ON THE FISHERY OF JUVENILES OF *PENAEUS SEMISULCATUS* ALONG THE TINNEVELLY COAST, TAMIL NADU

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ABSTRACT

Penaeus semisulcatus de Haan contributes to a considerable fishery on the southeast coast of India, particularly in the Gulf of Mannar. Juveniles occur in large concentrations in the shallow inshore sea, between Pattanamarudur and Tuticorin, covering a coastline of about 20 km. They are fished throughout the year by an indigenous gear known as 'Ola Valai' operated in the waters within 2 m depth; landing about 57 tonnes in 1978-79. The peak abundance was in November-January and June-July. The size ranged from 40 mm to 150 mm total length, majority measuring less than 100 mm, indicating that this area is a nursery ground of the species.

INTRODUCTION

Penaeus semisulcatus de Haan is one of the penaeid prawns enjoying wide distribution along the coastal waters of India (George 1972). It contributes to a major fishery and dominates the commercial catches along the southeast coast. This, being a species growing to a large size, is in good demand in the export industry and is increasingly exploited by mechanised boats at present. The fishery, larval development and some of the biological characteristics of the species have been studied by Mohamed (1969), Thomas (1974, 1975, 1976) and Devarajan et al (1978). However, very little information is available about the distribution pattern, peak seasons of abundance, spawning seasons and breeding and nursery grounds of the species along Tinnevelly coast and hence a detailed study was undertaken. During the course of these investigations, it was found that in a shallow inshore sea north of Tuticorin, juveniles of this species are exploited in considerably large numbers. The present paper deals with the salient features of this juvenile fishery.

MATERIAL AND METHODS

Two fishing villages, namely, Tarravarculam and Tuticorin North were chosen for weekly observations. Random samples, each of about fifty prawns, were drawn from the catches of the indigenous gear "Ola Valai," on all observation days. These samples were analysed or species composition and other biological characteristics such as size frequency, sex ratio and maturity stages. The

total length of prawns was measured from the tip of rostrum to the tip of telson. Details of the effort expended and the total landings on all observation days were recorded from October 1978 to September 1979. An attempt was also made to estimate the total catches of *P. semisulcatus* by 'Ola Valai' in the previous years (Table 1) from the records of local prawn merchants and dealers.

Fishing Ground

The fishery of *P. semisulcatus* is limited to the shallow coastal waters extending to about 20 km from Pattanamarudur to Tuticorin. Important fishing villages from where the fishery is exploited are Tarravarculam, Vellapetty, Alangarathatttu, and Tuticorin North. It is also exploited occasionally at the Harbour-Point (Tuticorin), Hare Island and Pattanamarudur. The substratum of the fishing ground is sandy, with corals and rocky patches. The ground slopes gently and is covered with a thick growth of marine plants, sea grasses and algae.

The inshore area is very shallow, the 3-fathom contour being conspicuously broad from Vaippar to Tuticorin (Fig. 1). It reaches the maximum width at Pattanamarudur and Tarravarculam, to about 6 to 7 km away from the shore.

