FOOD AND FEEDING BEHAVIOUR OF MUD CRAB *SCYLLA TRANQUEBARICA* (FABRICIUS, 1798)

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ABSTRACT

Diet of mud crab *S.tranquebarica* consists of crustaceans, mollusks, fish remains, detritus, debris and undigested flesh. Quantitative analysis of the gut contents contributed 53.18% crustaceans, 24.69% molluscan remains, 16.91% fish remains and 3.02% & 1.23% of detritus and debris respectively. The study indicated that this species is primarily predators of sessile and slow moving benthic macro invertebrates. The presence of detritus, debris and undigested flesh items in the stomachs suggested that the crabs are detritivorous consuming fresh and decaying flesh of all kinds. The sex wise and size wise of diet in these crabs may be largely due to relative abundance of prey species in the habitat or related to change in cheliped strength and foraging behaviour.

Key words : Mudcrab, Scylla tranquebarica, food and feeding

INTRODUCTION

*Scylla* spp. are large mud crabs distributed widely in the estuaries of Indo-Pacific region being reported as a predator of slow moving and sessile benthic organisms (Hill, 1976), but omnivorous in the general assessment. However, the feeding ecology of this crab depends on the source or abundance of its food in the environment. The investigations of the feeding strategy and natural food, clearance rate and activity have been described (Hill, 1976, ’79). In *S. serrata*, the feeding habits have been already reported by Prasad *et al.* (1984) (Sunker backwaters, Karwar), Joel and Sanjeeva Raj (1986) (Pulicat Lake), Prasad and Neelakantan (1988) (Karwar waters) and Mustaquim *et al.* (2001) (Karachi backwaters).

The feeding habits of the other crabs have been attempted in *Thalamita crenata* (Stefano *et al.*, 1996), *Portunus sanguinolentus* and *P. pelagicus* along Karnataka coast (Sukumaran and Neelakantan, 1997), *Charybdis smithii* (Balasubramanian and Suseelan, 1998) and intertidal shore crab.

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**Materials and Methods**

Samples were collected from the commercial landings along Parangipettai coast. After recording the carapace width, sex and moulting stage, the body of the crab was cut open from the dorsal side and the foregut was removed carefully and the gut was preserved in 10% formalin. To facilitate penetration of formalin to preserve the gut, the dorsocardiac region was pierced with a sharp needle before preserving it in formalin. It was cut open and the content was flushed out into a petridish with water. The gut contents were identified and separated into different food groups under a binocular microscope. Based on the gut content, the stomach of the crabs studied was grouped under any one of the following categories: actively fed (gorge, full, ¾ full); moderately fed (½ full); poorly fed (¼ full, trace) and empty.

To estimate the volume of food group, points were assigned to food groups as suggested by Swynnerton and Worthington (1940). The percentage of points was estimated by using the following formula:

\[
PP = \frac{\text{Points of the particular food group}}{\text{Total points of all food groups}} \times 100
\]

The relationship of food items in relation to sex and size has been calculated using analysis of covariance (ANOVA) and the level of significance seen at 5% level (p>0.05).

**Results and Discussion**

The number of specimens of *S. tranquebarica* collected for food and feeding was 311 of which 94.21% had stomach contents. Occurrence of many of the food items could be established only from the body fragments. The crustacean remains mainly included the different body parts of shrimps and crabs. The individual items could not be identified as they were found in a semi-digested state. The molluscan remains included the bivalve and gastropod shells. The fish remains in the stomach comprised mostly of skeleton and scales. The detritus comprised of many materials like body parts of invertebrates, mud and sand with decaying organic matter. The source of semi-digested flesh could not be identified unless accompanied by fish bones or scales or crustacean fragments. The sand particles might have entered the stomach during the feeding process.

**Food composition in relation to sex**:

The percentage of composition of food items in males, females and combined is presented in Table 1 and Fig. 1. Overall, in both the sexes together, the crustacean remains occurred at a frequency of 53.18%, molluscan remains at 24.69%, fish remains at 16.91%, detritus at 3.02%, debris at 1.23% and semi digested flesh at 0.97%.

Although crustacean, molluscan and fish remains formed the most favoured food item, there was a difference in the preference shown by the sexes to these foods. Thus crustaceans were the most favoured food items in males (54.52%) and in females (51.84%). However the second most favoured food item
Food and feeding behaviour of mud crab *Scylla tranquebarica*

by the males and females was molluscan remains (23.75% and 25.63%) and next fish remains (16.14% and 17.68%). The feeding intensity was higher in females than in males.

**Food composition in relation to size (carapace width) groups:** The percentage of composition of food items in relation to size (carapace width) groups is given in Table 2. It is evident from the above table that out of the various food items, the crustacean remains were found to be present in higher proportions (56.52%) in the smaller size groups of 51-100mm and in lower proportions (44.36%) in the bigger size groups of 151-200mm. The molluscan remains was found maximum (26.57%) in 101-150mm size groups and minimum (22.19%) in 51-100mm size groups. The fish remains was reported more (22.47%) in 151-200mm size groups and less (15.66%) in 101-150mm size groups. The detritus and debris were found higher in 101-150mm size groups followed by 151-200mm and 51-100mm. The maximum feeding intensity was observed in the 151-200mm followed by 101-150mm and 51-100mm. The maximum feeding intensity was observed in the 151-200mm followed by 101-150mm and 51-100mm size groups. The highest percentage of empty stomach was noticed in 101-150mm size group. The results of the ANOVA i.e. sex wise and size group wise relationship in terms of food items was found significant for both at p<0.05 level.

