of quality seeds and
- Market demand

Cage Farming:

Cage - 4 types of fish - rearing cages available: i) Fixed cages, ii) Floating cages, iii) Submerged cages, iv) Submersible cages. For pearlspot farming floating cages are desirable. Happa may also be used in large ponds for pearl spot culture.

Happa (10 X 3 X 1 m) installed in pond for pearl spot culture

Cage frames and nets:

Materials commonly used are High-Density Poly Ethylene (HDPE), Galvanized Iron pipes, PVC pipes. HDPE frames are expensive and long-lasting compared to Galvanised Iron frames. Epoxy coated Galvanized Iron frames are cost-effective and recommended for small groups and fishers. Nets of varying dimensions and materials have been tested for cage culture. Braided and twisted HDPE nets are best suitable for the grow-out phase. The ideal depth of the net ranges from 2 – 5m. And 2m diameter HDPE cages can be effectively used for grow-out culture of pearlspot in open waters.

The setting of cages:

Before introducing cage culture into a natural water body, three significant factors must be considered: 1. Water quality 2. Water depth 3. Water current

Water quality – All the water quality parameters like dissolved oxygen, pH, ammonia, free CO_2, different forms of N and P should be within the permissible limit for successful cultured**.**

Water depth – There should be a minimum of 1m of clear water below the cage bottom as protection from the mud and sedimentation. Hence, deeper areas have to be identified for positioning the cages.

Water current – Although cage culture can be carried out successfully in still water, a slight water current of about 10-20 cm/sec is better. This minimum water current ensures a good oxygen supply to the fish and water exchange between inside and outside the cage. The water current is also essential to remove solid wastes from the cage culture unit. According to several researchers, water velocity in cage fish culture shouldn't exceed 40 cm/sec for optimal growth of the fishes. High water velocity is considered disadvantageous for the following reasons,

- A large part of food can be washed away
- The fish waste energy as they need to swim continuously
- The regular shape of the cage is deformed due to the water current

Critical concepts in cage farming:

- Site selection affects both success and sustainability
- Stocking of right-sized juveniles inadequate stocking density
- Proper feeding with quality feeds
- Periodic monitoring and cleaning of cages

Etroplus culture potential in open water cages:

Pearlspot is currently cultured on a small scale, mainly in Kerala. It has been cultured traditionally in Pokkali rice fields. Pearlspot forms about 20% of the total yield from these fields. Farming of this species is also practised in Andhra Pradesh, Tamil Nadu and West Bengal on a small scale. Pearlspot has been demonstrated to be a suitable candidate species for high-density cage culture systems. The attainment of an average size of 127g

in 130 days in open water cages indicates the versatility of pearlspots for cage culture (Padmakumar et al., 2009). The production rate in the cage culture system can be 12 to 50 times that in pond culture, where it attains only 120-130 g in 6 to 8 months (Thampy, 1980). And it can attain 250 g and above in 10-12 months. The high growth rate and biomass gain in open water cage farming are apparently due to the total exclusion of breeding in such enclosure systems. *Etroplus* does not jump, and being very gentle neither damages the cage netting during sampling or harvesting. The laterally compressed body shape prevents the escape from cages and permits a larger mesh size. The larger mesh size of the net provides better water turnover for the cage culture units. Pearlspot has scrubbing behaviour, and they graze on the attached algae and periphyton growing on the cage mesh, indirectly cleaning the mesh apertures effectively. This behaviour of pearlspot reduces the 'fouling' of cage nets and facilitates proper water circulation throughout the culture.

Stocking: Production of fish in cages can be increased with larger initial stocking size and higher stocking density. The general practice is to have an initial stocking size of 30-50 g to achieve a market size of 200-250 g in 6-8 months. Survival rates are not affected by large stocking size (Padmakumar et al., 2009).

Feeding: Feed components primarily consist of locally available ingredients such as groundnut oil cake, rice bran, tapioca, fish meal, boiled mussel meat, cooked rice, vegetable waste, wheat flour, cattle feed, etc. Locally available algae and Commercial pelleted fish feeds can also be used. Feeding is twice daily @ 10% of the biomass. The feed can be dispensed using feeding trays suspended within the cages.

Nutrient requirement of *E. suratensis:*

Nutrient	Quantity
Energy	4000-4500 (Kcal/kg)
Protein	30 – 32%
Lipid	6 – 8%
Carbohydrate	30 – 40%

Harvest: Floating cages can be towed to a convenient place, and full or partial harvest can be carried out based on demand.

Economics of Pearlspot Culture In Coastal Water Cages (Cage dimension: 8x4x4 m^3, Culture period: 6 months) (Source: CMFRI)

Capital Investment	**Amount (Rs)**
1. Cage (Frame, Nets, Floats)	80000
2. Freezer and Accessories	20000
Sub Total	**100000**
3. Depreciation (20%)	20000
4. Interest on FC (12%)	12000
5. Annual Fixed Cost (A)	32000
Operational Costs	**Amount (Rs)**
6. Licence fee	1500
7. Seed (6000 nos @ Rs.5	30000
8. Labour (6000/ month for 6 months)	36000
9. Feed 3600kg @Rs. 50/ Kg	180000
10. Harvesting & Miscellaneous expenses	10000
Total Operational Cost (B)	**257500**
Total Cost (A+B)	**289500**
Returns	**Amount (Rs)**
Production (Kg)	2880
Gross Revenue (@ Rs.150/Kg)	432000
Net Profit	**142500**

CONCLUSION

Given its high attainable production in the cage culture system, Etorplus culture can play a significant role in augmenting the overall fish production in India. Pearlspot enjoys a very high market value in Kerala, and also, there is good demand in other states like Andhra Pradesh, Tamil Nadu, Orissa and West Bengal. Since the investment is low and requires minimal land area, this farming method is ideal for small scale fisher folks as an alternate income source. Economically speaking, cage culture is a low impact farming practice with high returns and the most minor carbon emission activity.

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