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Analysis of diet and proximate composition of few creek fishes from Vasai creek, Thane District (Maharashtra)

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ABSTRACT

The present study was aimed to determine the diet and proximate composition of *Tilapia mossambica, Boleophthalmus dussumieri, Mugil cephalus, Mystis vittatus, Parachaeturichthys ocellatus* and *Therapon jarbua* from Vasai creek of Mumbai coast. The food items in the gut were graded by the method of Index of Preponderance. Diet composition revealed that *T.mossambica* and *B.dussumieri* were herbivores as the diet contained index value of 77.91% and 75.01% plant matter. *M. cephalus* and *M. vittatus* were omnivores as plant matter was 57.04% and animal matter was 38.5% in the former and plant matter was 35.52% and animal matter was 59.24% in the later. *P.ocellatus* and *T.jarbua* were carnivores with 60.18% and 96.83% animal matter. Proximate composition showed that protein was high in *M.cephalus* (15.62%) followed by *P.ocellatus* (14.47%), *T.mossambica* (14.08%), *T.jarbua* (13.91%), *B.dussumieri* (12.76%) and *M.vittatus* (11.85%).The lipid content was highest in *T.jarbua* (3.98%) and least in *P.ocellatus* (0.89%). High moisture content was recorded from *P.ocellatus* (80.05%) and low in *M.cephalus* (74.74%), while high carbohydrate was found in *M.vittatus* (2.25%) and low in *T.jarbua* (0.86%). The ash content ranged between 4.93% to 3.63%. The overall nutrient compositions of these fishes were in comparison with that of commercial fishes. Diet composition did not show any effect on the nutrient composition of these fishes.

Key words : *Vasai creek, Diet composition, proximate composition*

Introduction

The diet reveals the habit, habitat and trophic position of organisms in ecosystem (Nikolsky 1963). Food and feeding habits of a fish is of primary importance since the growth, reproduction, development, migration and other physiological activities are dependent on the energy derived from the food (Bal and Rao 1984). The nature and quality of nutrients in most species is dependent upon their food type. Feeding habit of an individual fish species has great effects on its body nutrients composition (Lagler *et al.*,1977). The proximate composition of fish is necessary to ensure that they meet the requirements of food regulations and commercial specifications (Watermenn 2000)

The Vasai creek is an estuarine creek and lies between 19º 20´N and 72º45´E. It is one of the main distributaries of Ulhas river estuary in Western coast. It is surrounded by mangroves and organic rich mudflats, hence rich in fertility with high primary production. These habitat forms an ideal ground as nursery, feeding, breeding and shelter for many indigenous fishes. Fishing in this creek is high during monsoon and post monsoon months. The present study focuses on the diet composition of few fishes from Vasai creek like *Tilapia mossambica, Boleophthalmus dussumieri, Mugil cephalus, Mystus*

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vittatus, Parachaeturichthys ocellatus and *Therapon jarbua* and their biochemical composition.

Materials and Methods

Random fish samples of *Tilapia mossambica, Boleophthalmus dussumieri, Mugil cephalus, Mystus vittatus, Parachaeturichthys ocellatus* and *Therapon jarbua* were collected during monsoon period between June 2012 to September 2012 from the local fisher men of Vasai creek. Fishes were brought to the laboratory, cleaned and length and weight was noted. It was dissected and whole gut was removed and preserved in 5% formalin. The contents of the gut were examined under microscope. The food items were sorted and identified. The occurrence method (Hynes1950) and percentage volume by displacement method (Pillay 1952) were employed. The food items were graded by the method of Index of Preponderance (Natarajan and Jhingaran 1961) which was calculated by the formula

$$I = \frac{Vi\ Oi \times 100}{\Sigma\ ViOi}$$

Proximate composition of fish was determined by Standard convention method. Moisture was estimated by drying the pre-weighed wet sample at 105ºC±2 until a a constant weight was obtained. This was expressed in percentage. Protein was estimated by method of Lowry *et al.,* (1951) and was expressed in percentage. Carbohydrate was estimated by the method of Hedge (1962) using anthrone reagent and expressed in percentage. Lipid was estimated by the method of Folch *et al.,* (1957). Ash was determined by taking moisture free sample in pre weighed crucible and incinerating in a muffle furnace at a temperature of 600ºC±50 for 4 to 5 hours. The crucible was removed, cooled in a desicator and weighed. The value was expressed as percentage.