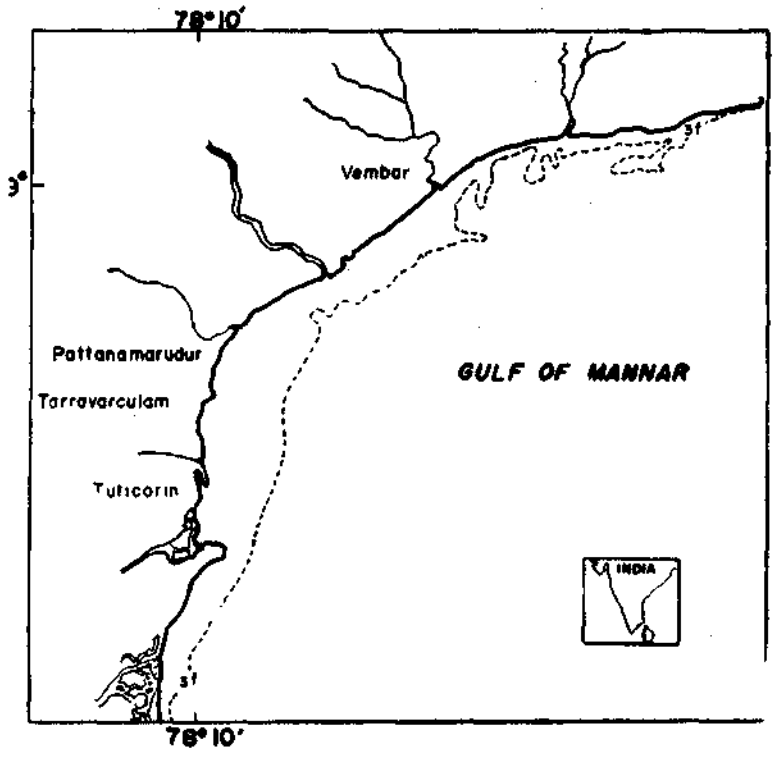

FIG. 1. Map showing the 3-fathom contour off Tinnevelly coast.

No such broad and shallow fishing ground is noticed anywhere in the adjacent inshore sea. Most of the commercial penaeid prawns are known to be closely associated with shallow brackistwater environment after their postlarval stages (George 1973), showing a preference to shallow waters during their juvenile stages. The extensive shallow water area, though not brackish, along this coast may be one of the favourable factors for the occurrence of a juvenile population of the species here.

Craft and Gear

Indigenous crafts used in the area are quite similar to the 'Tuticorin-type' boats, described by Zeiner and Rasmussen (1958), but for their smaller sizes. The main dimensions of a typical 'Tuticorin-type' boat are given as: length o.a. 29', breadth 6'3" and depth 2'11" (Silas 1967). An average boat is only 4.75 m long, 0.83 m broad and 0.46 m deep in the middle portion. These small boats are used, almost exclusively for the operation of 'Ola Valai,' and very rarely other gears such as 'Murrel Valai' (a type of drag net) and small gill nets.

The gear Ola Valai, is a kind of drag net which can be compared with the traditional 'Kuthu Valai' operated occasionally in this region. It can also be compared with the shore-seines, though smaller in size and operated with lesser man-power. A study of these nets has shown that they do not conform to any standard size and that the sizes depend mainly on the concerned fisherman's capacity for investment. However, it has been noticed that an average net is about 41 m long with a width of about 6 m in the middle. The gear has two parts, namely, the 'madi' which is a bag-like portion in the middle and the 'maruku' or arms which form the two sides. Both the 'madi' and 'maruku' are of the same mesh size which ranges from 1 to 1.5 cm. A good number of palmyra leaves called 'Ola' are attached to about 1/5 of the ropes, immediately in front of the net to cause disturbance in the ground and drive the prawns into the net.

About 60 to 70 units are operated during the peak fishing season. Almost all the gears used are made of cotton yarn, as nylon thread has made only a modest headway (less than 10%). The net is operated invariably in shallow waters of the nearshore areas going up to a maximum distance of 0.75 to 1 km and a maximum depth of 2-3.5 m. The normal depth of operation of this gear falls within 1.5 to 2 m. Operation of the gear is similar to that of a shore-seine but for the fact that a haul is completed in 60 to 80 minutes by about 3 to 5 people including women and children, 4 to 6 hauls are made during the 8 h constituting a day's work.

Species Composition and Trends in Production

About 75% of the total catch were constituted by fishes belonging to various families such as Carangidae, Leiognathidae, Theraponidae, Mullidae,

etc. *P. semisulcatus* constituted the entire bulk of the prawn catches. Stray occurrence of juveniles of *P. indicus, P. latisulcatus, Metapenaeus moyebi* and *Metapenaeopsis stridulans* was noticed occasionally Nearly 60% of *P. semisulcatus* caught were under 'quality No.4' (about 55-95 mm), which fetched a price of Rs. 12/- to 16/- per kg. Larger prawns came to about 20 to 25% by weight of the total catch and fetched a price of Rs. 28/- to 32/- per kg. The rest of the prawns, which were very small in size, were sold at a rate of Rs. 4/- to 6/- only.

