

Biology of Commercially Important Penaeid Prawns of Goa Waters

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Recruitment of *Metapenaeus dobsoni* from the estuary to the exploitable stock occurred at 50-60 mm size as against 70-80 mm for *M. affinis* and 80-90 mm for *Penaeus merguensis*. Seasonal and monthly variations in recruitment were discernible. Breeding population of these species also showed monthly and seasonal fluctuation. In *M. dobsoni* and *M. affinis*, maximum number of gravid females was recorded during postmonsoon season while in the case of *P. merguensis* and *P. stylifera*, it was during the premonsoon season. Relative condition factor was invariably > 1 for those size groups which had more number of mature females. The gut contents of these species suggested that *M. dobsoni* was essentially a detritivore while the other 3 species were omnivores.

Of the 17 species of penaeid prawns recorded from Goa waters¹, only 4 species, viz. *Metapenaeus dobsoni* (Miers), *M. affinis* (Milne-Edwards), *Penaeus merguensis* De Man and *Parapenaeopsis stylifera* (Milne-Edwards), are obtained in commercial scale. Practically, no information is available on any aspect of biology of these species from this region. In the present communication some important aspects of fishery biology of these species are presented.

Materials and Methods

Random samples of the 4 species were collected fortnightly during Jan. - Dec. 1981 from the commercial shrimp trawlers operating in the coastal waters of Goa. They were sexed and the total length (cm) from tip of rostrum to tip of telson and respective weights (g) were noted. Maturity condition of female was recorded². Guts were carefully separated and contents were evaluated by 'point method'³. Relative condition factor (Kn) was calculated using the equation⁴, $Kn = W/aL^b$. For convenience, the fortnightly data were pooled month-wise and presented here.

Results and Discussion

Recruitment to adult stock—Except *P. stylifera*, all other species studied are estuarine dependent as they grow initially in this habitat and later migrate to the sea for sexual maturity and spawning. Hence, the smallest size group of these species persistently occurring in the catches was considered as the size at which they were being recruited to the adult stock from the nursery. *M. dobsoni* was represented by 50-60 mm size group, *M. affinis* by 70-80 mm size group and *P. merguensis* by 80-90 mm size group. Intense recruitment of *M.*

dobsoni was observed during Feb. - April and in Nov., *M. affinis* during Feb. - May and in Oct. and *P. merguensis* during March-April and in Oct. During the monsoon (June-Sept.), recruitment of these species was generally poor. Assuming that these species follow the growth model derived for adults of the respective species from Goa waters⁵, *M. dobsoni* and *M. affinis* would have had a growth of about 4-5 months and *P. merguensis*, about 5-6 months in the estuarine environment before emigrating to marine biotope. Almost similar period of residence in the estuarine habitat was reported for these species both in the Cochin backwaters⁶ and estuaries of Goa⁷.

Breeding stock—Females with late maturing ovaries (stage III) and mature ovaries (stage IV) were considered as the breeding stock of these species. Percentage composition of different size groups of the breeding stock is shown in Fig. 1. Mature females of *M. dobsoni* and *P. stylifera* were present in all size groups from 70-75 mm onwards. However, 95-105 mm groups (42.4%) and 100-110 mm groups (34.3%) formed the main stay of breeding stock of *M. dobsoni* and *P. stylifera*, respectively. Although spawners of *M. affinis* were represented in almost all size groups above 95-100 mm, two distinct peaks were observed, one at 110-115 mm (15.1%) and the other at 150-155 mm (16.7%). Those above 160 mm were mostly spent ones. Mature females of *P. merguensis* were fairly common and somewhat equally distributed in smaller size groups up to 170 mm, above which their number reduced considerably.

Monthly variation and seasonal composition of the breeding stock are presented in Fig. 2. In *M. dobsoni* and *P. stylifera*, breeding stock occurred throughout the year in varying numbers with the maximum

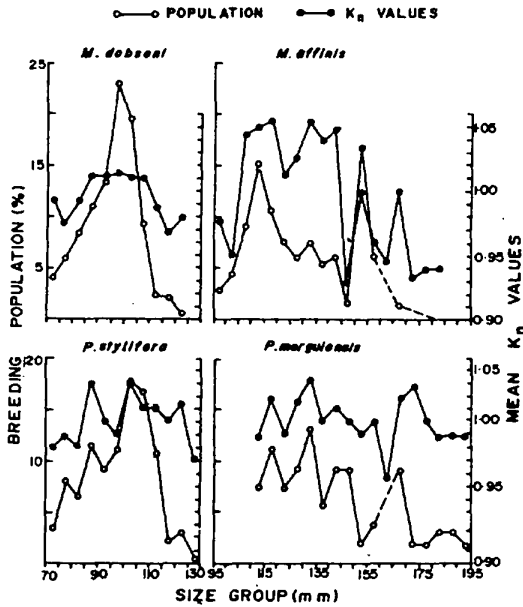


Fig. 1—Composition of different size groups of breeding stock and mean K_n values

population during the postmonsoon season (Oct.-Jan.) for the former (49.6%) and premonsoon season (Feb.-May) for the latter (53.4%). The largest monthly contribution of spawners for *M. dobsoni* was in Jan. (20.7%), while for *P. styliifera* was in Dec. (31%) and April (30.6%). Monthly and seasonal variations of the breeding stock of *M. affinis* were more or less similar to those of *M. dobsoni* except that they were absent during Aug.-Sept. Total absence of spawners of *P. merguensis* was noticed during the entire monsoon season with the maximum abundance during the premonsoon season (72.2%), having the primary peak in March (37%).