Results

The diet composition of *Tilapia mossambica, Boleophthalmus dussumieri, Mugil cephalus, Mystus vittatus, Parachaeturichthys ocellatus* and *Therapon jarbua* is shown in Table no1 to 6 and Figure no. 1 to 6. The results indicated that *Tilapia mossambica* fed on plant matter consisting of green algae, diatoms, and detritus which formed about 77.9% while animal matter consisting of insects, crustaceans, fish eggs and scales formed about 21.59%. *Boleophthalmus dussumieri* fed on 75.04% plant matter and 16.76% animal matter. Thus both the fishes were herbivorous.

Mugil cephalus fed of 57.04% plant matter of which diatoms formed the major bulk of 25.71% while animal matter was 38.5%. *Mystus vittatus* fed on 35.52% plant matter and 59.24% animal matter. Thus both the fishes exhibited omnivorus type of feeding habit.

Parachaeturichthys ocellatus showed animal matter was 60.18% and plant matter formed 30.12% while in *Therapon jarbua* animal matter was 96.83% and 3.17% diatoms. Thus showing carnivorous feeding habit.

The proximate composition of *Tilapia mossambica, Boleophthalmus dussumieri, Mugil cephalus, Mystus vittatus, Parachaeturichthys ocellatus* and *Therapon jarbua* is shown in Table 7 and Figure 7. It shows high moisture content in *P.ocellatus* (80.05%) and low in *Mugil cephalus*(74.74%). The protein was high in *M cephalus* (15.62%) followed by *P.ocellatus* (14.47%), *T mossambica* (14.08%), *T jarbua* (13.91%), *B.dussumieri* (12.76%) and *M vittatus* (11.85%). The lipid content was high in *T.jarbua* (3.98%) followed by *M.cephalus* (3.4%), *T.mossambica* (2.86%), *M.vittatus* (2.25%), *B.dussumieri* (1.08%) and *P.ocellatus* (0.89%). The carbohydrate content was highest in *M vittatus* (2.73) and lowest in *T.jarbua* (0.86%). The ash content was as high as 4.93% in *M. vittatus* and as low as 3.63% in *P.ocellatus.*

Discussion

Diet composition data are used for the estimation of trophic levels (Pauly and Christensen 2000a and Pauly and Sa-a 2000) as it is important for aquatic management. Vasai creek is an estuarine creek and is home to large number of organisms. Analysis of diet composition of six different species of fishes of Vasai creek showed that all of them showed difference in their diet composition. Diet composition of *Tilapia mossambica* showed that the main food consisted of green algae, diatoms and detritus while insects, crustaceans, fish parts formed obligatory food. Arvindan (1980) had reported that *T.mossambica* fed on filamentous algae, detritus, fish eggs, larvae and mysis in the estuaries of Kayamkulam, Kerala. In *Boleophthalmus dussumieri* diet consisted of green algae and diatoms as main food and hepacticoid, nematode and crustaceans formed obligatory food. Mutsaddi and Bal (1969)

Table 1. Index of Preponderance of diet composition of different fishes from Vasai creek.

Tilapia mossambica		Boleophthalmus dussumieri	
Food items	Index of preponderance	Food items	Index of preponderance
Green algae	40.32	Green Algae	30.23
Diatoms	15.38	Diatoms	38.12
Detritus	22.21	Herpacticoid	5.15
insect parts	6.29	Detritus	6.69
Crustaceans	11.8	Nematode worms	6.11
Fish scales and fish eggs	3.5	crustaceans	5.5
Sand	0.5	mud and sand	8.2
Mugil Cephalus	Mystus vittatus		
Food items	Index of preponderance	Food items	Index of preponderance
Green algae	20.11	Crustaceans	26.58
Diatoms	29.71	Rotifers	12.23
Annelids	4.51	Insects	15.22
Crustaceans	15.25	Green algae	9.28
Bivalves	2.23	Diatoms	10.34
Detritus	21.22	Detritus	15.91
fish scales and eggs	2.51	Mud and sand	5.23
sand	4.46	Fish scales and eggs	5.21
Parachaeturichthys ocellatus	Therapon jarbua		
Food items	Index of preponderance	Food items	Index of preponderance
Crustaceans	45.66	Fishes	52.44
Mollusc	14.52	Crustaceans	30.48
Fishes	5.25	Polycheates	5.21
Detritus	15.76	Insects	8.7
Algae	5.82	Diatoms	3.17
Diatoms	8.54		
Sand and Mud	4.45		

Table 2. Proximate composition of different fishes from Vasai creek.

