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Editors
V.N. Pillai and N.G. Menon

Central Marine Fisheries Research Institute
(Indian Council of Agricultural Research)
Tatapuram P.O., Cochin-682 014
Kerala, India

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55 Culture of the sea bass *Lates calcarifer*

R. Marichamy, H. Mohamad Kasim, V. S. Rengaswamy, K.M.S Ameer Hamsa and S. Rajapackiam

ABSTRACT

Studies on the growth of Lates calcarifer cultured in coastal ponds and net cages in the three different places at Tuticorin showed an increase of 16.2-23.2 mm/ 18.6- 53.2 g/ month at Karapad, 21.1-29.8mm/19.3- 36.3 g / month at Veppalodai in coastal ponds and 21.6-32.4 mm/ 31.4-55.0 g / month in a net cage in the Tuticorin Bay. The growth in Karapad pond, where supplementary feed was provided was better than in Veppalodai pond. The highest growth rate was obtained in net cage culture at Tuticorin Bay. Length-frequency analysis of samples from commercial catch reveal a faster growth in the wild than in the culture systems. The better growth in the brackishwater culture and in the wild is attributed to the lower salinity and better live feed availability in brackishwater. In the pond system, the growth can be improved by maintaining proper water exchange so as to maintain the salinity equivalent to open sea/bay/ brackishwaters and by providing supplementary feed.

Introduction

The seabass, *Lates calcarifer* is an economically important food fish as the flesh is delicately flavoured and it grows to a large size. Hence it is also known as the giant perch in the countries of the tropical and subtropical areas of the Western Pacific and Indian oceans. Though the seabass is widely distributed along the coasts of Australia, Thailand, Burma, India, Indonesia, Malaysia, Singapore and Philippines, this does not form a good fishery in many countries. This has prompted the researchers and fish farmers in countries like Thailand, Malaysia and Singapore to culture this species under different culture systems. In India,

this euryhaline and eurythermal species forms a fishery in Chilka Lake and also in Pulicat lake. A wealth of information is available on the biology and ecology of this fish (Jones and Sujansingani, 1954; Jhingran *et al.*, 1963; Jhingran and Natarajan, 1966 ; Patnaik and Jena, 1976). The procurement of breeders, the pattern of growth and reproduction of this species in the wild have also been studied by De (1971), Ghosh (1973), Naidu (1939), Chacko (1956), Pillay (1954), Rao (1964), and Kowati (1977). While earliest studies on the culture methods and growth in different culture practices have been made by Pillay, (1954); Pillay and Bose, (1957); Ghosh, (1971); Jhingran, (1977); Prasadam *et al.* (1984); James and Marichamy, (1987).

Pond culture

Three monoculture experiments were carried out with *Lates calcarifer*, two in ponds and one in net cage. The first experiment was carried out in a coastal pond at Karapad with an area of 0.25 ha and an average depth of 1 m. The pond bottom was mostly muddy and to a limited extent sandy. The seeds were collected from Pazhayakayal backwaters located 25 km south of Tuticorin, at the end of January, 1987 and were stocked at the rate of 1200 seeds / ha on 3rd February, 1987. Suplementary feed was provided in the form of live-feeds like 7,900 numbers weighing 4.4kg of fry of *Liza macrolepis*, 6500 numbers of young ones of *Penaeus indicus* weighing 2.6kg and 350 numbers of *Chanos chanos* weighing 0.2kg along with 350 kg of trashfish and 252 kg of groundnut oil cake. At the time of stocking, the size of *Lates* seed varied from 92 to 150 mm, with an average weight of 18.6 g. The stock was sampled every month for assessing the growth. The gain in length and weight in subsequent months from February onwards indicate a slow growth in length upto 6 months, it was moderate upto 8 months and then it was faster. Similarly, the growth in weight was also slow upto 6 months, thereafter it was much faster till 9th month. The data on the hydrological parameters from the culture sites are given in Table 1.

Table 1. The Hydrological observations made at culture sites.

