

POTENTIAL RESOURCES OF CULTIVABLE FISH SEED AROUND CALICUT AREA

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ABSTRACT

Lazarus, S. & K. Nandakumaran : Potential resources of cultivable fish seed around Calicut area. *Aqr. Bio* Vol VIII, 1988.

The availability and abundance of cultivable fish seeds around Calicut area have been presented. The nature of the seed grounds and the seeds available in the different localities and the seasons of their occurrence have been described qualitatively and quantitatively. The main seed grounds are located around Kadalundi, West Hill, Elathur, Thiruvangoor and Eranhical regions and the main resources are that of *Chanos chanos*, *Mugil cephalus*, *Etroplus suratensis*, *Lates calcarifer*, *Megalops cyprinoides*, *sillago sihama* and *Polynemus tetradactylus*. May-July period appears to be the important season for almost all the fish seeds in the area except that of the sand whiting and the threadfin in whose case the season is found to be between November and January.

INTRODUCTION

The success of aquaculture depends mainly on the availability of sufficient number of seed in the vicinity of the culture site in the right time without much labour and cost. The availability of the seed of some of the cultivable fishes has been recorded from different parts of the country (Gopinath, 1946; Ranganathan & Ganapathi, 1949; Ganapathi *et. al.*, 1950. Chacko & Mahadevan, 1956, Tampi, 1973; Anon, 1978; Silas *et. al.*, 1980; Dorairaj *et. al.*, 1984; and James *et. al.*, 1984). So far no report is available on the availability of seeds in large quantities in the Calicut area, except for brief mentions by Tampi (1973) and Mohan (1984). Apart from this the occurrence of the seed of the threadfin, *Polynemus tetradactylus*, which can be adopted for large scale cultivation has not been reported from other parts of the country. The fish culture project of the Central Marine Fisheries Research Institute at Calicut necessitated an investigation on the potential resources of seeds of cultivable fishes in the region and an intensive study was made from June 1983 to January 1986. The study revealed the existence of some important seed grounds in the Calicut area and has provided useful data for assessing the abundance and periods of availability in the different centres.

One of the geographical peculiarities of Calicut area is the existence of vast low-lying water bodies, both on the northern and southern sides, although they tend to occur more extensively on the northern side up to Korapuzha estuary. Soon after the monsoon these areas get inundated with rain water and in addition tidal water also gets mixed up from the sea, either over the sand bars or through temporary connections

established with the sea during the monsoon months. These low-lying waters are thus invariably saline, but the salinity is subject to a great deal of fluctuation from about 2° to 35 ppt., the higher values being observed during the summer months. In some cases towards the end of summer patches of water get isolated and the shallower ones dry up. These extreme conditions of drought were not observed at Calicut during the study period, which was served by both south-west and north-east monsoons regularly. The bottom of the inshore region was usually sandy except during the formation of mud bank and that of the tidal pools and estuarine regions muddy.

MATERIAL AND METHODS

The coastal area including the tidal pools and creeks between Kadalundi estuary in the south and Korapuzha estuary in the north covering a total distance of 34km was sampled regularly. At West Hill regular monitoring of the surf was also made. A drag net of cotton mosquito net of size 3 x 1.5 m was fabricated by providing nylon head-and foot ropes. The net was usually operated upto one-metre depth. Tightly held at both ends by two persons the net was slowly dragged along the bottom, from one end of the pool to the other, if the pool is small enough, or from the middle portion of the pool to one of the edges if the pool is large and the net was slowly lifted up. The fry were then carefully transferred, with minimum handling, into a plastic trough containing a liberal quantity of water. The collected seeds were transported to the fish farm in closed plastic bin with frequent changes of water.

Collections were mainly made during low tide in the morning hours from the tidal pools. In the surf area collections were made during morning and evening hours irrespective of the tidal conditions. Temperature, salinity, dissolved oxygen content and pH of the water of the seed grounds were also recorded regularly. Only culturable fish seeds encountered in the collections were recorded.

