COMMERCIALLY IMPORTANT MEROPLANKTON PRODUCTION AND FISHERY POTENTIAL IN THE GULF OF MANNAR

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Meroplankton productivity and the fish landing were recorded from the selected two inshore stations, Mandapam and Kudankulam along the east coast of India. Meroplankton such as nauplius, protozoa and mysis of penaeus and metapenaeus prawns; zoea and megalopa of crab; veliger larvae of mollusc; fish larvae and eggs were segregated and quantified from the zooplankton sampled for two years (November 1993 to October 1995). The meroplankton production was compared with fishery potential and found that both meroplankton production and fishery potential go hand in hand during most months of the study period. It reveals these locales are the ideal breeding sites for such fishes and shell fishes.

The occurrence and abundance of meroplankton vary with different seasons and regions. The fishery is entirely reflected by the meroplankton resources, because they are their larvae. Among the commercially important marine organisms, prawn, fish and molluscs hold the pride of place. Many researchers have suggested that an understanding of the production processes of food sources such as invertebrate will facilitate the management of fish stocks, the general relationship exists between plankton productivity and fish production. Therefore the success or failure of pelagic fishery potential depends upon the availability and production of plankton.

The plankton samples were made at every fifteen days interval over a period of two years (from November 1993 to October 1995) from the selected two inshore stations, (st 1, Mandapam and st 2, Kudankulam) along the east coast of India (Fig.1). plankton sample collections were made for 15 minutes (0006-0007 hrs) sub-surface hauls using 50 cm mouth diameter made of bolting silk cloth zooplankton net (no. 14 mesh size 60 μm) operated from a slow moving mechanized trawling boat. The mean depth of water was about 2.5 fathoms (5-6 metres). The volume of filtered water was calculated with the help of flowmeter, fitted in the ring (mouth of the net). The collected plankton samples were made to a constant volume (100 ml) and from this 1 ml sample was taken for analysis. It was repeated atleast thrice to minimize the error. Numerical abundance of meroplankton was calculated by using the Sedgewick rafter counter. The meroplankton from the preserved plankton samples were sorted out and pooled to have monthly data. The volume of plankton was calculated by the displacement volume method. The fishery data for these regions was obtained from CMFRI, Cochin.

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Fig. 1—Map showing the sampling stations
Maximum biomass (total volume of zooplankton) values were recorded in st 1 during monsoon and their minimum was noted during postmonsoon. In st 2 the maximum biomass values were observed during summer and their minimum during monsoon. (Table 1). The annual secondary productivity in st 1 was 79 ml/m³ during first year and 73 ml/m³ for second year. In st 2 it was 77 and 69 ml/m³ during first and second year respectively. Numerical biomass of larval forms such as nauplius (3000-3500 no./m³); protozoea (2500-2900 no./m³) and mysis (1500-2000 no./m³) of Penaeus and Metapenaeus prawns were recorded throughout the collection periods in both the stations and they showed only one peak of abundance annually. Whereas the molluscan larvae exerts two peaks of abundance, one in monsoon and another during summer. In the bimodal abundance of veliger larvae of gastropods and bivalve the primary peak of larval abundance (18,500-21,400 no./m³) was during monsoon in st 1 and (13,400-16,750 no./m³) summer in the st 2. The secondary peak (10,500-16,300 no./m³) was noted during summer in st 1 and (8100-9250 no./m³) monsoon in the st 2.

A high percentage of total meroplankton among the zooplankton was noted as 25.6-30.6 % during monsoon in strains 1 and a range of 20.8-26.4% was recorded during summer in st 2 (Table 2).

The fishery potential of st 1 was maximum during postmonsoon (3006 mt) of the first year but total meroplankton abundance was maximum during monsoon (38,000 no./m³) which was hierarchically coincided with the fishery potential but in the second year both the high fishery potential (2098 mt) and maximum meroplankton production (36,628 no./m³) were recorded during monsoon. (Fig. 2 A).

In st 2 the fish landings were maximum (13,805 mt) during premonsoon and the meroplankton density was high (31,841 no./m³) during summer in the first year. The second year also followed the same seasonal trend with fish landing (12,741 mt) and meroplankton populations (31,925 no./m³) during the above respective periods (Fig. 2 B).

The higher secondary productivity was recorded in st 1 during monsoon and postmonsoon for the first year and during monsoon in the second year, which indicates its high fertility and its ability to serve as nursing ground. It was evident from the meroplanktonic productivity also. The larval forms of prawn, crab, mollusc and fish were observed throughout the year in both the stations. It reveals that they are all perennial breeders. Prawn breeding and recruitment into the fishery, though take place more or less round the year, the breeding is more intense during monsoon and summer months in the south east
coast of India. High plankton concentration during monsoon within the EEZ, which might support the feeding needs of these larvae, might have prepared these areas for breeding and nursery. The maximum volume of total zooplankton and the maximum number of meroplanktonic larval forms were recorded during summer in st 2. The southwest monsoon might bring these meroplanktonic larval forms from the west coast to southeast coast through the surface water coastal current. Arabian Sea encounters rich plankton biomass during southwest monsoon. Similarly penaeid prawns breed in the sea and their planktonic larval stages were brought by wave and tidal currents to the inshore. The prevailing equatorial current pattern may also carry the larvae to far off places from the spawning areas. The maximum fish landing was recorded during premonsoon season at st 2, both the years might be due to the migration of spawners into this area for spawning, contribute to the fishery. The maximum prawn catch was recorded only during premonsoon in the three years of observation in Periapalai coast in the Gulf of Mannar. Station 2 was highly influenced by southwest monsoon, the higher concentrations of fish eggs and larvae among plankton during premonsoon indicating the corresponding premonsoon and monsoon season of west coast spawning period for various fishes from the inshore waters. The water current of the sea also may contribute significantly to the abundance of fish during premonsoon, the fish eggs and larval occurrence during summer indicates the spawning periods of various fishes of the inshore waters of Tuticorin.

Though fish landing is comparatively very high in st 2 than the st 1, but larval population is more in st 1. It proves that the coral and seaweed dominated shallow semienclosed area are much preferred by the larvae. Even the spawners migrated into this area for spawning. The fish landing and meroplanktonic production significantly correlated at P<0.05% level.

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References