Sl. No.	Water Qualities	Karapad Coastal pond (Range)	Veppalodai Coastal Pond (Range)	Tuticorin Bay Net Cage (Range)
1.	Water Temperature °C	25.7-30.7	26.5-29.0	26.3-28.5
2.	Salinity ppt.	32.0-46.5	30.2-37.0	31.5-34.9
3.	Oxygen Content ml/1	4.4-5.6	4.0-5.2	4.0-5.5
4.	pH	8.2-8.5	7.2-8.1	7.8-8.2

The monthly growth increment in length and weight are given in Table 2. The increment in length declined from February, 87 onwards and reached the lowest in August and then increased in September and November, whereas there was a marginal increase in weight from February up to August and then the increase in weight was very good reaching a maximum rate of 53.2 g / month. The lower growth increment in length and weight during March to August may be attributed to the higher atmospheric temperature and salinity. In the beginning of Novemeber 87 the experiment suffered a severe setback due to loss of stock by poaching.

Table 2. The trend of growth at different stages observed in coastal pond at Karapad.

Date	Days	Size Range		Growth rate per month	
		Length (mm)	Weight (g)	Length (mm)	Weight (g)
03.02.87	Stock	92-150	10-30	-	-
06.03.87	31	118-165	20-80	22.4	18.7
09.04.87	65	128-182	26-90	18.6	18.6
06.05.87	92	130-195	28-130	16.2	20.6
29.06.87	145	148-242	60-250	15.1	22.3
04.08.87	182	170-260	95-320	14.8	24.2
30.09.87	239	210-305	110-480	17.2	31.2
04.11.87	274	265-465	250-1250	23.2	53.2

The second experiment was carried out in a coastal pond with an area of 0.3 ha at Veppalodai located abount 25 km north of Tuticorin. The

seed were collected at the end of January,94 from Pazhayakayal backwaters and stocked on 3.2.94 at the rate of 1700/ha. Average depth of the pond was 1.25 m and the pond bottom was muddy. At the time of stocking the size range in length was 31-125 mm, with an average of 75.5 mm, and the weight varied from 3.5 to 18 g, with an average of 8 g. Samples were taken in May, June, September and December and the growth rate in length and weight at Veppalodai were similar to that obtained at Karapad pond till the stock attained a size of 250 mm in 8 months. Afterwards, the stock in the coastal pond showed better growth in length and weight. The reason may be that the Veppalodai stock was not raised on supplementary feed, as was done in Karapad. The growth increment data, given in Table 3, showed that the length rate continued to decline in subsequent months from 30 to 21 mm. The weight increment at Veppalodai was not as good as it was at Karapad in the last two months. The stock was harvested on 9.1.95. The survival rate was 41.2% with a production of 300kg / ha. As seed of seabass was not adequately available for stocking, the rate of stocking was far below the optimum. This experiment was aimed to see the suitability of the environment for farming. The rate of production could be easily raised to 2 t with optimum stocking of 5000 seeds / ha in this environment, besides proper farm management such as improving the feeding schedule, regulation of water etc.,

Table 3. The trend of growth at different stages observed in coastal pond at Veppalodai.

Date	Days	Size Range		Growth rate per month	
		Length (mm)	Weight (g)	Length (mm)	Weight (g)
03.02.94	Stock	31-125	3.5-18	-	-
06.05.94	90	114-285	20.0-300	29.8	19.3
30.06.94	150	145-325	30.0-460	24.0	23.1
29.12.94	330	245-415	190.0-880	21.1	35.8
09.01.95	340	245-415	220.0-920	20.8	36.3

Net cage culture

A rectangular net cage of size 5m x 5m x 2m was fabricated with 4 mm HDPE monofilament thread, with stretched mesh size of 20 mm. The cage was suspended in the Tuticorin Bay at a depth of 2.5 m by fastening

to 6 numbers of 7.5m palmyrah poles fixed at the bay bottom. Seed of *Lates calcarifer* measuring 125-180 mm with an average size of 145 mm and weight varying from 18 to 70 g with a mean of 37.3.g were stocked in the cage at the rate of 0.5 seed / m^2. The seed were fed with trash fish such as silverbellies, engraulids and sardines at the rate of 8% of the total weight of the stock. The stock was sampled every month except in October '88 and January '89 and the trend of growth is given in Table 4. The growth data indicate that the growth in length is better here than at Veppalodai and Karapad. The growth increment in length and weight are comparatively better than that obtained in pond culture at Veppalodai and Karapad.

