

PENAEID PRAWN POPULATION AND FRY RESOURCE IN A MANGROVE SWAMP OF GOA, INDIA

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ABSTRACT

Penaeid prawns abundantly occur in the mangrove swamp during the premonsoon season. They are constituted by the commercial species, *Penaeus merguensis*, *Metapenaeus dobsoni* and *M. monoceros*. Recruitment to the swamp takes place when the individuals are between 10 and 20 mm in size. Growth rate and period of stay in this environment vary with species. About 46.5% of the population is comprised of juveniles ranging in size from 10 to 30 mm. These could be collected in large numbers between December and June for aquaculture purposes.

INTRODUCTION

UNCERTAINTY in the availability of natural seed prawns is one of the major constraints in the success of commercial shrimp culture. Many countries of the Indo-Pacific region where shrimp culture has been practised traditionally have succeeded in large scale hatchery production of penaeid prawn fry and have thus overcome this obstacle (Milne, 1972; Pillay, 1972; Ling, 1977). A large portion of the natural prawn seed is being collected from the brackishwater environments making good use of their entry into these environments for their early development. Various aspects of penaeid prawn larval migration into the estuaries of Goa have been studied (Achuthankutty, *et al.*, 1977; Selvakumar, *et al.*, 1977). It was felt that vast areas of mangrove swamps bordering the Mandovi-Zuari estuarine complex may provide a potential site for seed prawn collection. Hence a year-round study was made in an ideal swamp to assess the prawn seed resource and other related aspects which are summarised in this paper.

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MATERIAL AND METHODS

The study was conducted in a low lying mangrove swamp (15°31'N, 73°48'E) (Fig. 1). The swamp opens to the mouth of the Mandovi estuary and hence is tide fed. Monthly samples were taken during low tide by hauling a rectangular net (mesh size 5 mm) through the bottom from June 1978 to May 1979. Penaeid prawns were identified and total length (tip of rostrum to tip of telson) was measured.

RESULTS

Occurrence and Composition: During the course of the study only three species of penaeid prawns were collected from this swamp. They were *Penaeus merguensis* de Man, *Metapenaeus dobsoni* (Miers) and *M. monoceros* (Fabricius). Their percentage occurrence was 22.32, 42.66 and 35.02 respectively. About 60% of the total catch was made during the premonsoon season (February-May) and a mere 16% during the postmonsoon season (October-January). Monsoon season (June-September) accounted for the rest of the catch. Species abundance also showed more or less a similar pattern of variation.

Recruitment: Recruitment to the mangrove swamp was taking place when the individuals were between 10 and 20 mm in size as this was the smallest size range of all these species occurring in the swamp. However, individuals belonging to 20-30 mm size group were also being recruited in small numbers in certain

Growth: Growth was studied by length-frequency method. Progression of modes was traced from 10-20 mm in all the species. *M. dobsoni* attains a maximum size of 50-60 mm in 5 to 6 months, whereas *M. monoceros* stays in this environment for 7 to 8 months and attains a relatively larger size of 70-80 mm



Fig. 1. Study area.

months as can be seen from Fig. 2. Year-round recruitment was taking place only in *M. dobsoni*. Recruitment which was at a slow pace during the postmonsoon months in all the species, intensified during the premonsoon months and gradually declined during the monsoon months. Total absence of 10-20 mm size group of *P. merguensis* and *M. monoceros* during the monsoon season indicates that recruitment of these species was not occurring during this season.

(Fig. 2). *P. merguensis*, on the other hand, grows to 80-90 mm in a relatively short span of 6 to 7 months (Fig. 2). Nevertheless, due to overlapping of modes, the tracing of the progression of modes was difficult in certain months. This might happen in tropical species having slow growth or prolonged breeding or a combination of both (Qasim, 1973).

