

Natural diet of the moon crab, *Ashtoret miersii* (Henderson, 1887) collected from the southeast cost of India.

***Sartaj Ahmad Allayie¹, S. Ravichandran², S.Hemalatha¹, Bilal Ahmad Bhat¹ and RM. Anbuezhian²**

1- Department of Zoology, Annamalai University, Annamalainagar – 608 002, Tamil Nadu, India.

2- Centre of Advanced Study in Marine Biology, Annamalai University, Parangipettai-608502, India.

*E-mail: s.h.sartaj@gmail.com

ABSTRACT

During monsoon season, a total of 550 *Ashtoret miersii* were obtained from Parangipettai coastal environment, south-east cost of India to study its natural diet. The occurrence of this crab is the first record in Indian coast which expands in its known range. The analysis of gut contents indicated that these crabs are primarily carnivorous. Their diet consisted of 52% to 84% of animal tissue. The juveniles and sub adults of this crab were found to feed actively than adults. The diet of juveniles was mainly composed of mollusks (11%) and arthropods (32%) by volume. The stomach contents of sub adult crabs were dominated by arthropods (38%) whereas in adults, mollusks were the major food (32%). Dietary diversity values were consistently high in all cases and variation was slight. However, variation was somewhat higher between juveniles and adults classes.

Key words: First record; gut contents; carnivorous; juveniles; sub adults and adults

INTRODUCTION

Most crabs are foraging omnivores although certain families show tendencies towards a more specialized diet. Marine crabs are reported as being mainly carnivorous, preying on slow-moving invertebrates such as mollusks and crustaceans. Typical studies are those on *Portunid* crabs (Tagatz, 1968; Paul, 1981; Williams 1982; Satish, 1986; Joaquim *et al.*, 2002). But many mangrove sesamid crabs are herbivores (Ravichandran *et al.*, 2006). The diets of tropical and sub-tropical marine crabs are relatively uniform because of high diversity and regular availability of prey species. In contrast, the diets of temperate species change markedly as a result of lower diversity and seasonal changes in the availability of prey species. Despite the occurrence of *A.miersii* crabs in the South- east coast of India, the diet and feeding behaviour of this crab is not yet studied. Nevertheless information on many aspects of its biology and ecology is still scarce. Hence the present study has been carried out to know the proportions of materials in the gut and nature of contents.

MATERIALS AND METHODS

Crabs for the present study were obtained from south-east cost of India. A total of 550 crabs obtained from collections were used for the study. Based on carapace width (CW), three groups namely, juveniles (<15 mm CW), sub adults (15-25 mm CW) and adults (>25 mm CW) were segregated. The food content present in the

foregut only was used for the present study for easier identification of various food components. The intensity of feeding was determined based on the degree of distension of stomach wall, amount of food contained in it and classified as full, half-full and empty (Hynes, 1950). The food contents were identified into various taxonomic groups and the relative abundance of each of the groups was estimated by the frequency of occurrence method and the volumetric methods as suggested by Williams (1981) for the study of food and feeding habits of these moon crabs. Most of the food items of these moon crabs were found in highly crushed form and hence only the hard structures that could be recognized were relied for qualitative evaluation.

RESULTS

A total of 550 crabs obtained from south-east coast of India were used for this study. Of these, 125 crabs were juveniles, 270 were sub adults and the rest of them were adults. In juveniles, about 64% were full and the rest were half-full. Figs. 1 and 2 show the percentage frequency of occurrence of different food items in the foregut and estimated percentage contribution of the different food items to the total volume of observed crab diet of juveniles.

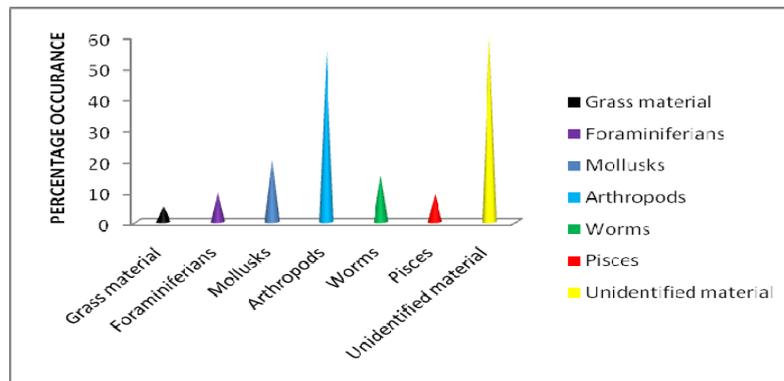


Fig. 1: Percentage frequency of occurrence of dietary composition for juveniles.

