

Distribution of Penaeid Prawn Larvae in the Coastal Waters of Goa

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Larval and postlarval distribution of 4 commercially important penaeid prawns was studied in the coastal waters of Goa extending up to 40 m depth zone during Jan.-Dec. 1981. Larval stages of *Metapenaeus dobsoni* and *M. affinis* were mostly distributed within the 20 m depth zone whereas those of *Penaeus merguensis* and *Parapenaeopsis stylifera*, between 20 and 30 m depth zone. Larval abundance also showed species specific seasonal variation. Statistical analysis indicated that larval and postlarval stages of *M. dobsoni* and *P. stylifera* were significantly dominant in that order and that 20 and 30 m depth zones had significantly high density of larval stages. Larval abundance in the coastal waters has been related to the breeding behaviour of individual species.

Studies on distribution and abundance of penaeid prawn larvae and postlarvae in the coastal waters help in assessing the potential seed resources of the cultivable species in addition to identifying the area and period of their abundance. Very little information is available on these aspects from the coastal waters of Goa¹⁻³. The present investigation has been made to understand and compare seasonal variation and depth zone-wise distribution of larval and postlarval stages of 4 commercially important penaeid prawns, viz. *Metapenaeus dobsoni* (Miers), *M. affinis* (Milne-Edwards), *Penaeus merguensis* De Man and *Parapenaeopsis stylifera* (Milne-Edwards) and to relate these findings to their breeding behaviour.

Materials and Methods

Four stations, representing 10, 20, 30 and 40 m depth zones off Aguada (lat. 15°30' N; long. 73°47' E) were selected for the study. From Jan. to Dec. 1981, oblique hauls from near the bottom to surface were made monthly at all stations using a HT net (0.3 mm mesh size) fitted with a calibrated flow meter. Larval and postlarval stages of the 4 species⁴⁻⁷ were sorted from the whole sample. Their density is expressed as no. (100 m³)⁻¹ of water filtered. For convenience of presentation, the developmental stages are broadly grouped into larvae and postlarvae, the former consisting of all larval stages including mysis and the latter, all postlarval stages. Seasons are arbitrarily classified into SW monsoon (June-Sept.), postmonsoon (Oct.-Jan.) and premonsoon (Feb.-May).

Results

Larvae—Larval stages (Fig. 1A) of *M. dobsoni* and *M. affinis* sustained high density at 20 m depth zone

(52.1 and 52.4% respectively) followed by 10 m depth zone (31.4 and 25% respectively). In the case of *P. merguensis* and *P. stylifera*, the highest density was observed at 30 m depth zone (50.8 and 54.8% respectively) and the second highest at 20 m depth zone (36 and 25.9% respectively). Larval stages of all the species were poorly distributed at 40 m depth zone. Dec.-Jan. was the period of maximum larval abundance of *M. dobsoni* and *M. affinis* in the coastal waters with a primary peak at 10 m depth zone in Jan. for the former [1320.(100 m³)⁻¹] and at 20 m depth zone in Dec. for the latter [523.(100 m³)⁻¹]. In the case of *P. merguensis* and *P. stylifera*, the peak larval abundance was recorded at 30 m depth zone in Feb. [248 and 695.(100 m³)⁻¹ respectively].

Conspicuous seasonal variation in larval abundance was observed in all species. Postmonsoon season registered 61.2% of the total larvae collected in the case of *M. dobsoni* and 57.1% in the case of *M. affinis*. On the other hand, larval stages of *P. merguensis* (64.4%) and *P. stylifera* (59.6%) were abundant during the premonsoon season. Larvae of all the species were poorly distributed during the monsoon season (Fig. 1A).