Collections from the tidal pools and creeks were made by repeated hauls from different transects and the density of the seed stock was estimated based on the area of each water body. For the surf collection the number of hauls were restricted to five. The seed abundance is expressed as number per unit area of 100 m².

RESULTS

Seed Grounds in and Around Calicut : Before starting regular observations a preliminary survey was conducted to locate areas where fish seed was available in good quantities. The regions which offered good supply of seed were Kadalundi, Beypore, West Hill, Elathur, Thiruvangoor and Eranchical. Excepting the first three regions in the south all the other regions were influenced by the Korapuzha estuary, which extends from Korapuzha in the south to Quilandi in the north. The Kadalundi estuarine region is characterised by its vast shallow mudflat exposed during low tide and are used for retting coconut husks. Small quantities of milk fish and *M. cephalus* seeds were encountered during June and July months. Though the seeds were available on both sides of the railway bridge more numbers were normally collected from the western

side towards the bar mouth. Unlike Kadalundi, the Beypore region is devoid of mudflat and the seed, mainly of *Etroplus suratensis*, was available in the river mouth region in good numbers. Among the regions mentioned above only the West Hill region is not influenced by estuarine condition and the low-lying regions found in the locality have numerous small pools of varying sizes and the sand banks of these water bodies are heavily guarded by heavy growth of grasses. The places like Kampuram, (the area between CMFRI fish farm and Kerala Soap Factory), Bhut Road Junction and Edakkal provide a good nursery area for seeds of *C. chanos*, *M. cephalus* and *M. cyprinoides*. Because of the less saline nature of the water and muddy condition of the bottom good growth of grasses is seen in these tide ponds. The intense growth of grasses often makes the seed collection difficult also. Only during highest spring tide the sea water enters these areas. The surf of Kampuram beach in the West Hill region is found to be an ideal place for the threadfin and the sand whiting and these were found in plenty in this locality. In the Elathur area the creeks found around Mattuvayi and Azhikkal sustain seeds of milkfish and pearlspot. This area gets saline water during high tide through the Azhikkal bar mouth by which the Korapuzha estuary opens into the sea. The creeks are muddy and unlike the West Hill area very little vegetation is found on their banks. The Thiruvangoor area is flooded by the Kunnyapuzha, a tributary of Korapuzha. During the high tide the creeks are connected to the "Kettu" which harbours plenty of milkfish seed. These creeks used to get inundated during high tide and because of this condition it becomes difficult to collect seeds during high tide periods. The ground is marshy with less vegetation on the banks. The ditches along the banks of Kunnyapuzha, which are also used for retting, provide pearlspot and *Lates calcarifer* seeds. The Puzhadipuzha with its mangroves present at the Eranhical region, harbours plenty of pearlspot seed. Here also the ground is very marshy with very little vegetation.

Occurrence and seasonal abundance of the important seeds :

The details of the seeds collected from the different centres and the environmental parameter values collected from the seed grounds are given in Table 1.

1. *Chanos chanos*: The maximum number of seed was available in July 1983 with the highest density of 320 per unit area in the West Hill region and 580 per unit area in the Elathur region. The size ranged from 15 to 37 mm in the West Hill and Thiruvangoor regions and 32 to 58 mm in the Ealathur and Kadalundi regions. In the year 1984, it was available in the months May and July in the West Hill area with a size range 35-90mm and during May and June months in the Thiruvangoor region with a size ranging from 61 to 67 mm. It was found with a density ranging from 75 to 110 per unit area in the West Hill region and from 30 to 280 per unit area in the Thiruvangoor region. In the other two regions the seed was not available during this period. During 1985 it was found in all the areas during June with good densities at Thiruvangoor (350 per unit area). The sizes recorded were, 32-52 mm in the West Hill area, 50-86 mm in the Elathur area,