Fish	Moisture	Protein	Lipid	Carbohydrate	Ash
Tilpia mossambica	75.92	14.08	2.86	2.3	4.84
Boleophthalmus dussumeiri	*79.32*	13.76	1.08	*1.2*	*4.64*
Mugil cephalus	74.74	15.62	3.4	2.1	4.14
Mystus vittatus	77.24	12.85	2.25	2.73	4.93
Parachaeturichthys ocellatus	*80.05*	14.47	0.89	0.96	3.63
Therapon jarbua	77.02	13.91	3.98	0.86	4.23

Figure no.1 Diet composition of different fishes from Vasai creek.

from Gujarat coasts recorded algae, diatoms, polycheates, nematodes, crustaceans and teleost eggs in the gut of *B.dussumieri* while Rathod and Patil (2009) reported that it fed predominantly on diatoms and algae while harpactocoids and nematode worms were accidental food from Ulhas river estuary,Thane. *Mugil cephalus* was found to feed on green algae, diatoms, crustaceans, detritus, annelids, bivalves, fish eggs and scales. Tandel *et al* (1986) has reported that *M.cephalus* from Thane creek fed mostly on diatoms and sometimes on polycheates and algae. In present study *M.cephalus* was found to be omnivorous feeding on both plant and animal matter. This is due to the fact that *M.cephalus* feeds on animal matter when there is no sufficient availability of plant food. The diet composition of *Mystus vittatus* showed that it fed on crustaceans, rotifers, insects, green algae, diatoms, detritus, fish scales

