CMFRI

Course Manual

Winter School on

Recent Advances in Breeding and Larviculture of Marine Finfish and Shellfish

30.12.2008 -19.1.2009

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COMMERCIAL SEED PRODUCTION AND FARMING OF ASIAN SEABASS LATES CALCARIFER

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Introduction

The seabass *Lates calcarifer* is a marine food fish belongs to family, Centropomidae. This eurihaline fish widely distributed in Indo – Pacific region and abundant much all along the Indian coast. In nature this fish grown to the maximum size of 12 – 14 kg with a TL of 72 – 90 cm and its colour is black at dorsal side and rest of the body is silvery white covered with placoid scales. This fish is highly carnivorous and mainly eats small fishes, crustaceans and mollusks, etc. Though the sexes are separate, the fish initially grown as male upto 4 kg. and subsequently transformed into female and this phenomena is named as "Protrondrus Hermaphroditism" The life cycle of the fish is in two phases i.e., spawning and larval development stages takes place in open sea whereas juveniles, sub adults and adults are in brackish water.

The vernacular name of *L. calcarifer* in English is *Seabass;* Telugu : *Pandukappa;* Malayalam : *Kalanji* ; Tamil : *Koduva;* Bengali : *Betki;* Marathi and Gujarathi : *Jittada.* So far in our country, this fish has been captured in open sea by trawlers and hook and line/gill net in inshore areas and estuaries. This wild caught fish is being sold mainly in domestic market @Rs.120/- kg. and little contribution to export too along with other fin fishes as chilled and fillet form.

Candidate species for Aquaculture

In India so far export is centric to shrimp and scampi aquaculture only. The recent outbreak of the viral disease made impact in aquaculture production of these species. Hence, introduction of diversified species for aquaculture is a need of the hour in our country. Sea bass is the best candidate species for diversified aquaculture due to its suitability in captive breeding, wide tolerance of salinity and also availability of standard techniques for breeding, nursery rearing and grow out culture.

Technology Developed by RGCA

Research and Development wing of Rajiv Gandhi Centre for Aquaculture (RGCA), a arm of MPEDA has developed a suitable and viable technology of its own – **Culture of finfish in cages in ponds first time in India** by using well designed cages with platforms and using extruded pellet feed. The best management practices (BMP) is also established in maintaining water qualities, health management, feed management and bio security measures at farm level.

Hatchery production of asian seabass seed

Sexual Dimorphism: Although the sexes are separate, initially the fish in the size range of 2- 4 kg mature as male and once it attains the size of >4 kg, it convert into female. **Brood stock (male and female):** Can be collected from wild or from fish farms.

A proper quarantine steps to be observed in the hatchery while recruiting wild brood stock into the hatchery system.

Catheterization/Cannular Biopsy: Once fishes are brought into controlled condition, sex determination is done through Catheterization/Cannular Biopsy.

Hormone injection: For induced spawning, hormone (LHRH-a – *Leutinizing hormone Releasing Hormone-Analogue)*

is administered in prescribed doses based on the body weight of the brood stock.

Spawning and fertilization: After the hormone induction, 2 males + 1 female are kept in spawning tanks. After 34-36 hours, eggs are released by female synchronized with the release of milt by males. Fertilization takes place externally.

Hatching: After 12-15 hours from spawning, fertilized eggs hatch out to hatchlings. The hatchlings are collected and stocked in larval rearing tanks after estimating the number by random sampling.

Intensive larval rearing: Larvae are reared in indoor hatchery facilities by providing ambient saline water conditions and feeding with live feeds such as rotifers, Artemia nauplii and biomass.

Weaning: The larvae which are grown on live feed are subsequently weaned to artificial dry diets which are considered as the most critical phase in seed production. During the weaning phase, the fish larvae are grown into baby fish (fish seed). Within 30-35 days the larvae metamorphose to juveniles having size1.5 cm.

- Rearing of seed of 1.5cm to fingerling of > 5cm body length, proper acclimatization is required to be done before stocking.

Methods of Nursery rearing:

Nursery rearing is recommended to conduct in indoor/outdoor cement tanks, small earthen ponds, happas and cages installed in earthen ponds. During nursery rearing, proper preparation of the pond need to be done before stocking seeds in happas/cages which are installed in earthen ponds (applicable only for drainable ponds).