TABLE I

Details of the seeds and the environmental conditions of the seed grounds

Species	Available area	Season	Size range (mm)	Potential availability During the season (no/100m ²)		Optimum environmental conditions (range)				
				Range	Average	T (°C)	S (ppt)	O ₂ (mlll)	pH	
<i>C. shanos</i>	West Hill	May - Jul.	15 - 90	23 — 321	210	27.0 - 30.5	2.8 - 10.0	3.9 - 4.4	7.9 - 8.3	
	Elathur	Jun. - Jul.	30 - 86	15 — 538	200	28.5 - 30.0	3.7 - 7.9	4.1 - 4.2	7.9 - 8.1	
	Thiruvangoor	May - Jul.	37 - 67	10 — 351	170	28.0 - 32.0	4.6 - 13.5	4.0 - 4.4	8.0 - 8.3	
	Kadalundi	Jun. - Jul.	35 - 58	24 — 85	34	29.0 - 29.5	3.3 - 9.8	3.9 - 4.3	7.9 - 8.3	
<i>M. cephalus</i>	West Hill	Jun. - Aug.	20 - 70	25 — 350	120	27.0 - 32.0	3.7 - 9.3	3.7 - 4.3	8.0 - 8.4	
	Elathur	Jul.	60 - 65	180 — 200	190	28.5 - 30.0	4.5 - 10.5	5.0 - 5.1	8.0 - 8.1	
	Eranhical	Jun.	23 - 27	40 — 60	50	28.0 - 29.5	6.5 - 7.0	3.7 - 3.9	7.9 - 8.0	
	Thiruvangoor	Jul. - Aug.	20 - 39	67 — 286	210	28.0 - 28.5	6.0 - 6.4	4.0 - 4.1	8.0 - 8.1	
<i>E. suratensis</i>	Kadalundi	Jun.	26 - 33	12 — 30	21	29.0 - 29.5	3.3 - 9.8	3.9 - 4.3	7.9 - 8.3	
	Elathur	Jul.	69 - 95	50 — 70	60	28.5 - 29.0	7.9 - 9.0	4.2 - 4.5	8.0 - 8.1	
	Thiruvangoor	May - Jul.	36 - 97	15 — 65	29	28.0 - 29.0	5.2 - 10.5	3.5 - 4.0	8.0 - 8.1	
	Eranhical	Jun. - Jul.	25 - 51	39 — 247	286	29.0 - 29.5	4.5 - 7.9	4.1 - 4.5	8.0 - 8.1	
<i>M. cyprinoides</i>	Kadalundi	Jun. - Jul.	28 - 92	18 — 65	26	29.0 - 29.5	3.3 - 9.8	3.9 - 4.3	7.9 - 8.3	
	West Hill	Jul.	22 - 34	550 — 600	575	28.5 - 29.5	8.7 - 9.3	3.9 - 4.0	8.0 - 8.2	
	Elathur	Jul.	20 - 23	1100 — 1160	1130	28.5	7.9	4.2	8.0	
<i>L. caclarifer</i>	Thiruvangoor	Jun. - Jul.	15 - 20	63 — 842	396	28.5 - 29.5	4.6 - 8.3	3.8 - 4.3	8.0 - 8.1	
	West Hill	Jun. - Jul.	23 - 82	5 — 14	7	27.0 - 30.0	4.3 - 10.5	4.1 - 5.1	8.0 - 8.1	
	Thiruvangoor	May - Jul.	30 - 82	32 — 80	44	28.0 - 29.5	5.2 - 11.3	3.8 - 4.3	8.0 - 8.3	
<i>S. sihama</i>	Eranhical	Jul.	35 - 50	24 — 26	25	29.0	4.5 - 7.9	4.1	8.0 - 8.1	
	West Hill	Nov. - Jan.	25 - 55	2 — 1177	404	28.8 - 30.0	32.6 - 33.5	4.5 - 4.6	8.6 - 8.7	
<i>P. tetradactylus</i>	West Hill	Nov. - Dec.	15 - 25	235 — 1060	648	28.0 - 29.0	32.8 - 33.1	4.2 - 4.4	8.5 - 8.8	

50.65 mm in the Thiruvangoor area and 35-46 mm in the Kadalundi area. In the West Hill area the availability of milk fish seed extended up to July with a density of 20 per unit area with the size range 41-54 mm. The season for milkfish seed in the Calicut region seems to be from May to July, lasting for about a month or two in an area. However, Mohan (1984) has reported the collection of a few numbers from the surf during March-April 1978 and its occurrence at Puthuvypeen near Cochin (Anon., 1978) from January to April in limited numbers.