The earlier studies on the food and feeding of *Scylla* spp have shown that they feed on crustaceans, molluscs, fishes etc. (Hill, 1976; Prasad *et al.*, 1984; Joel and SanjeevaRaj, 1986 and Prasad and Neelakantan, 1988). As characteristic of brachyurans, most of the food items were found in highly crushed form and hence only the hard structures that could be recognized were relied for qualitative evaluation. The most preferred food items are pelagic shrimps and crabs; whereas in subadult crabs the same are teleost fishes and brachyuran crabs which may be due to the abundance of such organisms in that habitat (Balasubramanian and Suseelan, 1998).

In the present study, the fragments of antenna, rostrum, telson, maxilla and parts of exo and endoskeleton that were found in the gut, helped in the identification of the food species. The food usually comprised of remains of crustaceans, molluscs and fishes, detritus, debris and undigested flesh. The crustacean remains in the guts of the crab were those of amphipods, isopods, hermit crabs, *Uca* spp., *P. pelagicus*, *P. sanguinolentus*, *Penaeus indicus*, *P. merguiensis*, *P. monodon*, *Metapenaeus dobsonii*, *M. monoceros* and small sized *S. serrata* etc. Molluscan comprised of both gastropods and bivalves usually *Meretrix meretrix*, *M. casta*, *Crassostrea* sp., *Telescopium* sp. and *Cerithidea* sp. Vertebrae and some skeletal pieces of *Mugil* spp. and *Etroplus suratensis* fishes whose identity was difficult to make out, formed the third part of the food of the crab. The leafy matter, algal filaments, mud and sand also were noticed in the crabs studied apart from the above items.

Hill (1976) reported from his analyses of the foregut contents of *S. serrata* that it is a predator of sessile or slow moving benthic micro invertebrates, chiefly molluscs. Small crabs also contained, mollusc and crustacean remains. It is also possible that plant material may be part of the natural diet of juvenile stages. In supporting this view, in the present study also the crustacean remains (56.52%)
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were highly consumed by the 51-100mm size groups than the other two size groups.

Hill (1979) observed that food location was by contact chemoreception using the dactyli of the walking legs in *S. serrata* and it showed preference towards small crabs as prey because of their larger mass and higher energy content when compared with the other prey organisms. In the present study also, the crustacean remains formed the major food item (upto a maximum of 64.66%).

Next to the crustaceans, the molluscan remains contributed more occupying second position (32.40%) in the present study. For the consumption of molluscs (bivalves and gastropods) the chelae and certain mouth parts are suitably adopted. The blunt large teeth of the dactylus and five other lower teeth, the first four of which are so arranged in rows of two, as to position the shells for crushing. The maxillips and mandibles of these species have the ability to skillfully manipulate the meat position of the crushed gastropod and the bivalve shells. Further the observed ability of the juveniles to capture the fast moving preys like fish, prawns, etc. may be linked to the long, slim and sharp toothed chelae with a relatively high proportion of fast contracting muscles that are well adapted for the rapid snapping movements (Joel and SanjeevaRaj, 1986).

Table 1. Percentage composition of various food items in relation to sex in the mud crab *Scylla tranquebarica*

<table>
<thead>
<tr>
<th>Food items</th>
<th>Males</th>
<th>Females</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crustacean remains</td>
<td>54.52</td>
<td>51.84</td>
<td>53.18</td>
</tr>
<tr>
<td>Molluscan remains</td>
<td>23.75</td>
<td>25.63</td>
<td>24.69</td>
</tr>
<tr>
<td>Fish remains</td>
<td>16.14</td>
<td>17.68</td>
<td>16.91</td>
</tr>
<tr>
<td>Detritus</td>
<td>3.26</td>
<td>2.78</td>
<td>3.02</td>
</tr>
<tr>
<td>Debris</td>
<td>1.34</td>
<td>1.12</td>
<td>1.23</td>
</tr>
<tr>
<td>Undigested flesh</td>
<td>0.99</td>
<td>0.95</td>
<td>0.97</td>
</tr>
</tbody>
</table>

With the help of RFLP (Restriction Fragment Length Polymorphism) and RAPD (Random Amplified Polymorphic DNA) – PCR recent biotechnological techniques a primer has to be designed for each food item and to be identified and what preferences they have in feeding.
Table 2. Percentage composition of various food items in relation to size (Carapace width) groups in the mud crab *Scylla tranquebarica*

<table>
<thead>
<tr>
<th>Food items</th>
<th>51-100mm</th>
<th>101-150mm</th>
<th>151-200mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of specimens examined</td>
<td>216</td>
<td>63</td>
<td>32</td>
</tr>
<tr>
<td>No of empty stomachs</td>
<td>10</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Crustacean remains</td>
<td>56.52</td>
<td>49.69</td>
<td>44.36</td>
</tr>
<tr>
<td>Molluscan remains</td>
<td>22.19</td>
<td>26.57</td>
<td>24.83</td>
</tr>
<tr>
<td>Fish remains</td>
<td>16.95</td>
<td>15.66</td>
<td>22.47</td>
</tr>
<tr>
<td>Detritus</td>
<td>3.58</td>
<td>4.08</td>
<td>3.69</td>
</tr>
<tr>
<td>Debris</td>
<td>0.51</td>
<td>2.46</td>
<td>2.14</td>
</tr>
<tr>
<td>Undigested flesh</td>
<td>0.25</td>
<td>1.54</td>
<td>2.51</td>
</tr>
</tbody>
</table>

Fig. 1. Percentage composition of different food items in the mud crab *Scylla tranquebarica*

Male

- Crustacean remains
- Molluscan remains
- Fish remains
- Detritus
- Debris
- Undigested flesh

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REFERENCES


