



Short Communication

†Need to regulate the *thalluvalai* fishery along Palk Bay, southeast coast of India

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Abstract

Along the coast of Palk Bay the juveniles of the green tiger prawn *Penaeus semisulcatus* are indiscriminately exploited from the nursery ground by the artisanal gear *thalluvalai* round-the-year except during the 45-day ban period. Studies on the *thalluvalai* fishery from one of the fishing villages namely, Thirupalaikudi was carried out during the years 2006-08. The fishing ground where the net is operated comprise mostly of seagrass and seaweed beds, dominated by the seagrass *Cymodocea serrulata*, serving as a potential nursery ground for the juveniles of *P. semisulcatus*. The estimated monthly landings of *P. semisulcatus* by *thalluvalai* at Thirupalaikudi landing centre fluctuated with an average of 3.4 t, the maximum of 10.0 t observed in March 2007. It was found that a large number of females constituting a significant proportion were exploited before the first spawning. The total number of immature females was estimated at 3.9 million constituting on an average 85.4% of the total number of females landed by *thalluvalai*. Juvenile females measuring less than 100 mm in total length contributed 39.1% of the total landings of females. The size composition of *P. semisulcatus* landed by *thalluvalai* was compared with that landed by trawlers and gillnets operated in the Palk Bay.

Keywords: Palk Bay, juveniles, *thalluvalai*, *Penaeus semisulcatus*

Introduction

Along the coast of Palk Bay, the crustacean fishery resources are exploited mainly by four different types of gears namely, trawl in the mechanized sector and bottom-set gillnet, gillnet (specialized gillnet for prawns) and *thalluvalai* (pushnet) in the artisanal sector. The operation of *thalluvalai* for exploiting prawns in the inshore waters of Palk Bay is in practice for the past several decades. Fishing by *thalluvalai* is of low investment and is carried out in the inshore waters all along the coast which is rich in seagrass and algal beds. Studies carried out by earlier workers have shown that such areas serve as potential nursery grounds for the green tiger prawn, *Penaeus semisulcatus*. This species contributes to the fishery significantly at Mandapam constituting nearly 70% of the total prawn catches landed by the mechanized trawlers

(Nandakumar, 1980, 1983). The exploitation of juveniles of *P. semisulcatus* from the nursery grounds of Palk Bay in the late 1980s has been documented by Sampson Manickam *et al.* (1989). However, several changes have taken place in the last 20 years both in the artisanal and mechanized sectors and therefore, a detailed study was carried out on *thalluvalai* fishery at Thirupalaikudi fishing village, which is one of the important centres in the Palk Bay.

Material and Methods

Thalluvalai (pushnet), an indigenous gear resembling a mini trawl net is operated from plank-built boat. The details regarding the gear and method of operation were described by Sampson Manickam *et al.* (1989). Wind energy with the help of sail fitted to the boat is used for propulsion of the boat and

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operation of the net. The fishing operation is carried out at a depth of about 4 m. The important fishing villages engaged in the operation of *thalluvalai* are listed in Table 1. It was enquired from fisherman that 740 units of *thalluvalai*, are engaged in fishing. Although fishing operation was carried out from 18 fishing villages, the number of units operated exceeded only 100 at three centres namely, Devipattinam, Thirupalaikudi and Thondi. The present investigation on the thalluvalai fishery in the Palk Bay is based on the data collected from Thirupalaikudi landing centre during the period from April 2006 to March 2008.

Table 1. The number of *thalluvalai* units operated along the coast of Palk Bay during 1987 and in the present investigation

Name of the landing centres	Sampson Manickam <i>et al.</i> (1989)	Present (2006-'08) investigation
Akkal madam	200	18
Panaikulam	—	8
Pudu valasai	—	11
Eranian valassi	—	6
Mudiveeran pattinam	—	15
Devipattinam	196	120
Thirupalaikudi	200	150
Morepannai	—	15
Mullimunai	126	60
Pudupattinam	67	30
Nambuthalai	125	45
Thondi	183	110
Pudhukudi	—	45
Valasapattinam	15	10
Narandal	22	4
Damodarapattinam	51	25
Pasipattinam	185	60
Theerthandathanam	5	8
Total units in operation	1375	740

