Food and feeding behaviour of Mozambique tilapia (*Oreochromis mossambicus* Peters) from Borna Reservoir of Maharashtra, India

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**Abstract**
The food analysis of 80 specimens of *Oreochromis mossambicus* collected from Borna Reservoir of Maharashtra, India revealed that the food of juveniles mainly consisted of rotifers (35%), followed by copepods (30%), Chlorophyceae (20%), Bacillariophyceae (10%) and aquatic insects (5%). While the food items recorded in the gut of adults were Chlorophyceae (40%), followed by Bacillariophyceae (30%), rotifers (15%), copepods (10%) and aquatic insects (5%). During present study it was found that the juveniles of *O. mossamobicus* mainly feed on zooplankton, and adults on phytoplankton. Intense feeding was noticed during summer season and juveniles were the active feeders.

**Keywords:** Food and feeding; *Oreochromis mossambicus*; exotic fish; Borna Reservoir; Maharashtra; India

**INTRODUCTION**
Food is the basic prerequisite for growth, development, survival and existence of all organisms. Ross (1986) identified that in aquatic environments food is the main factor and that its partition defines fundamental groups within the community, which get together in guilds according to the trophic similarity. Food plays an important role in the growth, migration and spawning behaviour of the fish. As the nature of food depends upon the nature of several biotic and abiotic factors, the problem is interesting from specific, as well as ecological point of view (Bhuiyan *et al.* 2006).

Studies on the food and feeding habits indicate the species niche in the ecosystem, their food preferences and food spectrum overlaps. The study of food and feeding habits of freshwater fish species is a subject of continuous research because it constitutes the basis for the development of a successful fisheries management. Different fishes consume different types of food items. Thus, the food and feeding habits of fish have immense ecological value. By studying the food and feeding habits, the pattern of inter-specific competition of fishes can be assessed.

Food and feeding habits of freshwater fishes in India has been a field of interest to fisheries researchers since very long. The food and feeding habits of *Heteropneustes fossilis* from the Brahmaputra River system in Assam was studied by Kohli and Goswami (1996) and they found fry as planktrophagous. Juveniles feed on crustacean, plant matter, miscellaneous matter and insects. Adults feed on insects, detritus and plant matter. Serajuddin *et al.* (1998) conducted the study of food and feeding habits of *Mastacembelus armatus* and pointed out that this fish as carnivorous and highly predacious. Jesu *et al.* (2004) studied the food and feeding habits of *Mystus montanus*
from river Tambaraparani and categorized the fish as an omnivorous bottom feeder. Rajkumar et al. (2007) conducted the study on the food and feeding habits of *Catla catla* from Daya reservoir of Udaipur (Rajasthan) and categorized this species as planktivorous. Padmakumar et al. (2009) studied the food and feeding behaviour of *Horabagrus brachysoma* and reported this fish as omnivorous. Choudhuri (2010) described the food and feeding strategy of *Puntius conchonius* and concluded that availability of certain food items made the fish euryphagous and availability of limited food items made it stenophagous. According to Choudhuri (2010) *P. conchonius* is either a stenophagous omnivore or a euryphagous omnivore. Anna Mercy et al. (2002) reported *Puntius melanampyx* as omnivorous bottom feeder. Sakhare (2010) studied food and feeding habits of an exotic fish, *Cyprinus carpio* from water bodies of Ambajogai. Arthi et al. (2011) summarized the food and feeding habits of two freshwater fishes viz., *Ompok bimaculatus* and *O. malabaricus* and inferred that these both the species are omnivorous, feeding mainly on vegetable matter and fish. Sakhare et al. (2012) studied the food and feeding habits of *Channa punctatus* from the paddy field of Sivsagar district (Assam) and reported this fish as carnivorous. Kanwal and Pathani (2012) reported the food and feeding habits of a hill stream fish, *Garra lamta* from some tributaries of river Suyal (Uttarakhand) and found this species as the bottom grazing planktivorybivorous. Sakhare and Chalak (2014a) conducted the study on food and feeding habits of *Clarias batrachus*, feeding on small fish, insect larvae, shrimps and organic debris. Sakhare and Chalak (2014b) have given a report on the food and feeding habits of *C. catla* from water bodies around Ambajogai.