Postlarvae—Distribution of postlarvae of all 4 species is presented in Fig. 1B. The general trend in distribution was more or less similar to that of the respective larval stages except that they were considerably less in number. Unlike the larvae, postlarvae of *M. dobsoni* and *M. affinis* sustained maximum abundance at 10 m depth zone (61.8 and 53.6% respectively), *P. merguensis* at 20 m depth zone (53.6%) and *P. stylifera* at 30 m depth zone (62.4%). The largest number [no.(100 m³)⁻¹] of postlarvae of *M. dobsoni* (66 in July), *M. affinis* (21 in Dec.) and *P.*

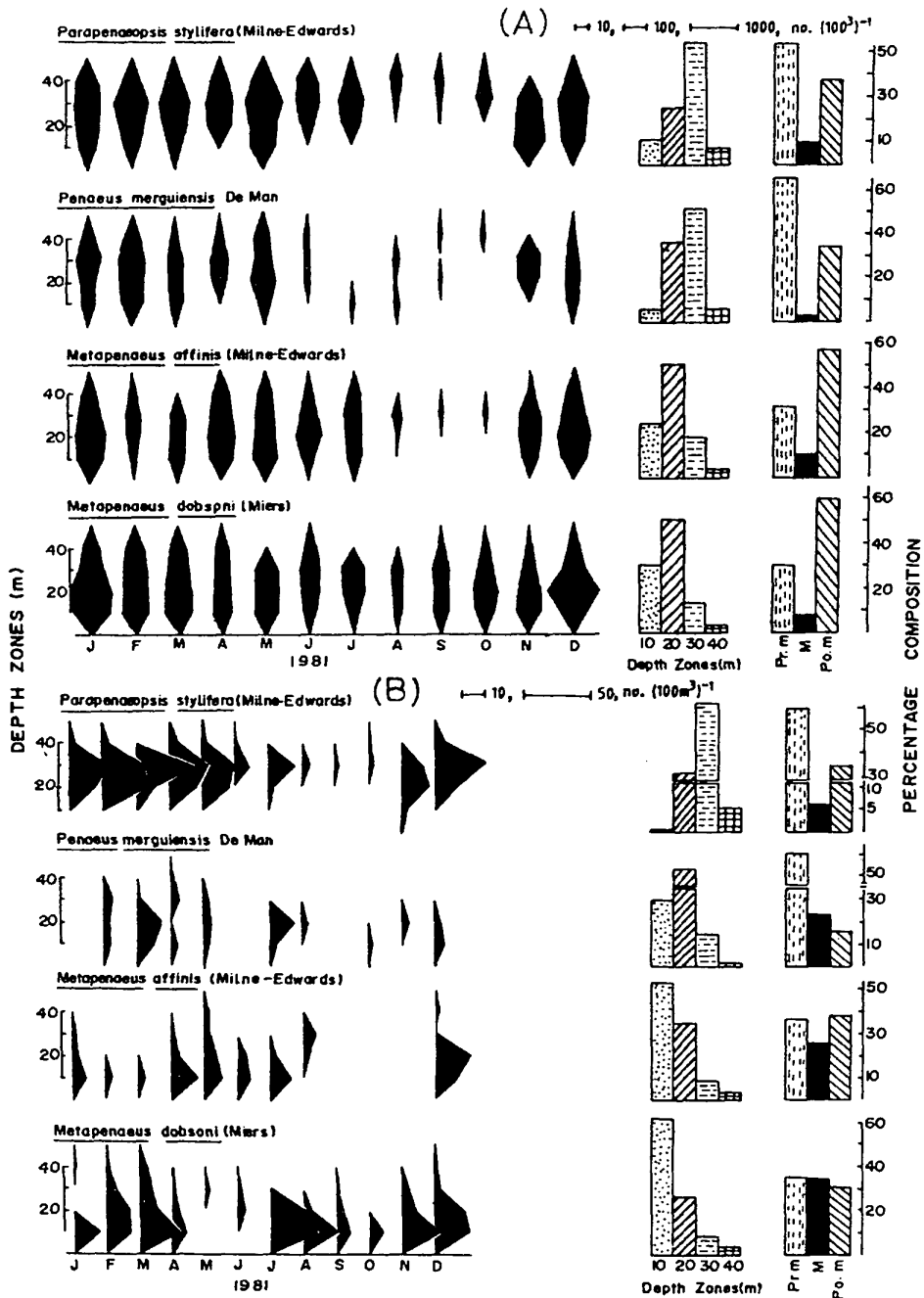


Fig. 1— Distribution of (A) larvae and (B) postlarvae of penaeid prawns in the coastal waters of Goa

merguensis (12 in July) was collected at 20 m depth zone while that of *P. stylifera* (42 in Mar.) at 30 m depth zone. As compared to other species, postlarvae of *P. stylifera* had a wider distribution in the coastal waters.