An estimated total of about 37.6 of *P. semisulcatus* was landed during April 1976-March 1977, the average catch per month being 3,133 kg. Fishery was better in the following year when an average of about 3,783 kg of prawns were landed per month, the total catch of the year amounting to 45.4 t. Total estimated landings of the species during April 1978-March 1979 also was fairly high (57.4 t), giving an average of about 4,783 kg per month (Table 1). Thus the catches showed a steady increase over the years. This steady increase in the total catch might be attributed to an increasing trend in the effort expended. The total estimated catch during October 1978-September 1979 was about 61 t, consisting of an estimated 79,78,660 juvenile prawns.

TABLE 1. *Catches of* P. semisulcatus *along Tinnevelly coast during April 1976-September 1979.*

	Catch of *P. semi-sulcatus.* Kg		Catch of *P. semi-sulcatus.* Kg		Catch of *P. semi-sulcatus.* Kg
Apr 1976	3060	Jun	1221	Aug	1100
May	4164	Jul	531	Sept	5250
Jun	5625	Aug	459	Oct	6003
Jul	1596	Sep	3612	Nov	14000
Aug	1449	Oct	2094	Dec	15296
Sep	1797	Nov	4905	Jan 1979	3600
Oct	4116	Dec	18450	Feb	2520
Nov	4887	Jan 1978	6669	Mar	1400
Dec	5376	Feb	3051	Apr	1470
Jan 1977	2973	Mar	1089	May	1785
Feb	1278	Apr	1635	Jun	6000
Mar	1281	May	1821	Jul	3750
Apr	2427	Jun	2505	Aug	2719
May	909	Jul	2250	Sept	2450

The fishery was exploited round the year and catches seemed to follow a more or less regular pattern rising to a peak in November-January. This peak

coincided with the North East monsoon and post-monsoon period. Catches were good in the months of June and July also. There was a corresponding rise in the catch per unit during the peak seasons of abundance. The catch per unit, averaging to about 5.82 kg for the year, was 11.33 kg at the time of peak landings (Table 2).

TABLE 2. *Total landings and catch per unit of* P. semisulcatus *along Tinnevelly coast during October* 1978-*September* 1979.

	Total catch Kg	Total units	Catch per unit Kg
Oct 1978	6003	756	7.94
Nov	14000	1260	11.11
Dec	15296	1350	11.33
Jan 1979	3600	900	4.00
Feb	2520	560	4.50
Mar	1400	372	3.76
Apr	1470	420	3.50
May	1785	510	3.50
Jun	6000	750	8.00
Jul	3750	750	5.00
Aug	2719	725	3.75
Sept	2450	700	3.50

SIZE COMPOSITION

The size of prawns in the catches ranged from 36-40 mm to 136-140 mm in the case of males and from 36-40 mm to 146-150 mm in the case of females. However, the fishery was supported mainly by prawns measuring 56-60 mm to 106-110 mm (Fig. 2). The mean sizes of males and females for the period under study was 89.1 mm and 90.5 mm respectively. Recruitment of the younger size groups into the fishery took place throughout the year, resulting in a multimodal length-frequency distribution. However, the entry of younger sizes ranging in modal length from 56-60 mm to 89-90 mm into the fishery was conspicuous in the months of March, April and May (Fig. 2), indicating this to be the main recruitment season. Entry of waves of smaller sizes was conspicuous in the months of September, and December-January also. The modal lengths were noticed at the maximum in the months October and November (Fig. 3).

SEX RATIO

The sexes were not equally distributed in the fishery. There was a clear predominance of females in almost all the months constituting on an average to about 56.5% of the total catch. Similar cases of female predominance in several commercially important species were observed by George et al (1963) during a study of the offshore prawn fishery of Cochin.