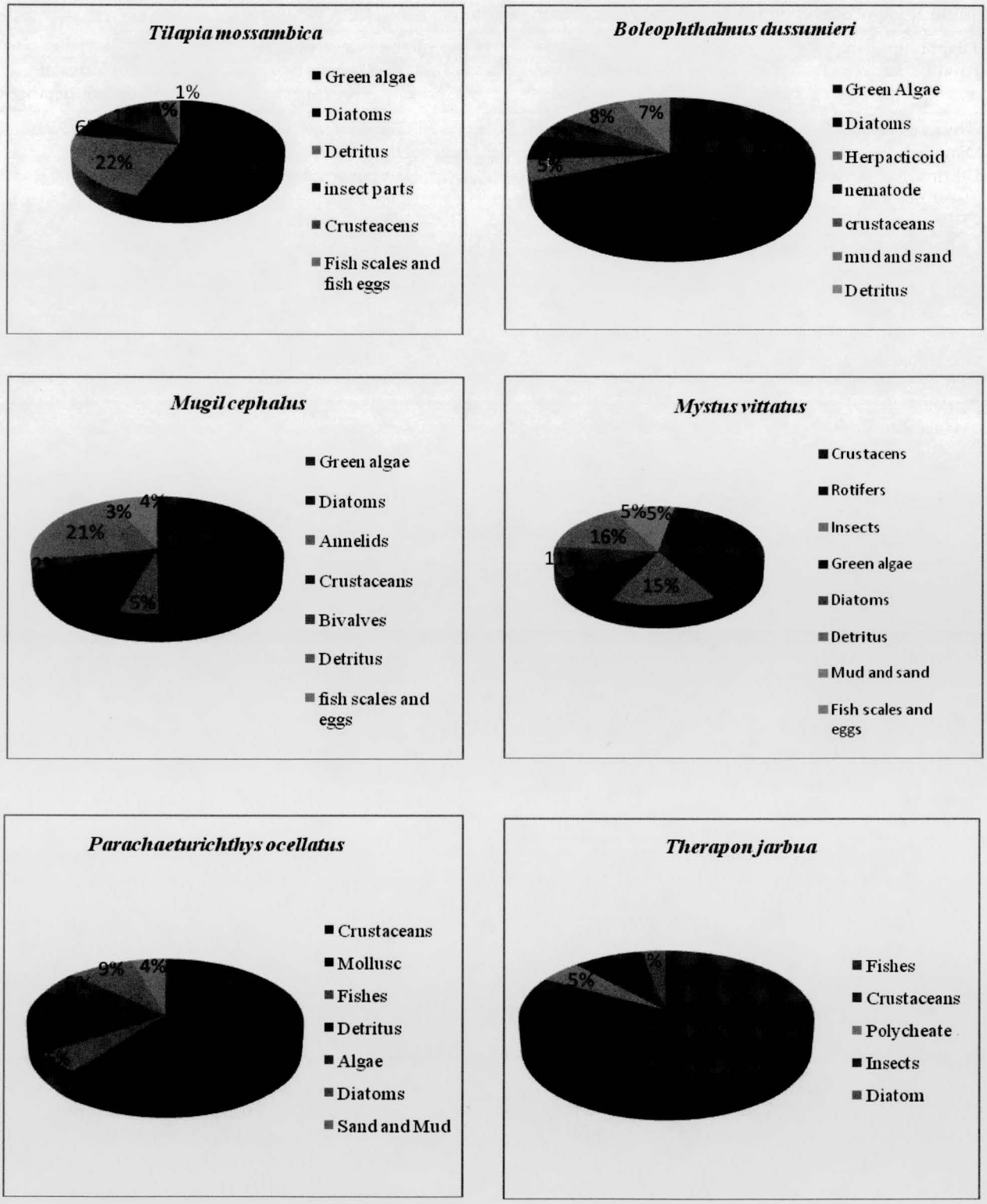

Fig. 1. Diet composition of different fishes from Vasai creek.

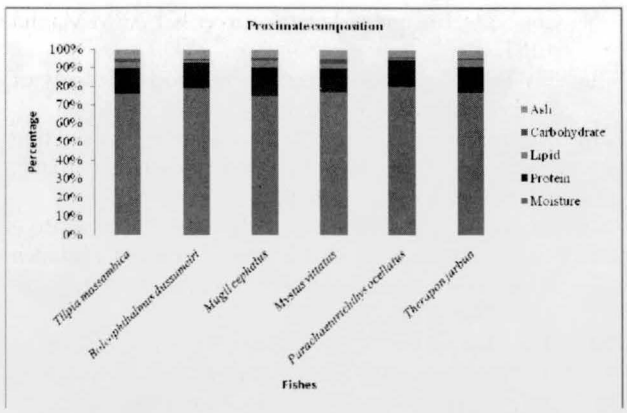

Fig. 2. Proximate composition of different fishes

and eggs. The main food of *M.vittatus* was animal matter but was found to shift its diet as per the availability of food in the creek. This was in agreement with Rao and Shivani (1996) who reported that it fed on polycheates, diatoms, detritus, algae, crustacean larvae and mollusc from Gosthani estuary. *Parachaeturichthys ocellatus* was found to feed on crustaceans, mollusc and fishes as main food while detritus, algae and diatoms formed obligatory food. There is no literature available on food and feeding of *P.ocellatus*. *Therapon jarbua* was found to feed on fishes, crustaceans, polycheates, insects and diatoms. Diatoms were obligatory food in *T.jarbua* as it might have consumed while feeding at the bottom of the creek. Rao and Durgaprasad (2002) reported that it fed on shrimps, teleosts fishes, squilla crabs and their juveniles. Thus *T.mossambica* and *B.dussumieri* were found to be herbivorous, *M.cephalus* and *M.vittatus* were omnivorous while *P.ocellatus* and *T.jarbua* were carnivorous in Vasai creek. It was observed except *T.jarbua* all other fishes fed on detritus and algae. In estuaries detritivory : herbivory ratio are often high compared to other waters (Lin *et al.*, 2001). Berg (1979) and Pillay (1952) reported that the analysis of stomach contents of fish could provide information about the niche of a particular fish in its ecosystem. In the present study all the fishes were found to feed from the bottom of the creek. The variations in the diet composition in these fishes allowed less inter specific competition among them for food although it occupied same habitat.

The proximate composition of above species of fishes showed that they were all nutrient rich fishes comparable with commercial fishes. The percentage of protein was high in *M.cephalus* (15.62) while lowest was in *M.vittatus* (12.85). Both the species which had high protein and low protein value were omnivores feeding on both plant and animal matter. In *M cephalus* plant matter was more than animal matter while in *M.vittatus* animal matter was higher than plant matter. Both species showed change in diet as per their availability. Lipid was found to be higher in *T.jarbua* (3.98) and low in *P.ocellatus* (0.89). The difference in lipid content of the fish may be related to its reproductive condition. Moisture, carbohydrate and ash content showed a narrow range of difference between the fishes. Thus there was no marked variation in the proximate composition of these fishes and diet does seem to influence it.

In conclusion the diet composition of six different fishes from Vasai creek shows that this estuarine creek is a rich source of food for these fishes and their preference for a particular food is according to their habitat. The biochemical composition shows the potent nutrient value of these fishes. There is a huge demand for these creek fishes. The present study would provide some basic information on the food and feeding and nutrient value opening new vistas for culture of these fishes.

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