Salinity of the seed grounds varied from 2.8 to 13.5 ppt and these extreme values coincided with the abundance of seed during July '83 in the West Hill area and in May '84 in the Thiruvangoor area. The ranges of temperature, dissolved oxygen and pH values recorded in the milkfish ground were 27.0°C-32.3°C, 3.8-4.4 ml/l and 7.9-8.3 respectively.

2. *Mugil cephalus*: The seed of *Mugil cephalus* started appearing in the month of July '83 in the areas West Hill and Thiruvangoor with a size ranging from 23 to 48 mm under densities 50 and 70 per unit area respectively. During 1984 it was available from June to August in the West Hill area with a size ranging from 20 to 70mm, in the month of July in the Elathur area (60-65 mm) and in August in the Thiruvangoor area (20-39 mm) with more number (286) per unit area. During 1985 it was found only in the month of June in this area, having high concentration (350 per unit area) in the West Hill region with size ranging from 22 to 45 mm. The period June to August seems to be the best season for the seeds of *M. cephalus* in this area with a peak either in June or August. Earlier report (Anon., 1978) shows its season as from July to August in the Puthuvypeen area which also indicates that the seeds can be collected from other parts of Kerala during this season.

This seed was found to thrive well in waters having temperature 27.0-32.0°C, salinity 3.3-10.5 ppt, dissolved oxygen 3.7-4.5 ml/l and pH 7.9-8.3.

3. *Etroplus suratensis*: The seed of the pearlspot was found in all the regions except West Hill (Table 1) during the period of observation. Eranhical was found to be the important locality for this resource. During June 1983 a total of 247 number with a size 25-35 mm was collected from an area of 100 m². In all other centres its availability was found to be less than that. It was available only during July '83 in the Elathur, Thiruvangoor and Kadalundi areas. During 1984 it was available from May to July in the Thiruvangoor area. Thus the season for pearlspot seed in this area seems to be from May to July. Except Eranhical in all the other centres only fingerlings could be obtained. Anon (1978) has reported the occurrence of the fry and fingerlings of this fish in the Vyttila area during monsoon and premonsoon months.

The water temperature observed in the seed grounds ranged between 28.0 and 29.0°C and the salinity was found between 3.3 and 10.5 ppt. Like temperature and salinity the oxygen and pH values fluctuated within a very narrow range only. It was from 3.5 to 4.3 ml/l for dissolved oxygen and from 7.9 to 8.3 for pH.

4. *Megalops cyprinoides*: Leptocephalus stage of *Megalops cyprinoides* was found in plenty at West Hill, Elathur and Thiruvangoor and its occurrence was restricted to only one month in all the three areas during 1983 and during June in the Thiruvangoor area in the year 1985. In the first year it was available from 20 to 34 mm size and in the third year from 15 to 20 mm size. In the second year, however, this resource was not found in this area. In the Elathur area it was available in plenty at the rate of 1160 per unit area, which is followed by 842 in the Thiruvangoor and 600 in the West Hill areas. Mohan (1984) has reported its peak availability in this area as between May to June in the surf waters. In the present study it was recorded during June-July months.

The water temperature of the grounds varied from 28.0 to 29.5°C with salinity ranging between 4.6 and 9.3 ppt. The dissolved oxygen content was between 3.8 and 4.3 ml/l with the pH ranging from 8.0 to 8.2.