Pond preparation for nursery rearing

Drying: Ponds are to be dried at least for 15 days.

Application of Lime: Liming with burnt lime (CaO) can be done based on the soil pH

Soil pH	Quantity of CaO required (Kg)
<6	900 - 1000
>6-7	700 - 750
>7-7.5	400 - 450
>7.5	150

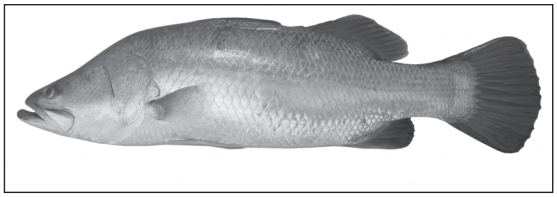
Eradication: Eradication can be done by application of Ammonium Sulphate @ 5 gram/m^2 with 10 gram of Ca $(OH)_2$ in 5 cm water depth.

Manuring: Both inorganic and organic fertilizers can be used and the main purpose is to maintain optimum plankton bloom.

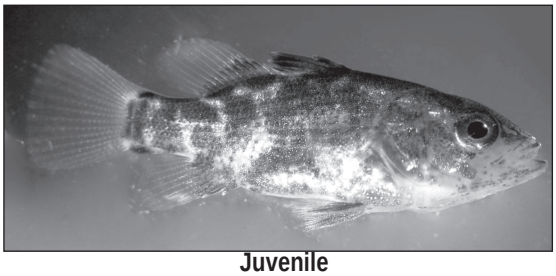
1. Nursery rearing in Indoor/Out door tanks: Cement/FRP tanks of 1 ton to 10 ton capacity with minimum 1 meter water depth can be used for nursery rearing.

Stocking density in a given area/unit: 2200 nos of 1.5 cm larvae/ton of water to start with and end with around 1500 seeds with average size of 5 cm (with continuous aeration to keep optimum oxygen level)

Food and Feeding : 20% of body weight (only dry formulated powdered diet)
Duration : Around 40 days
Water quality Management : Pollution free freshwater or saline water.
Water exchange : Daily 100%
Grading : Once in 7-10 days
Survival : 60%



Broodstock Fish

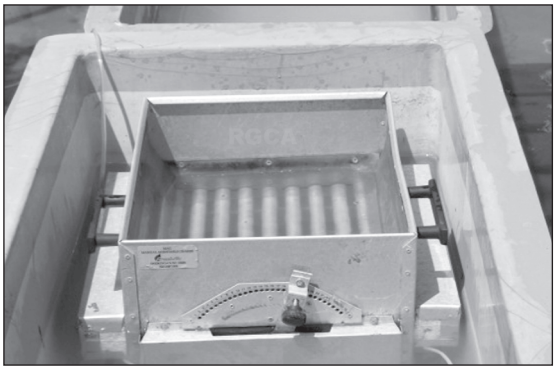


Juvenile

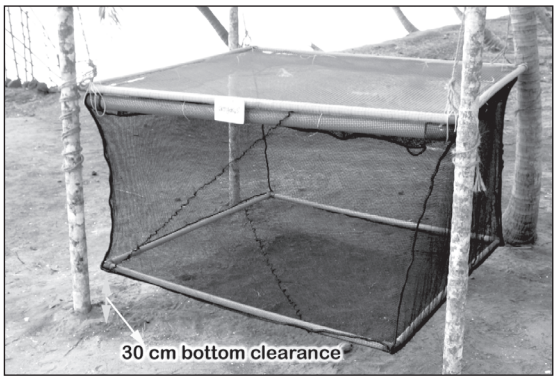
Acclimatization of Seabass seeds

Nylon happas installed in ponds

Acrylic Grader being used for grading



Metallic grader for grading Fingerlings



Typical net cage with top cover

Cage Culture at RGCA Demo.Farm

A view of RGCA Cage Culture Farm

Harvesting of Seabass under Progress

2. In small earthen ponds: Small **drainable** ponds of 50-100 m^2 with 1 meter depth are suitable.

Stocking density	:	200 numbers of fish seed of 1.5 cm size /m^3 without aeration.
Food and Feeding	:	20% of body weight (dry formulated powdered diet) or minced trash fish @ 50% of body weight
Duration	:	Around 30 days
Water quality Management	:	Pollution free fresh water or saline water.
Water exchange	:	Daily 10-20%
Grading	:	Not possible
Survival	:	30 %

3. Nylon happas installed in ponds/creeks:

➢ Nylon happas of 1.0 x 1.0x 1.0 m is suitable.

