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Paper 57

EVALUATION OF CULTURE OF MILK FISH, *CHANOS CHANOS* IN FISH PENS IN A SHALLOW LAGOON AT MANDAPAM, INDIA

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ABSTRACT

Culture of milk fish in net enclosures in the Pillaimadam lagoon near Mandapam is described. Erection of the net enclosure, maintenance, results obtained from culture operations constraints and improvement in the system are discussed. The feasibility of extension of the pen culture to the rural areas is analysed. The results of the trials conducted by the fishermen is also examined.

INTRODUCTION

Milne (1970, 1978) and MΦller (1978) described various type of enclosures for fish culture. Culture of fishes in enclosures is practiced in China, Philippines, Taiwan and other far eastern countries (Delmendo and Gedney 1974, Pillai, 1978). In Phillippines 5,000 ha of fish pens have been established in the Lake Laguna producing 7,000-10,000 tons of milk fish annually (Pillai, 1978). In China about 0.9 million ha, are being used for pen-culture forming about 28% of the potential areas (Tang, 1978). India has about 2.3 million hectres of brackish water area but not even 1% of the potential area is used for fish culture. If we can utilise a small portion of the available lagoons, mud flats and low laying areas for fish culture, our fish production can be increased considerably. Though culture of fishes in net enclosures is practised on large scales in other countries the practise has not been very popular in India. Culture of milkfish in net enclosures

was tried in a lagoon near Mandapam south-east coast of India. *Chanos* was selected for culture as the fry and fingerlings of it were available in the lagoon during April-June. The technology developed, at the Central Marine Fisheries Research Institute during 1981-'86 was imparted to a few fishermen of Valayarvadi village, near Mandapam.

A study of the economics of various methods of culture such as cages, race ways and enclosures show that income derived from enclosures was comparable to other systems (Collins and Delmendo, 1978). It was further suggested that the extensive culture is more suitable when there are highly productive shallow waters, inexpensive labour and lack of moden technology and equipment for manufacturing fish feed.

MATERIAL AND METHODS

Mohan (1983 a, b, c, 1986) has given a detailed account of pens erected in the Pillaimadam lagoon. Palmyra poles of 3 meters length were planted in the lagoon and webbed with 16 mm mesh HDPE net. The webbing was kept firmly in the mud so that it would not get lifted by the strong wind which was prevelent in the lagoon. The head rope of the webbing was held firm to the nails placed at the top of the palmyra poles and the bottom rope was tied to a 3 kg granite stones placed at an interval of 2 m. Pens were monitored daily and the barnacles attached to the webbing and the poles were removed manually (Fig. 1). A canal of 80 m length and 5 m width was made across the sand bar (Fig. 2) to facilitate the flow of water from the sea to lagoon during the summer months when the water level in the lagoon became low and the salinty and temperature rose to 140 ppt and 40°C respectively. Opening of the canal made it possible to culture the fishes during the summer months. As indicated in the Table 1 heavy mortality was observed during summer months before opening of the canal as the lagoon dried.

Fig. 1. Manual removal of Barnacles attached to the webbing and poles

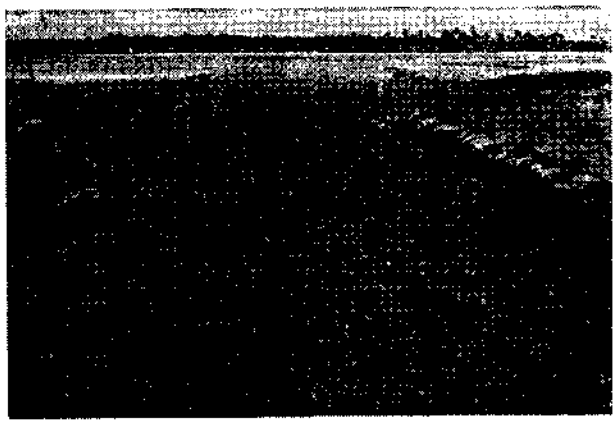

Fig. 2. Artificially made canal across the sand bar for free flow of sea water

RESULTS

Twenty trials were conducted in fish pens during 1981-'86. (Table 1). During the early phase of the trials, from 22-8-1981 to 11-7-1983, before the opening of the canal, the results were not encouraging. A few trails had to be abandoned due to low level of water in lagoon. Some of the trials yielded very low production due to low recovery as a result of drying of the lagoon.

Milk fish was cultured in the lagoon in the fish pens for a period ranging from 110-285 days. The highest production obtained was 455 Kg/ha in 110 days. Salinity during the experiments varied from 26 to 45 ppt and the dissolved oxygen from 4.1 to 5.2ml/l. The stocking size in the