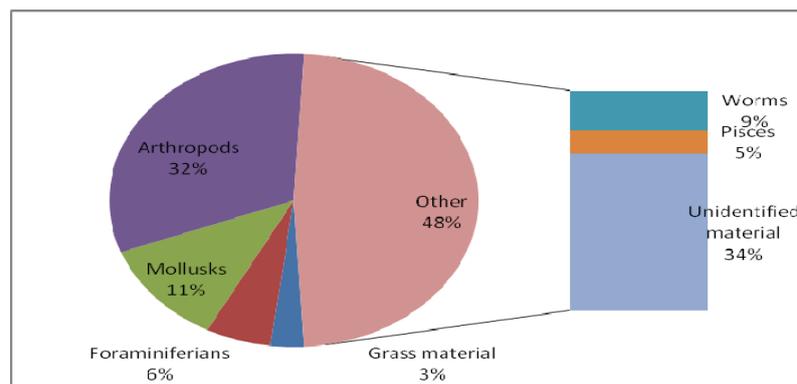


Fig. 2: Estimated percentage contribution of the different food items to the total volume of observed crab diet (juveniles).

Foraminiferans, worms, mollusks and arthropods were the common food items in the foregut of juveniles, the most frequently occurring prey being arthropods (55%). Arthropods represented by shrimps and crabs made the highest contribution in terms of volume. About 20 % of foregut was filled with mollusks, 15 % with worms and 10 % with foraminiferians (Fig. 1). Other items met within the stomach included Pisces (9 %) and unidentified material (60 %). Of the 270 sub adult crabs, 80% had

their stomach full, 1.85 % had empty stomach and remaining crabs had half full stomach. Mollusks, arthropods, fishes and worms formed the most frequently occurring items of food (Fig. 3 & 4) presents the percentage contribution of different food items in terms of total volume of food in the sub adults. Arthropods made the highest contribution (38%) in terms of volume.

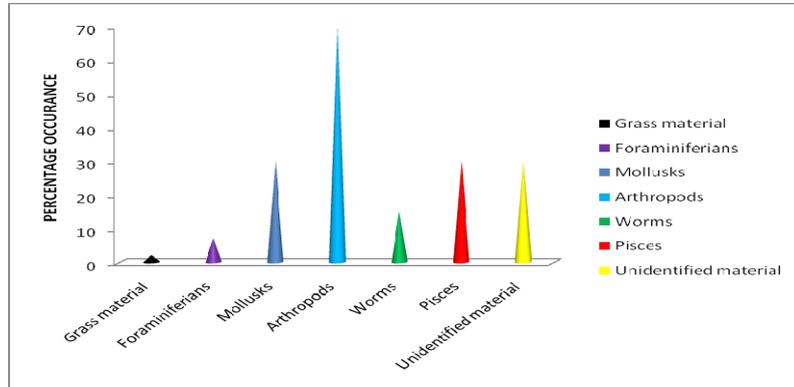


Fig. 3: Percentage frequency of occurrence of dietary composition for subadults

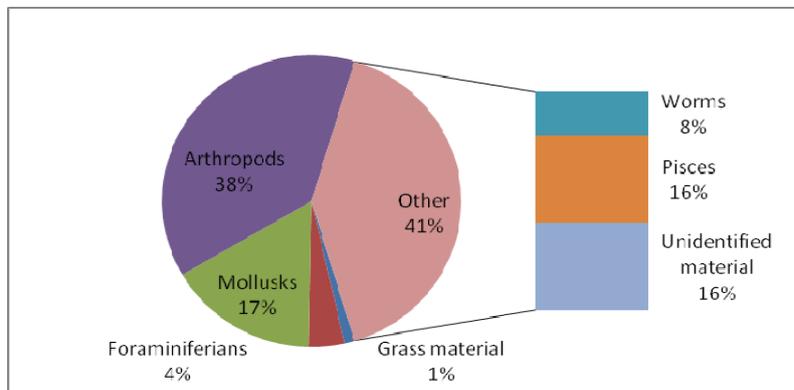


Fig. 4: Estimated percentage contribution of the different food items to the total volume of observed crab diet (subadults).

Similarly of the 155 adult crabs, 86 % had their stomach full and remaining crabs had half full stomach. Mollusks, arthropods, fishes and worms formed the most frequently occurring items of food (Figs. 5 & 6) presents the percentage contribution of different food items in terms of total volume of food in the adults. Mollusks made the highest contribution (32%) in terms of volume.