Monthly and seasonal variations of the breeding stock of the species presently studied were in close agreement with their larval abundance observed in the coastal waters and estuaries of Goa⁸⁻¹⁰. A year round breeding activity of *M. dobsoni* and *P. styliifera* as observed presently was reported from other parts of the west coast of India^{2,11-15}. The breeding behaviour of *M. affinis* was studied from the southwest coast of India^{2,13,14,16} and Bombay waters¹⁷. However, the peak breeding activity of this species showed some difference from what was observed presently. Information on the breeding activity of *P. merguensis*, is not available from Indian waters for comparison. The present study indicates that the breeding activity of penaeid prawns, in general, was very poor in the coastal waters of Goa during the monsoon season, thus confirming the same conclusion drawn earlier based on the larval abundance of these

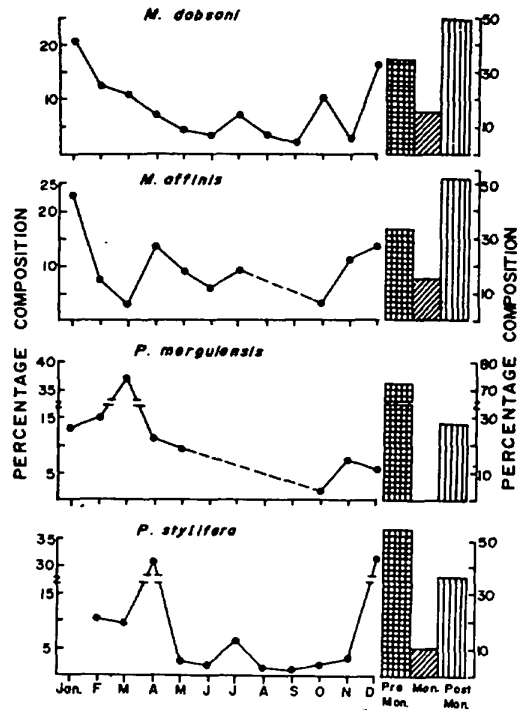


Fig. 2—Monthly and seasonal composition of breeding stock

species in the coastal waters and estuaries of Goa^{8,10}.

Relative condition factor (K_n)—Relative condition factor indicates the well-being of an animal¹⁸ and hence animals in good condition will have a factor > 1 and those in poor condition < 1 . Rajyalakshmi¹⁹ and Thomas²⁰ have reported that higher K_n values in penaeid prawns represent their cyclic gonad development and breeding activity. To find out whether maturity condition was exerting any influence on the condition of these prawns, mean K_n value was worked out for each size group (Fig. 1). Although K_n values of different size groups were not exhibiting large variations, they were relatively high and invariably > 1 for those size groups which had more number of spawners. Hence, it may be inferred that higher K_n value is an indirect indication of the presence of spawners and a fall in condition factor is closely related to the presence of spent-recovering females.

Food habits—Only marginal monthly variations were observed in the composition of different food items both in adults and juveniles. Hence, only average percentage composition is given (Table 1). Adults and juveniles of *M. dobsoni* were essentially detritivores. Vegetable matter formed a substantial percentage in juveniles of *M. affinis* and *P. merguensis* as compared to their adults. Crustacean remains were a major constituent in juveniles and adults of *P. merguensis*

Table 1—Average Percentage Composition of Different Food Items of Penaeid Prawns

Food item	<i>M. dobsoni</i>		<i>M. affinis</i>		<i>P. merguensis</i>		<i>P. stylifera</i>
	J	A	J	A	J	A	A
Detritus	86.5	89.7	64.7	73.2	40.3	48.0	57.4
Crustacea	1.2	0.9	1.3	4.7	16.2	13.0	9.2
Mollusca	0.3	0.2	1.7	0.6	0.3	2.4	2.7
Polychaeta	—	—	5.8	0.7	—	0.3	0.1
Vegetable matter	6.1	6.2	15.7	6.5	26.1	7.2	3.2
Shell fragments	—	—	3.3	8.2	11.6	22.7	20.6
Sand particles	5.9	2.3	7.5	5.8	5.5	5.6	5.0
Other items	—	0.7	—	0.3	—	0.8	1.0

J = Juvenile; A = Adult

and adults of *P. stylifera*. Polychaetes and molluscs were the other organisms found in small quantity in all the species. Shell fragments and sand particles were present in varying percentage, the former in some cases in substantial quantities.

Some reports suggest that penaeid prawns are selective in their feeding habit^{21,22} while some others suggest that they are basically omnivores^{10,23,26}. However, Menon²⁷ and Panikkar and Menon²⁸ have suggested that *M. dobsoni* is mainly a detritus feeder, as also observed in the present study. The gut contents of the other 3 species also, though did not indicate any selective feeding behaviour, appeared to be more actively feeding rather than merely browsing on the substratum. Dall²⁹ opined that detritus contains enormous quantities of micro-flora and meio-fauna which may be an ideal food for penaeid prawns. This may be true as detritus formed the major food item in all the species notwithstanding the large variation in the percentage composition.

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