Table-1 *Results of Pen Culture in Pillaimadam Lagoon*

	Area (ha)	Stocking	Harvest	Days	Stocking (number)	Recovery (%)	Stocking Length (mm)	Stocking Weight (g)	Harvest Length (mm)	Harvest Weight (g)	Harvest (Kg)	Remarks
1.	0 06	22-8 81	13-5-82	264	360	1 5	139	20.0	435	520	2.8	Low water
2.	0.06	13-5-82	10 9-82	121	360	3.0	101	7.5	214	66	1,0	,,
3.	0.25	26-6-82	10-9-82	77	2000	0.5	107	10.0	210	74	0.7	,,
4.	0.25	27-6-82	31-8 82	66	1500	0 6	108	9.5	242	103	1.0	,,
5.	0.25	15-7-82	10-9-89	58	1000	nil	146	25,0	—	—	—	,,
6.	0.50	17-8-82	5-10-82	50	635	1 4	185	68.0	236	197	2.0	,,
7.	0.25	18-11-82	31-3-83	134	866	10.1	75	2.0	260	137	11.9	,,
8.	0.50	22-6-83	22-7-83	31	5673	—	113	10.0	—	—	—	Lagoon dried
9.	1.00	29-6-83	11-7-83	13	2593	—	95	4.7	—	—	—	,,
10.	0.50	28-7-83	9-12 83	135	2927	7.8	112	14.2	312	220	50.0	Bar-mouth opened
11.	1.00	6-8-83	9-12-83	126	3698	—	112	14.2	—	—	—	Cyclone damage
12.	0.25	7-3-84	6-4-84	30	1000	—	77	2.9	—	—	—	Low level
13.	0.25	16-3-84	19-10-84	218	2500	13.0	14	1.0	221	80	26.0	Bar-mouth opened
14.	0.25	30-4-84	14-11-84	198	3500	19.0	76	4.0	192	55	37.0	,,
15.	0.25	16-5-84	14 11-84	183	3000	19.6	80	4.5	221	80	59.0	,,
16.	0.50	31-5-84	15-11-84	169	7500	31.1	87	4.6	206	54	133.0	,,
17.	1.00	14-8-84	4-12-84	110	20000	55.0	100	5.0	176	39	455.0	,,
18.	0.50	19-11-84	19-4-85	154	300	62.6	145	18.0	346	289	62.0	,,
19.	0.50	15-5-85	16-11-85	186	4000	51.1	69	2.0	260	136	227.0	,,
20.	1.00	1-7-85	25-3-86	267	10000	21.0	112	11.7	317	213	390.0	,,

trials ranged from 14.0 - 139 mm. It was observed that the recovery was only 13% when the stocking size was 14 mm and period of culture was 187 days. A higher recovery of 55% was obtained when the stocking size was 100 mm and the culture period was 110 days. But the recovery was only 21,%when the period of culture was 268 days with a stocking density 10,000/ha.

Maximum stocking rate tried in the fish pens in the Pillaimadam lagoon was 20,000/ha in a 1 ha pen. Fishes were cultured for a period of 110 days. The stock attained a length of 176 mm weighing 39.5 g from 100 mm weighing 5g. Recovery was 55% for 110 days. The pen yielded 455 kgs of milk fish. But when stocked at a rate of 10,000/ha in a 1 ha pen for 268 days, the fishes grew to 317 mm weighing 213 g from 112 mm weighing 5 g respectively. Recovery was 21% and the yield was 390 Kg/ha (Table 1). Growth of fishes in the above 2 trials was 0.3 g/day and 0.7 g/day respectively. But the production per day of the pens was 3.2 Kg/ha and 1 Kg/ha in the above 2 trials respectively. Though the high level of stocking produced better yield, the growth of individual fish was slow.

Six fishermen of Valayarvadi village near Pillaimadam lagoon organised themselves into a 'Pen culture Society' and availed Rs 36,000 (6,000 for each) with 30 per cent subsidy from the Indian Overseas Bank Uchipulli, Ramnad Dist. They could enclose 2 ha area in the Pillaimadam lagoon. The area of each pen was 1 ha. The pens were stocked with 10,000 milk fish fingerlings measuring 60-80 mm weighing 5-8 g. The pens were harvested after 6 months (April to October) with 55 percent recovery. About 900 Kgs of chanos of average 200 mm weighing 100 g were harvested along with 200 Kg of prawns, *P. indicus* measuring 150 mm weighing 15 g. The ' Pen culture society' could get Rs. 18,500 (Fishes @ Rs. 15/kg and the prawns @ of Rs. 25/Kg).

But the fish culture could not be continued due to the drought condition prevailed in the area and because of the inability of the fishermen to open the bar mouth as the lagoon dried during May-June, 1987.

REMARKS

While conducting the trails the followig constraints were observed.

1. The cost of webbing is a major factor which made the pen culture above the reach of the fisherman. They have to depend on the financial agencies for funds. The HDPE webbing was also liable to damage and its strength decreased progressively. Barnacle settlement on the palmyra poles also damaged the webbing. The settlement was found to be more on the HDPE, knotted-webbing. But the machine made knotless webbing was free from barnacle settlement.

2. Occurrence of milk fish seed was seasonal and there was seasonal incompatibility. The milk fish seed occurred from April to June and this period was succeeded by a spell of dry period alone the east coast. The Southwest wind during June-August also hastened drying of the lagoon. Evaporation due to solar radiation was also high during the Period.

3. In Pillaimadam lagoon the water level during the summer months could be maintained only by opening the bar mouth and facilitating sea water to flow into the lagoon. But it is a costly venture. Many species of coastal piscivorous birds invaded the coastal lagoons during the summer months and fed on the fishes. Eagles (*Milves migrans* and *Haliaster indus*), gulls (*Larus brunnicephalus* and *L. rudibundus*), terns (*Hydropronge caspia, Sterna sandvincensis, Sterna* Spp) and cranes (*Egretta gazetta*) were some of the important species visiting the lagoons.

4. Poaching by fishermen was another problem as the pens were located in remote places and monitoring the pens were difficult during the nights. But if the pens are managed by fishermen this problem can be controlled to a great extend.

5. Unpredictable weather change was another factor to be reckoned with. Cyclones and heavy winds of various intensities hit the Pillaimadam lagoon causing considerable damage to the structures including the webbing. The weather condition clamped restriction on the period of culture as the stock had to be harvested before the onset of north-east monsoon starting from the second week of November. Hence the fish culture could be conducted only from April to November without much risk.

6. The Pillaimadam lagoon was not very productive as indicated by the growth of fish and the estimation of primary productivity. The net primary productivity ranged from 300 to 900 mg/Cm^3/day.

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