Well pronounced variation in seasonal abundance was not observed in the case of *M. dobsoni* postlarvae.

In the case of *M. affinis*, the difference between pre and postmonsoon seasons was negligible but monsoon season registered only 25% of the total. It was, however, very conspicuous for those of *P. merguensis* and *P. stylifera* respectively with 60.9 and 59.6% of the total being recorded during the premonsoon season.

Statistical analysis—The larval and postlarval abundance was subjected to multiple analysis of variance and the critical difference was worked out. Almost similar picture was obtained in both the cases except that the interaction, depths *vs* months was not significant for postlarval abundance. The species were significantly different ($P < 0.001$), indicating that larvae and postlarvae of *M. dobsoni* and *P. stylifera*, in that order, were numerically abundant. Significant difference between the depth zones ($P < 0.001$) showed that larval stages were abundantly occurring at 10 and 20 m depth zones whereas postlarval stages at 20 m depth zone. Between the months difference ($P < 0.001$) indicated that larval stages were distributed in significant numbers in the coastal waters between Nov. and July and postlarval stages between Feb. and Apr. and in Dec. Significance of interaction, species *vs* depth zones ($P < 0.001$) suggested that larval and postlarval abundance at 20 m depth zone was mainly contributed by *M. dobsoni* and *P. stylifera* while the larval abundance at 30 m depth zone was largely supported by those of the former. Species *vs* months was significant ($P < 0.001$) indicating that the larval and postlarval abundance of individual species was significantly different during different months. Larval stages of *M. dobsoni* were abundantly occurring from Dec. to Mar., *M. affinis* from Nov. to Jan. and Apr. to June, *P. merguensis* from Dec. to Mar. and in May and *P. stylifera* from Nov. to May. Postlarval abundance in the above order of the species was, from Feb. to Mar. and in Dec., in Apr. and Dec., during Feb.-Apr. and between Feb. and Apr. and in Dec.

Discussion

The 4 species under investigation form the bulk of the penaeid prawn landings from Goa waters. They showed species specific difference in breeding ground as the larval stages of *M. dobsoni* and *M. affinis* occurred more abundantly within the 20 m depth zone and those of *P. merguensis* and *P. stylifera* between 20 and 30 m depth zone. Distinct seasonal variation in breeding activity was also observed. Although both *M. dobsoni* and *M. affinis* were found to breed throughout the year, they were intensely breeding during the postmonsoon season as their larval stages were encountered in large numbers during this season. On the other hand, the active breeding period of *P. merguensis* and *P. stylifera*, based on their larval abundance, was found to be the premonsoon season. However, all the species showed poor breeding activity during the monsoon season.

It was reported² that the larval stages of all the penaeid prawns occur abundantly in the coastal waters of Goa during the premonsoon season. This, however, was found to be in agreement with the present findings only in the case of *P. merguensis* and *P. stylifera* whereas both the *Metapenaeus* spp showed higher abundance during the postmonsoon season. The breeding grounds of *M. dobsoni* and *P. merguensis*, identified earlier² based on the larval abundance, was also not in full agreement with the present results as the former was reported to breed actively even at 25 m depth zone and the latter at 10 m depth zone. As mentioned above, the present investigation indicated that the intense breeding activity of *M. dobsoni* was confined to within the 20 m depth zone and that of *P. merguensis* between 20 and 30 m depth zone.

The difference noticed in the active breeding periods of the same species inhabiting the nearshore waters of Cochin⁸ suggests the possibility of some regional variation in their breeding behaviour. It is also noteworthy that the secondary breeding peak reported during the monsoon season in Cochin waters was not observed in Goa waters.

It is well known that postlarval stages enter the estuaries for initial growth and hence they are not abundant in the coastal waters. However, postlarvae of *P. stylifera* enjoyed a wider distribution in the coastal waters over a relatively longer period because this is purely a marine species. It appears that postlarvae tend to aggregate in the close inshore waters during the monsoon season as observed in the case of *M. dobsoni* and *P. merguensis* in July, which was also reported by Goswami and George². This may probably be due to the adverse conditions prevailing in the estuaries during this season.

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