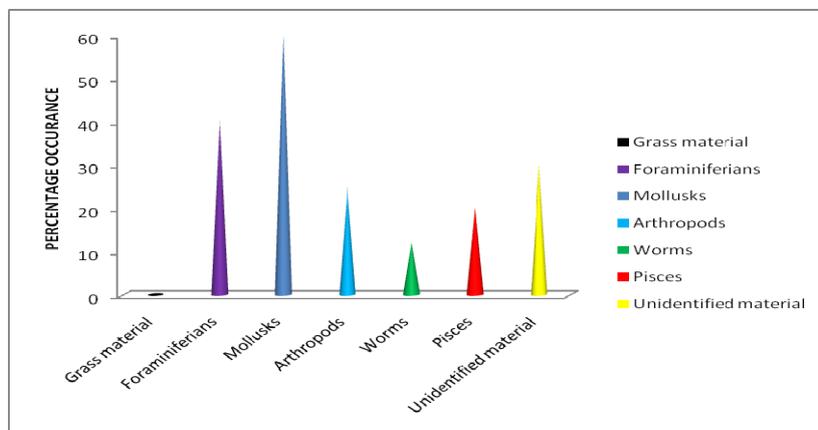


Fig. 5: Percentage frequency of occurrence of dietary composition for adults.

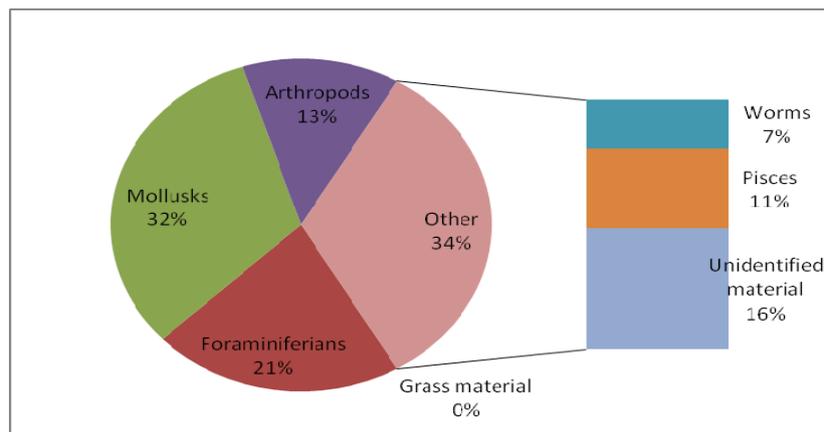


Fig. 6: Estimated percentage contribution of the different food items to the total volume of observed crab diet (adults).

DISCUSSION

The analysis of gut contents of *A. miersii* crabs indicated that these crabs are primarily carnivores. The occurrence of this crab is the first record in Indian coast which expands in its known range. Earlier it was recorded from Japan, 1976; Sri Lanka in 1995 but interestingly in India it was reported in Madras coastal waters during 1893 before 118 years after that for the first time it was recorded in Parnagipettai waters. The reason for why this crab species to be caught in our coastal area may be due to the changes in the drifting of ocean currents or other natural calamities like tsunami and cyclone etc., where by the eggs and larvae of the crabs may be drifted from other (Japan, Sri Lanka) to our coastal area. The present observations indicate that Juvenile crabs obtained exclusively from the south-east coast of Indian environment showed a high feeding intensity than the adult crabs. Nevertheless, qualitative study of food of different life stages showed notable variations in the food eaten by crabs at different stages of growth. The most preferred food items in the juvenile stages are arthropods, mollusks and foraminiferians whereas in sub adult crabs arthropods and mollusks are preferred food items. The high percentage of arthropods and mollusks in the diet of juvenile and sub adult crabs respectively may be due to the abundance of such organisms in that habitat. Losse (1969) reported the voracious feeding habit of *Charybdis smithii* in the pelagic habitat. Jewett and Feder (1983) have also made similar observation in the juveniles of tanner crab, *Chionoecetes bairdi*. They assumed that small crabs might be expected to feed more intensively than larger crabs as moulting frequency among smaller crabs is greater and hence requires a greater amount of energy. The most common food items consumed include arthropods, mollusks, worms and fishes as in the case of most other portland crabs (Joel and Sanjeevaraj, 1986; Sukumaran and Neelakantan, 1996). But the findings of Ravichandran *et al* (2006) are contradictory to present investigation. He recorded 40 to 72 % of plant material in the gut contents of various mangrove crabs. The existence of dense concentration of arthropods and mollusks in the deep scattering layers of the coast of India has been well established (Mini Raman and James, 1990; Suseelan and Nair, 1990). It can be concluded that the preponderance of some food groups in the stomach reflects the relative abundance of the same in the habitat as suggested by Ennis (1973) for the lobster *Homarus americanus*. In the case of adult crabs, however, crustacean food material was relatively less in the stomach, although mollusks and fish remains formed one of the

major items of food consumed. From this it may be inferred that arthropod food preference of *A. miersii* is more pronounced among subadults.