5. *Lates calcarifer*: The Bekti' seed, mostly in the fingerling and juvenile stages, was found in the West Hill, Thiruvangoor and Eranhical areas in small numbers and its abundance was found to be less than 100 per unit area. It occurred during July 1983 and 1984 in all the above regions. But some numbers were collected during May 1984 also from the Thiruvangoor and during June 1985 from the West Hill areas. During 1983 season the young ones collected were in 30-45 mm size range. But in 1984 mostly juveniles in the size range 35-82 mm were available. In the year 1985 they were available from 23 to 30 mm sizes. Juveniles of the species have been observed at Calicut by Mohan (1984) during March 1978. The period between March to July appears to be the season for this resource in this area.

The environmental parameter values recorded from the seed grounds were temperature 27.0—29.5°C, salinity 4.3-11.2 ppt., dissolved oxygen 3.8-5.1 ml/l and pH 8.0—8.1

6. *Sillago sihama*: The Indian whiting fingerlings were first observed in the Konad beach of West Hill area during November 1985 and they were available upto January 1986 in this area. They ranged in size from 25 to 50 mm during November, 27 to 29 mm during December and 30 to 55 mm during January. Good numbers were available during January. The seed could be collected at an average of 404 per unit area. Mohan (1984) has observed the whiting seed at Calicut during January and July months. Gopinath (1946) found the post-larvae of this species in the Trivandrum coast from the end of December with abundance in February. Palekar & Bal (1960) found very young juveniles in Karwar waters during December-January months. In the present study it has been observed from November to January. Thus, it appears that the season for the seed of *S. sihama* in this area is from November to February.

The sea water temperature ranged between 28.0 and 30.0°C. The dissolved oxygen content was around 4.5ml/l and pH around 8.7. *Hornellia marina* bloom was present in the inshore region at the time of seed collection. Juveniles of *Ambassis* and *Therapon* and smaller carangids were also seen along with the sand whiting seed. The bottom of the ground was sandy and the seed was found in the surf region only in the morning hours. James *et al.*, (1984) have also made similar observation in the Palk Bay region of the east coast of India.

7. *Polynemus tetradactylus*: The threadfin seed was located for the first time at Konad in the West Hill region in the last week of November 1985 and was available in the surf region up to the middle of December 1985. They were in the size of 15-23 mm in the first month and 18-25 mm in the second month. Heavy concentration of the seed was noticed during November and collected at the rate of 1060 number per unit area. During December, however, the number declined to 235 per unit area.

The environmental conditions were similar to those described for the whiting seed, since it was also collected from the same ground along with whiting.

DISCUSSION

Tampi (1973), while giving the list of culturable marine fish fry resources from brackish water environments mentions about the availability of milkfish, mullets and *Megalops* at West Hill during the period May-June, October-January and December-January respectively. He had also mentioned about the availability of *Etroplus* and mullets at Elathur throughout the year. However, in the map given by him to show the intensively exploitable milkfish resources, he has not included the Calicut area. Mohan (1984) while presenting the hydrobiological character of the surf waters of Calicut mentions about the occurrence of *C. chanos* seed during March-April, *S. sihama* during January and July, *M. cyrinoides* from May to June and juveniles of *L. calcarifer* during March. These two reports are useful to understand the seed seasons and one of them (Mohan, 1984) also gives some details about the size of the seeds. However, any quantitative information regarding the occurrence and actual number collected is not given in these reports and hence it has been supplemented by this report which may be of use for future fish culturists of this locality.

By incorporating the earlier findings with the present one some conclusions on the seasonal occurrence of the various culturable fish seeds can be arrived at as far as the Calicut area is concerned. They are March-July for *Chanos chanos*, June-August for *Mugil cephalus*, December-January and May-July for *Megalops cyrinoides*, November-January and July for *Sillago sihama*; November-December for *Polynemus tetradactylus*, March-July for *Lates calcarifer* and throughout the year for *Etroplus suratensis*. In general May-July period seems to be an important season for almost all the fish seeds in the Calicut area except *Sillago* and *Polynemus*.