Minimum water column	**:**	100 cm
Water column in happa	**:**	80 cm
Bottom clearance	**:**	20 cm
Total height of the happa	**:**	100 cm

Size of the fish and corresponding happa mesh size

Total length of fish (cm)	Happa Mesh Size (mm)
1.5	2.5
2.5	4.0
4.0	5.0
5.0	6.0
6.0	8.0
7.0	8.0

Stocking density/Happa

(1 x 1 x 1m) : 500 Nos of fish seed of 1.5 cm to start with and end with 250 fingerlings of 5 cm size while dry formulated feed is used. However, the stocking density should be 250 nos. of fish seed of 1.5 cm to start with while wet feed (minced fish/clam meat etc.) is used.

Food and Feeding : Start with 20% of body weight and end with 8 % of body weight applicable only when dry formulated feed is used. If wet feed is used 50% and 15 % respectively.

Duration : Around 35 days

Water quality : Pollution free fresh water or saline water.

Management
Water exchange : Daily 10-20%

Grading : Once in 7-10 days

Survival : 50 % with formulated diet and <50% with wet feed.

Feeding: For nursery rearing, feed size start with 0.5 mm and end with 1.5 mm based on the mouth size of the larvae.

Grading: Grading is done to avoid cannibalism among Seabass larvae.

Grading is done by using: Nylon nets, or Prefabricated Graders

Grow out culture of Asian seabass

Earthen ponds are preferred to conduct grow out culture either as open pond culture or using cages.

Cage culture in ponds

- Freshwater and brackishwater ponds are used.
- Size of the pond can be 1 acre WSA to 2.5 acre (1 Ha) WSA
- Water column shall be minimum 2 meter
- Clearance between pond bottom and net bottom shall be 30-50 cm
- **Spacing in between adjacent cages**: To begin with 50 cm and end with 2 m
- Minimum size of the fish at the time of stocking: Fingerlings of >5cm

Sl. No.	Particulars	Cages with aeration	Cage without aeration
1	Water quality	Fresh water/Sea water with optimum water quality parameters	Fresh water/Sea water with optimum water quality parameters
2	Water column in cage (m)	2	2
3	Dimension of the cage (m)	2 x 2 x 1.3	2 x 2 x 1.3
4	Stocking density (initial) in biomass/m^3	6 Kg of biomass (each with 7 cm Total length and 5 gram body weight)	3 Kg of biomass (each with 7 cm Total length and 5 gram body weight)
5	Stocking density (end)/m^3	12 Kg of biomass	6 Kg of biomass
6	Feed – extruder pellet feed (% body weight)	Initially 9 and end with 2	Initially 9 and end with 2
7	Food – Wet feed	Not recommended	Not recommended
8	Duration of culture (Days)	180 - 200	180 - 200
9	Water Exchange (%)	10-30 (as per requirement)	20-40 (as per requirement)
10	Grading Frequency (Days)	To start with once in 15 days and end with once in 45 days until the fish attain an average of 200 grams. Later in order to maintain the recommended biomass in each cage, it is necessary to thin out.	To start with once in 15 days and end with once in 45 days until the fish attain an average of 200 grams. Later in order to maintain the recommended biomass in each cage, it is necessary to thin out.
11	Survival (%)	80	70
12	Average size at harvest (grams)	500	500
13	Production recommended/Ha	Stock 11,250 seeds of 7cm size to get a targeted production of 4.5tons/Ha WSA	Stock 3,500 seeds of 7cm size to get a targeted production of 1.2tons/Ha WSA
14	Total no. of cages expected to be stocked in 1 Ha WSA to produce targeted production by adhering the recommended stocking given at Sl. No 5	75 cage	40 cage

Achievement made by RGCA

During 2007,in RGCA Aquaculture Demonstration Farm at Karaikal, U.T.of Puducherry, from 1.0 ha brackish water area around 12.24 t of seabass grown and harvested from 124 cages weighing with an average weight of 650 gm. This produce was given to exporter, processed and exported to EU countries. This achievement was received well appreciation from all over the world.