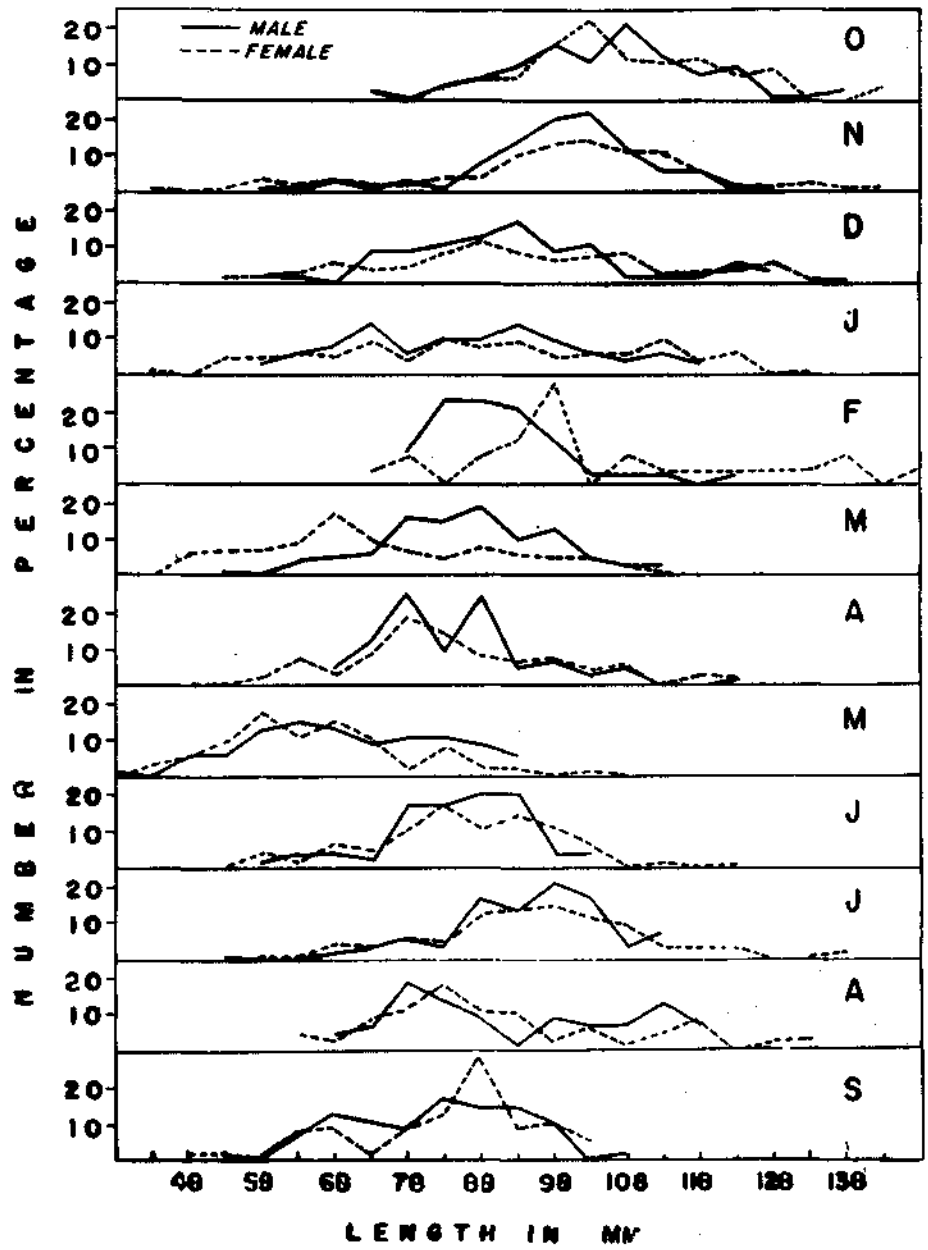

FIG. 2. Monthly size distribution of *Penaeus semisulcatus* landed by 'Ola Valai' along Tinnevelly coast during Oct. 1978-Sept. 1979.

General Remarks

Penaeid prawns in their juvenile stage are extensively fished from the shallow brackish waters and estuaries all along the coast of India. According to George (1973), considerable variation occur both in the degree to which the brackishwater environment the commercial penaeids utilise and in the

distribution of the parent and juvenile populations in the brackish and marine environments. The non-entry of *Parapenaeopsis stylifera* into the brackishwater environment was cited as an example. Although juveniles of *P. semisulcatus* are found in estuaries in other areas, an exception to the set pattern of life history of the species is noticed in the fishery observed in the shallow coastal waters of Tuticorin which provide a purely marine environment.