Thirupalaikudi landing centre was visited weekly once and data on various aspects of the fishery were collected during 2006-2008. During each observation about 50 prawns were measured mostly in the landing centre itself and total length, weight, sex and maturity stages were recorded. Observations were also carried out during the same period at Mandapam and Devipattinam and data on *P. semisulcatus* landed by trawlers and gillnet (specialized net for prawns; locally called disconet) were collected and length distributions in the landings by the three gears were

compared. The landing on the observation day was recorded from which the landing for the month was estimated. The number of prawns landed at each length group (5 mm interval) was estimated by relating the number of prawns in each size group in the sample weight to the total weight landed on the sampling day and then raising it to the respective month. The gonadal maturity conditions were classified as immature, mature, spent and recovering stages based on the size of the gonads (Rao, 1967). In order to find out to what extent the juveniles and sub-adults of *P. semisulcatus* are exploited before first spawning by the artisanal gear, the females of *P. semisulcatus* were classified into three categories *i.e.*, juveniles measuring less than 100 mm, sub-adults ranging in total length from 101 to 125 mm and adults above 125 mm. The number of females exploited was estimated in order to highlight the loss of population that would have spawned if not exploited.

Results and Discussion

Estimated catch and effort of *P. semisulcatus* landed by *thalluvalai*: *Thalluvalai* fishery at Thirupalaikudi was carried out on all the days except on Fridays. There was no fishing activity in May as per the regulations imposed for trawlers by the Department of Fisheries, Government of Tamil Nadu. The prawn catch landed by *thalluvalai* at Thirupalaikudi consisted exclusively of *P. semisulcatus*. Apart from prawns, the catch consisted of juveniles of the swimming crab *Portunus pelagicus* and other miscellaneous organisms in small quantities.

During the period of observation, the average annual catch of *P. semisulcatus* landed by *thalluvalai* was estimated as 37.7 t with an average catch per effort of 2.7 kg/unit. The average monthly landing fluctuated between 1.0 t in April and 6.0 t in February with the corresponding catch per effort for the two months being 1.9 and 4.2 kg/unit respectively. Three peaks were observed in the landing, the first in February and March, the second in June and the third in November. The monthwise landings and the catch rate of *P. semisulcatus* recorded during 2006-07 and 2007-08 are given in Fig. 1.

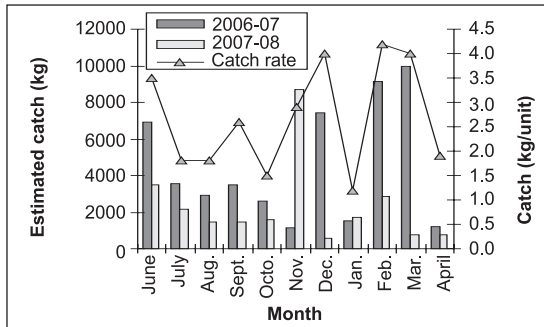


Fig. 1. Estimated catch and catch rate of *P. semisulcatus* landed by *thalluvalai* at Thirupalaikudi during the years 2006-08

In the late 1980s, three types of artisanal crafts were operated for exploiting juveniles of *P. semisulcatus*. However, a lot of changes had taken place in the fishery since then and at present only one type of boat (length ranging from 7 to 10 m) is operating *thalluvalai* from most of the centres. The number of units operated also came down and only 740 units of *thalluvalai* were actively engaged in the fishery during the period of the present investigation as against 1375 units recorded by Sampson Manickam *et al.* (1989). The reduction in the number of units is due to poor catch and returns.

Exploitation of juveniles and sub-adults by *thalluvalai* from the nursery ground: At Thirupalaikudi alone the total number of females exploited before attaining maturity was estimated as 2.0 million and 1.8 million in 2006-07 and 2007-08 (Fig. 2a, 2b) respectively constituting an average of 85.4% of the total landings.

Maximum number of landing of juveniles and sub-adults were recorded in November followed by July (Fig. 3). It is well known that *P. semisulcatus* spends its juvenile phase in the seagrass and algal beds in the shallow coastal waters (Heales, 2000).

Size composition of *P. semisulcatus* landed by different gears: There was not much difference in the size composition of *P. semisulcatus* landed by *thalluvalai* and disco gillnets as the two nets are operated in the same fishing ground. However, the disco gillnet may not affect the habitat as this net does not drag along the bottom. On the other hand, *thalluvalai* are dragged at the bottom over the seagrass beds affecting the seagrass and associated