Juvenile population: About 46.5% of the penaeids was constituted by individuals of the

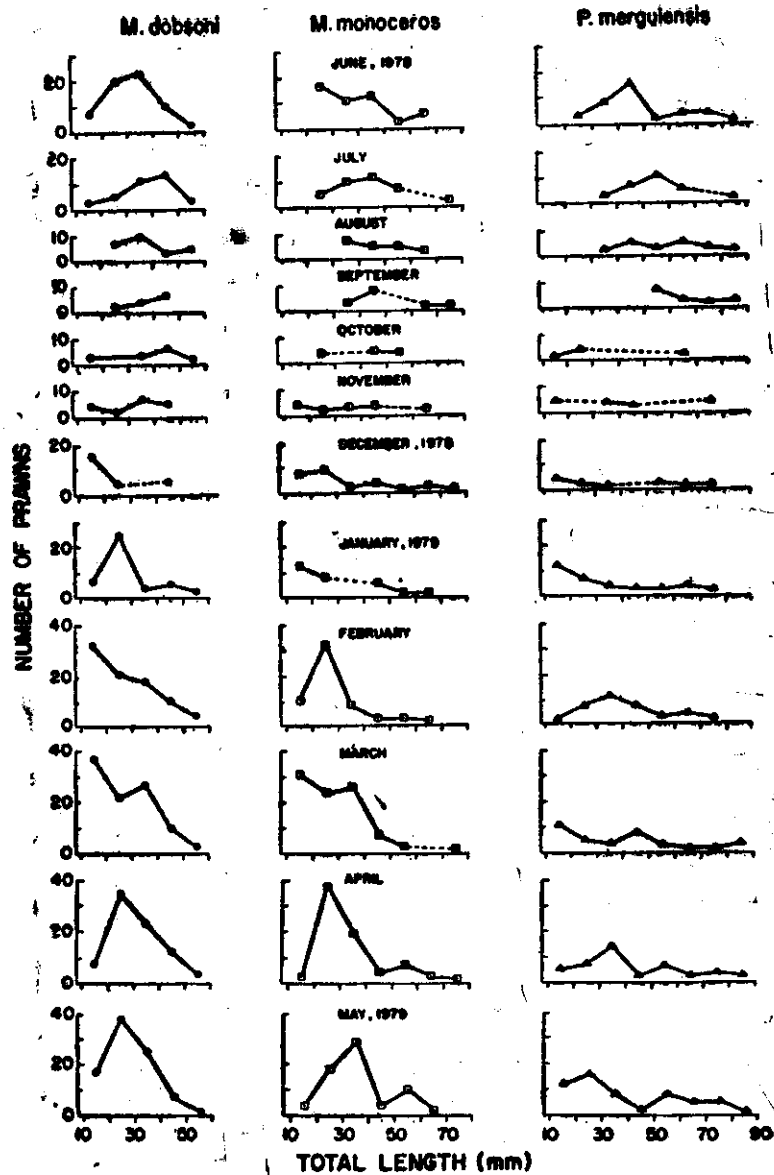


Fig. 2. Progression of modal length in successive months in different species of penaeid prawns.

size group 10-30 mm. Of this, the percentage contributions of *P. merguensis*, *M. dobsoni* and *M. monoceros* were 15.3, 49.2 and 35.5 respectively. The maximum juvenile population (10-30 mm) was recorded during the premonsoon season (Fig. 3). Average number

latter half of the monsoon season. Juveniles which appeared in small numbers in October progressively increased to attain the maximum abundance during the premonsoon season and declined drastically or was completely absent during the monsoon months.