ACKNOWLEDGEMENTS

Authors are greatly thankful to University Grants Commission, Government of India for the financial support.

REFERENCES

- Elnor, R. W. (1981). Diet of the green crab *Carcinus maenas* from Port Herbert, Southwestern Nova Scotia. *J. Shellfish Res.*, 14: 89-94.
- Ennis, G. P. (1973). Food, feeding and condition of lobsters, *Homarus americanus*, throughout the seasonal cycle in Bonavista Bay, Newfoundland. *J. Fish. Res. Bd. Canada*, 34: 2203-2207.
- Hynes, H. B. N. (1950). The food of freshwater stickle backs (*Gasterosteus aculeatus* and *Pygosteus pungitius*) with a review of methods used in studies of the food of fishes. *J. Anim. Ecol.*, 19: 36-58.
- Joaquim O. B., M. J. Lunardon-Branco, J. R. Verani, R. Schweitzer, F. Xavier Souto and W. Guimaraes Vale. (2002). Natural Diet of *Callinectes ornatus* Ordway, 1863 (Decapoda, Portunidae) in the Itapocoroy Inlet, Penha, SC, Brazil. *Brazil. Arch. Biol. Technol.*, 45: 35-40.
- Jewett, S. C. and H. M. Feder (1983). Food of the tanner crab *Chionoecetes bairdi* near Kodaik Island, Alaska. *J. Crustacean Biol.*, 3(2): 196-207.
- Joel, D. R. and P. J. Sanjeevaraj 1986. Food and feeding of the two species of *Scylla* (de Haan) Portunidae Brachyura). *J. mar. biol. Ass. India*, 28(1&2): 178-183.
- Losse, G. F. (1969). Notes on the portunid crab *Charybdis edwardsi* Leene and Buitendijk 1949 from the Western Indian Ocean. *J. Nat. Hist.*, 3:145-152.
- Mini Raman and P. S. B. R. James (1990). Distribution and abundance of Lantern fishes of the family Myctophidae in the EEZ of India. *In: Proc. First Workshop Scient. Result. FORV Sagar Sampada*, 5-7, June, 1989, Cochin, India, K. J. Mathew (Ed.), Cochin, CMFRI, 1990, 285-290.
- Paul, R. K. G. (1981). Natural diet, feeding and predatory activity of the crabs *Callinectes arcuatus* and *C. toxotes* (Decapoda, Brachyura, Portunidae). *Mar. Ecol. Prog. Ser.* 6: 91-99.
- Ravichandran, S., T. Kannupandi and K. Kathirasan, (2006). Mangrove leaf processing by sesamid crabs. *Ceylon J. Sci. (Bio. Sci.)*, 35(2): 107-114.
- Satish C. Choy, (1986). Natural diet and feeding habits of the crabs *Liocarcinus puber* and *L.holsatus* (Decapoda, Brachyura, Portunidae). *Ecol. Prog. Ser.*, 31: 87-99.
- Sukumaran, K. K. and B. Neelakantan (1996). Food and feeding of *Portunus (Portunus) sanguinolentus* (Herbst) and *Portunus (Portunus) pelagicus* along Karnataka coast. *Indian J. Mar. Set*, 26(1): 35-38.
- Suseelan, C. and K. R. Manmadan Nair (1990). Quantitative distribution of pelagic shrimps in the Deep Scattering Layers of the Indian EEZ. *Proc. First Workshop Scient. Result. FORV Sagar Sampada*, 5-7 June 1989, Cochin, India, K. J. Mathew (Ed.), Cochin, CMFRI, 1990, p. 361-370.
- Tagatz, M. E. (1968). Biology of the blue swimming crab, *Callinectes sapidus* Rathbun, in the St. John River, Florida. *Fish Wildl. Sew. Fish. Bull.* 67: 17-33
- Warner, G. F. (1977). The biology of crabs. *Elek Sci.*, London Williams, M. J. 1981. Methods for analysis of natural diet in portunid crabs (Crustacea; Decapoda: Portunidae). *J. Exp. Mar. Biol. Ecol.*, 52: 103-111.
- Williams, M. J. (1981). Methods for analysis of natural diet in portunid crabs (Crustacea; Decapoda: Portunidae). *J. Exp. Mar. Biol. Ecol.*, 52: 103-111.