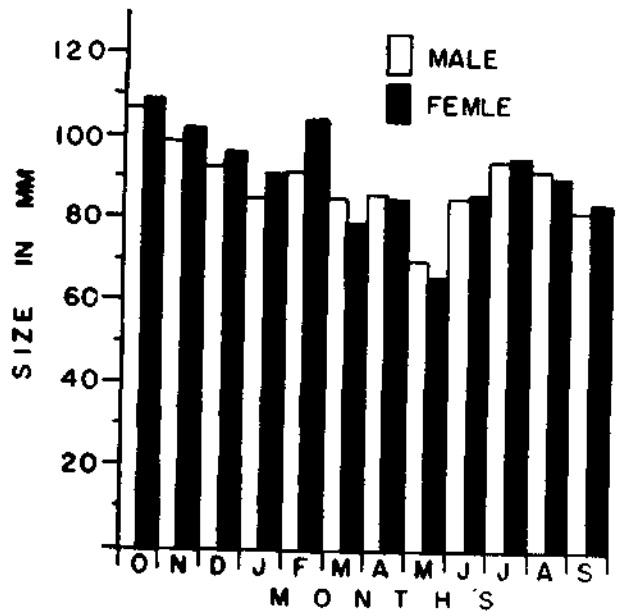

FIG. 3. Mean size of *Penaeus semisulcatus* landed by 'Ola Valai' along Tinnevelly coast during Oct. 1978-Sept. 1979.

One of the salient features of this environment is the abundance of marine plants in the fishing ground. Occurrence of the juveniles of *P. semisulcatus* in marine habitat with thick growth of aquatic plants had been noticed by earlier workers. While reporting *P. semisulcatus* in Durban Bay, on the east coast of Africa, Joubert (1965) observed the occurrence of the species in large numbers when there was a good growth of eel grass (*Zostera capensis*) and relatively scarce when the growth of eel grass was poor. According to Yasuda (1956) the juveniles of *P. semisulcatus* measuring 3.2 mm to 17.0 mm in carapace length spent their life from late August to middle October in areas of the Seto Island Sea of Japan where *Zostera marina* was growing. After middle of October the species seemed to be fished only from the offshore areas with muddy bottom. The abundance of juveniles of *P. semisulcatus* in the shallow inshore waters off Tinnevelly coast rich with marine plants, and their migration, as they grow in size, to deeper waters with muddy substratum is in agreement with the observations of Yasuda in Seto Island sea. Nevertheless, it cannot be said that *P. semisulcatus* in its juvenile stage always prefers a marine environment with thick

growth of aquatic weeds. Pillay (1954) observed that the species formed significant portions of the prawn catches of 'Bheris' (muddy brackishwater areas) of West Bengal. Mohamed (1969) also reported that juveniles of this species are often well represented in the brackishwater fishery of the west coast of India.

It was noticed that the peak season of abundance (November-January) of the species coincided with the North East monsoon and the post-monsoon period. The influence of claimatic conditions on the abundance of prawns in general had been pointed out by various authors. According to Menon and Raman (1961) the prawn catches appeared to follow the pattern of rainfall, the landings being more with heavier rainfall in the case of stake-net catches from the backwaters of Cochin. Gunter and Hildebrand (1954) observed a relationship between shrimp abundance and rainfall in the Texas Coast. Ramamurthy (1972) in a study of the prawn fishery of Mangalore estuary on the southwest coast of India, also highlighted relationship between the prawn landings and rainfall: according to him more than 80% of the annual rainfall was during June-October and the prawn fishery improved to reach the maximum during the subsequent months. The present observation also indicates a direct relationship between shrimp abundance and rainfall along the Tinnevelly coast.

It has been noticed that catches improved with increased effort, indicating the possibility of further development by increased exploitation. However, in view of the area forming a nursery ground, one step that suggests itself in the context of improving the offshore resources of the species is limiting the fishery of the small juvenile prawns. This will allow most of the juveniles to return to the offshore waters, where they can be caught at bigger sizes.

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