Growth in wild condition

Length frequency data of samples from the commercial landings of Punnakayal during February '96 to January '97 were analysed as per Alagaraja (1984) . The Loo is estimated to be 1241 mm and K. O. 275/yr. Accordingly *Lates* is estimated to attain a size of 292, 514, 631 and 810 mm in 1, 2, 3 and 4 years respectively. This observation is similar to that reported by Kasim and James (1987) from the Chilka lake.

Table4. Trend of growth at different stages observed in cage culture at Tuticorin Bay.

Date	Days	Size Range		Growth rate per month	
		Length (mm)	Weight (g)	Length (mm)	Weight (g)
25.08.88	Stock	125-180	18-70		
24.09.88	30	152-220	42-120	32.4	31.4
05.11.88	72	192-250	80-230	30.5	37.5
23.12.88	120	225-295	150-295	29.3	45.9
06.02.89	165	268-325	250-440	2.61	53.4
23.03.89	210	282-340	270-520	24.0	52.8
02.05.89	250	296-350	305-625	21.6	55.0

Discussion

Though *Lates calcarifer* can be profitably cultured in ponds, net cages and pens, available information on the culture of this species reveals that this species is not subjected to any such organised culture in

this territory. Most of the culture practices in the country are either traditional or sustenance in nature. Information on stocking densities, feeding practices, environmental monitoring and other farm management practices is totally lacking but for a few details on survival and production rate. Pillay (1954) reported that seabass fry that entered the ponds at 2-5 cm size during rainy season, attained a size of about 12.5cm by October-November and grew to a size of 25 cm in the second year, whereas Pillay and Bose (1957) observed a faster growth from 12.9cm in September to 21.5cm in October and 36.4cm in November in paddy fields in West Bengal and this was attributed to the availability of forage fish as food. Similar faster growth was observed by Ghosh (1971) in freshwater pond culture, from a stocking size of 30-205 mm, to an average size of 253 mm in one year. Prior to stocking of the seed, the pond was stocked with several varities of forage fish to serve as food for *Lates*. The present study also reveals that the wild growth of seabass is faster than in both the pond and cage culture systems, being 308 mm in 330 days from 145 mm in the ponds at Veppalodai, 330 mm from 118 mm in 274 days in the ponds at Karapad and 325 mm from 75 mm in just 250 days reared in net cage in Tuticorin Bay. Growth in net cage was much better than the pond-reared *Lates*. This could be possible due to the better water quality in the open bay than in the ponds where the depth and the rate of water exchange depended mainly on the tidal influx.

Jhingran (1977) recorded a gross production of 2759.5kg/ha in 8 months by rearing *Lates* in feeder canals and this was possible because of the surplus natural food organisms like prawn fry and fish brought in by the tidal water. In the present observations, *Lates* fed with prawn fry and fish grew fast in pond and faster in the net cage. Prasadam et al. (1984) while trying to culture the seabass in pen and cage in the lagoon system of Pulicate lake, found that the fingerlings stocked at 142mm/80g in velon cages in September 1983 grew to 164 mm/339g and 208mm/496g in a period of 14 months with survival rate of 50-55% . James and Marichamy (1987) have reported that young *Lates* stocked at an average size of 217mm in March 1983 and reared on supplementary feed of frozen trash fish at 10% of the body weight have grown to 424mm/818g in a period of 16 months. In another experiment the stock released at 285 mm in September 1984 attained 512 mm/953g in 17 months duration and the monthly growth rate varied from 10 to 17 mm and weight increase of 20 to 80 g in these size groups. The growth recorded by other workers on this species in net cages was more or less similar to that observed by James and

Marichamy (1987). The growth in size and weight in the present study was 16.2-23.2mm/18.6-53.2g/month at Karapad, 21.1-29.8mm/19.3-36.3g/month at Veppalodai and 21.6-32.4mm/31.4-55.0g/month in the net cage at Tuticorin. When compared to brackishwater growth rate, present results are lower, since the salinity of the pond remained high, 32.0 to 46.5 ppt at Karapad, 30.2 to 37 ppt at Veppalodai and from 31.5 to 34.9 ppt in Tuticorin Bay. In pond system the growth of *Lates* can be improved by providing a better water exchange that would maintain the salinity equivalent to the bay / open sea and by the supply of fresh trash fish as supplementary feed.

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