The south-west monsoon which starts by May in this region makes the waters of the low-lying coastal areas less saline and a number of temporary inlets are formed all along the coast and thereby making it possible for the post-larvae of fish to migrate into the landward sheltered areas near the coast where they probably find proper estuarine conditions for their nursery purposes. The high productivity of these waters which afford a plentiful supply of microvegetation necessary for the post-larvae of these fishes, the relatively calm and shallow waters and the abundant humus and detritus, and also the apparent safety from larger carnivorous enemies, all make this an ideal habitat that provides the larvae better chances of survival and growth.

The study also indicates that the variety of fish seed available in this locality can support to a greater extent the need of the cultivators of this area since these seed are at present not available from hatcheries. Some of the agencies can even take up the programme of collection and supply of the seeds to the fish farmers of this area or elsewhere on an organised basis which will help the development of fish culture programmes in the neighbouring villages also.

ACKNOWLEDGEMENTS

We express our sincere gratitude to Dr. E. G. Silas, former Director and Dr. P. S. B. R. James, present Director, Central Marine Fisheries Research Institute, Cochin for their constant suggestions and encouragements and to Shri C. Mukundan, Head, Demersal Fisheries Division of the above Institute for the guidance and going through the manuscript.

REFERENCES

- Anonymous, 1978. Report of the third workshop on all India co-ordinated research project brackish water prawn and fish farming, Cochin, Nov. 9-10, 1978, *Technical Report, Kerala Centre (Mimeo.)*, 1-13.
- Chacko, P. I. & Mahadevan, S. 1956. Collection and cultivation of milkfish *Chanos chanos* in and around Krusadi and Rameswaram Islands with notes on its biology. *Fish Stn. Reports and Year Book, April 1954 to March 1956, Department of Fisheries, Madras*, 105-155.
- Dorairaj, K., Mohanraj, G., Gandhi, V., Raju, A., Rengaswamy, V. S. & Rodrigo, J. X. 1984. On a potential rich milkfish seed collection ground near Mandapam along with the methods of collection and transportation. *Indian J. Fish.*, 31: 257-271.
- Ganapathi, S. V., Chacko, P. I., Srinivasan, R. & Krishnamurthy, B. 1950. On the acclimatisation, transport and culture of some salt-water fishes in inland waters of Madras State. *Indian Geogr. J.*, 25: 1-15.
- Gopinath, K. 1946. Notes on the larval and post larval stages of fishes found along the Trivandrum coast. *Proc. natn. Inst. Sci., India*, 12: 7-20.
- James, P. S. B. R., Soundararajan & Rodrigo, J. 1984. A study of the seed resources of the Indian sand whiting *Sillago sihama* (Forsk.) from the coastal waters of Palk Bay, with special reference to diurnal and seasonal variation and lunar periodicity. *Indian J. Fish.*, 31: 313-324.
- Mohan, R. S. L. 1984. Some hydrobiological characteristics of the surf region of West Hill, Calicut, *Ibid.*, 31: 362-365.
- Palekar, V. C. & Bal, D. V. 1960. Studies on the maturation and spawning of the Indian whiting *Sillago sihama* (Forsk.) from Karwar water. *Proc. Indian Acad. Sci.*, 54: 76-93.
- Ranganathan, V. & Ganapathi, S. V. 1949. Collection, acclimatisation and transport of the fry and fingerlings of the milkfish *Chanos chanos* (Forsk.). *Indian Farming*, 10: 368-374.
- Silas, E. G., Mohanraj, G., Gandhi, V. & Thirunavukkarasu, A. R. 1980. Spawning grounds of milkfish and seasonal abundance of the fry along the east and south west coast of India. In: *Symposium on Coastal Aquaculture*, Marine Biological Association of India 40. Abstract,
- Tampi, P. R. S. 1973. Culturable marine fish fry resources from brackish water environments. In: *Symposium on Living Resources of the Seas Around India*, Marine Biological Association of India, 390-399.