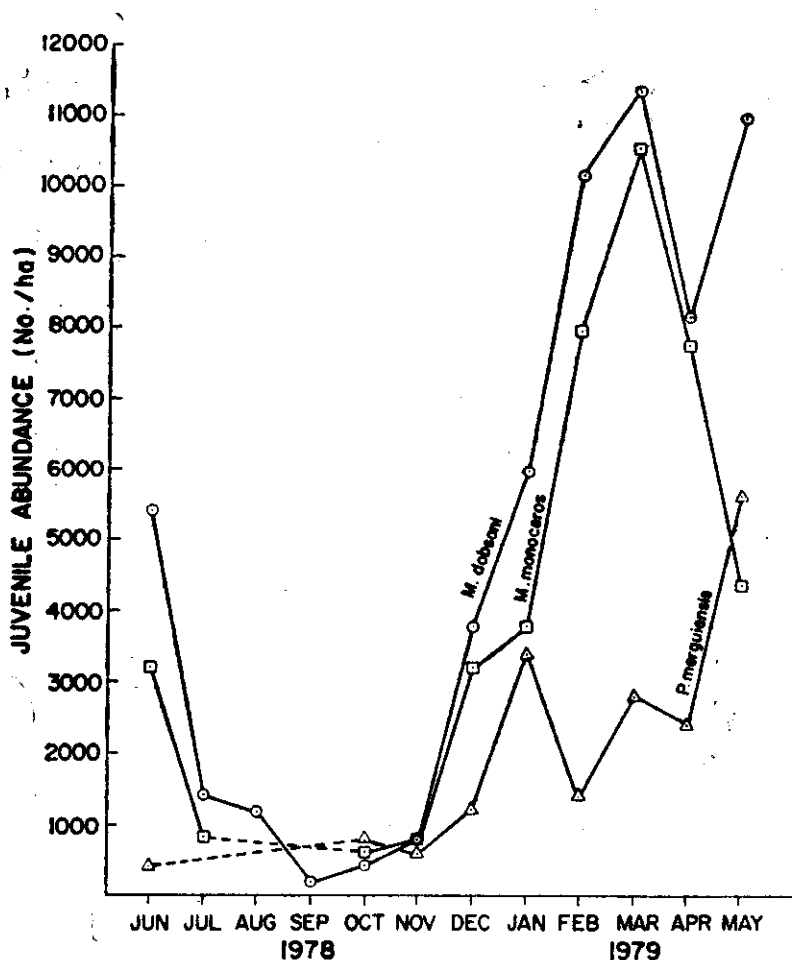


Fig. 3. Variation of juvenile population of *M. dobsoni*, *M. monoceros* and *P. merguensis* in different months.

of *M. dobsoni* juveniles collected during this season was 10,175/ha and that of *P. merguensis* and *M. monoceros* was 3,000/ha and 7,625/ha respectively. Juveniles of the latter two species were totally absent in the swamp during the

DISCUSSION

The species under investigation form the bulk of penaeid prawn landing from Goa coast. These species are known to breed in inshore

waters (George, 1962, 1970 a, b; Rao, 1968, 1972; George and Goswami, 1977; Goswami, *et al.*, 1977) and their postlarvae enter the estuaries and backwaters for early development (George, 1962, 1968; Kutkuhn, 1966; Gunter, 1967; Achuthankutty, *et al.*, 1977). A large portion of the postlarvae of these species which enter the estuaries, soon after attaining the juvenile stage may migrate to the nearby mangrove swamp as evidenced by the initial size of the recruited individuals. It is also likely that most of the postlarvae may grow to juvenile size immediately after their entry into the estuaries (Selvakumar, *et al.*, 1977) and hence a rich population of juveniles could be expected in the swamps which are directly connected to the estuarine mouth. Intense recruitment of the juveniles occurs during the succeeding months of their peak spawning reported from the coastal waters of Goa (Achuthankutty *et al.*, 1977; George and Goswami, 1977).

A combination of different conducive factors for faster growth make this specialised ecosystem an ideal nursery ground for these marine prawns. These swamps are tide fed and the salinity is relatively low. Large quantities of

food in the form of organic aggregates are available here (Snedaker, 1978). Fine silty mud substratum and abundance of mangrove foliage offer suitable cover for these juvenile prawns to bury. Absence or less number of predators and harmful creatures provide necessary protection in the most critical growing stage.

Martosubroto and Naamin (1977) have emphasized the need for the proper management of these tidal forests for commercial shrimp production and Snedaker (1978) has listed the factors responsible for their growth and propagation in this environment. Goa has vast stretches of potentially rich mangrove swamps which are the natural nursery grounds of the penaeid prawns which have an estuarine phase in their life-cycle. Hence, the exploitable yield of the juvenile prawns from their nursery ground should be properly assessed before commencing large scale collection for aquaculture. Overexploitation of juveniles would have far-reaching consequences on the commercial shrimp production. So also, utmost care should be taken to manage this specialised ecosystem for the conservation of penaeid prawn fishery.

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