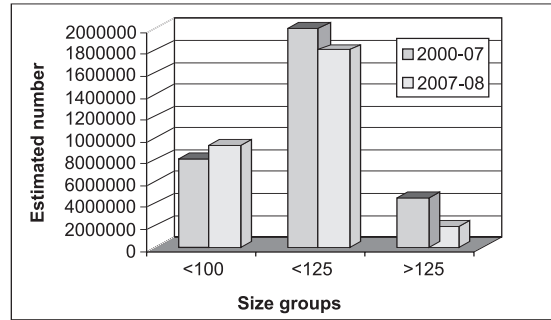


Fig. 2a. Estimated number of *P. semisulcatus* at three different size groups

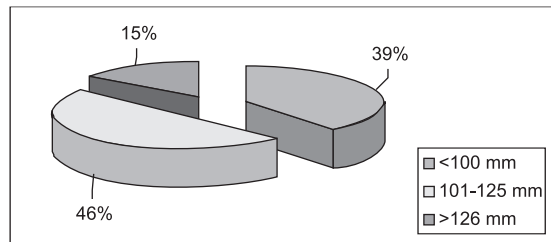


Fig. 2b. Average composition of *P. semisulcatus* at three different size groups

fauna and flora. In contrast to the landings of *thalluvalai*, only a negligible quantity of juveniles and sub-adults were recorded in the landing of trawlers operated in the Palk Bay. The size ranges in the females of *P. semisulcatus* landed by *thalluvalai*, disco gillnets and trawlers during the period of observation were 63-173 mm, 68-173 mm and 88-253 mm with the composition of juveniles and sub-adults constituting 85%, 71.2% and 5.7% respectively (Fig. 4).

The exploitation of *P. semisulcatus* from the trawling grounds in the Palk Bay off Mandapam and in the Gulf of Mannar off Tuticorin by mechanized

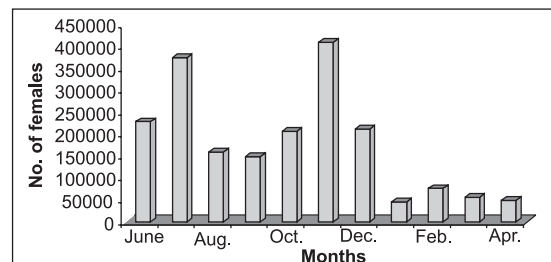


Fig. 3. Estimated number of females of *P. semisulcatus* (<125 mm in total length) landed by *thalluvalai* at Thirupalaikudi during the years 2006-08

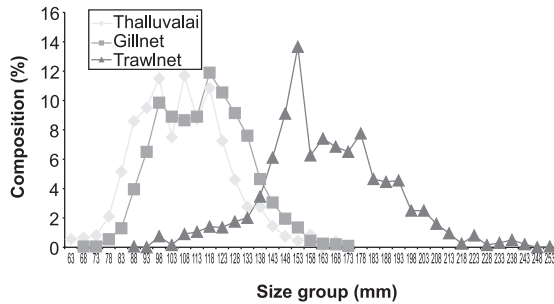


Fig. 4. Composition of females of *P. semisulcatus* juveniles and subadults landed by *thalluvalai*, gillnet and trawl net during the years 2006-08

trawlers were reported earlier by Nandakumar (1980, 1983) and Rajamani and Manickaraja (1995), respectively. Manisseri (1982) and Sampson Manickam *et al.* (1989) cautioned earlier that the exploitation of juveniles of *P. semisulcatus* from the inshore waters along Tuticorin and Palk Bay coast may affect the resource. The overall size ranges recorded by Manisseri (1982) was 36-150 mm when the fishery was supported by prawns in the size group of 56-110 mm (Tuticorin) whereas Sampson Manickam *et al.* (1989) observed the size range from 23 to 128 mm with the maximum catch in the size group of 33-68 mm (Palk Bay). Thus a comparison of the results on the exploitation of the resource from the inshore waters as reported by Manisseri and Sampson Manickam with that of the present investigation suggests that juveniles and sub-adults constitute a significant proportion of the catches landed by *thalluvalai* at Tuticorin and Mandapam respectively.

As the inshore waters of Palk Bay is rich in seagrass beds, it serves as a nursery ground for the juveniles of this species. Exploitation of juveniles and pre-adults is detrimental to the fishery. It can be seen from Fig. 3 that a significant proportion of females are exploited even before they attain maturity. It has been reported by Thomas (1974) that the fecundity of *P. semisulcatus* collected from both Palk Bay and Gulf of Mannar was high with a mean value of 0.27 million. Considering this, the exploitation of sub-adults of *P. semisulcatus* even before first spawning will affect its production in

the sea. Apart from the juveniles of *P. semisulcatus*, under-sized *Portunus pelagicus* were also landed by *thalluvalai* during the period of observation. To conserve the crustacean resources, fishing in the inshore waters may be restricted to selective gears like disco gillnet as unregulated operation of *thalluvalai* in the nursery ground of the Palk Bay will affect the population and may result in the depletion of the resource.

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