Mozambique tilapia (*Oreochromis mossambicus*) is native of Africa and the Middle East. They have spread mainly through introductions for fish farming and are now found in all tropical and semitropical continents. Tilapia is now being farmed in more than 90 countries. It is cultured in India, Thailand, Pakistan, Sri Lanka, Vietnam, South Africa, Java, Malaysia, Uganda etc. and the backwater ponds of Indonesia. The nick name ‘aquatic chicken’ has been used in Java, Malaysia, Uganda etc. and the backwater ponds of India, Thailand, Pakistan, Sri Lanka, Vietnam, South Africa, Mozambique tilapia (*O. mossambicus*) were collected from October 2014 to September 2015. The specimens were collected from Borna Reservoir near Parli (Vaijnath) by using gill net once in every month. Just after collection, 10% formalin solution was injected into the guts of all fishes. The specimens were finally preserved in 10% formalin. Individual food items were separated in petridishes. The food items were identified (Pennak 1953; Ward and Whipple 1959) under the microscope. Gravimetric method (Hynes, 1950) was followed for estimation of the percentage composition of different food items.

### RESULTS

Various food items and their percentage composition found in the gut of *O. mossambicus* are depicted in Table 1. Rotifers (35%) formed the main diet of juveniles of *O. mossambicus* (Figure 1) and were represented by *Brachionus calyciflorus*, *B. falcatus*, *B. diversicornis* and *Lecane bulia*. Keratella tropica and *Filinia longiseta* recorded in the gut of adults were not seen in the gut of juveniles.

<table>
<thead>
<tr>
<th>Group</th>
<th>Organisms in gut</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorophyceae</td>
<td>Spirogyra sp., Pediastrum sp.</td>
</tr>
<tr>
<td>Bacillariophyceae</td>
<td>Fragilaria sp., Synedra sp., Nitzschia sp., Navicula sp., Melosira sp., Pinnularia sp.</td>
</tr>
<tr>
<td>Rotifers</td>
<td>Brachionus calyciflorus, B. falcatus, B. diversicornis, Keratella tropica, Lecane bulia, Filinia longiseta</td>
</tr>
<tr>
<td>Copepods</td>
<td>Mesocyclops hyalinus, <em>M. leuckarti</em>, <em>Diatomus orientalis</em></td>
</tr>
<tr>
<td>Aquatic insects</td>
<td><em>Gryllus</em>, Mosquito larvae.</td>
</tr>
</tbody>
</table>

Copepods (30%) formed the next important item of diet of juveniles of *O. mossambicus* and comprised of *Mesocyclops hyalinus*, *M. leuckarti* and *Diatomus orientalis*, followed by Chlorophyceae (20%). Members of Chlorophyceae recorded in the gut were *Spirogyra* sp and *Pediastrum* sp.

Bacillariophyceae formed 10% of the diet. *Fragilaria* sp, *Synedra* sp, *Nitzschia* sp, *Navicula* sp, *Melosira* sp. and
**Pinnularia** sp. were the members of Bacillariophyceae observed in the gut.

Aquatic insects found in the gut were *Gryllus* and mosquito larvae. They contributed to 5% of the gut content of *O. mossambicus*.

In adults Chlorophyceae formed the main item of gut contents forming 40 percent (Figure 2). The major genera of Chlorophyceae in the diet of the species were *Spirogyra* sp., *Pediastrum* sp. Bacillariophyceae was next in the order of dominance forming 30 percent in the gut contents of *O. mossambicus*. This group was mainly represented by *Fragilaria* sp., *Synedra* sp., *Nitzschia* sp., *Navicula* sp., *Melosira* sp., *Pinnularia* sp. Rotifers formed 15 percent of the gut contents. This group was represented by *B. calyciflorus*, *B. falcatus*, *B. diversicornis*, *K. tropica*, *L. bulla*, *F. longiseta*. Copepods formed 10 percent of the gut contents. Among the copepods, the abundant genera were *M. hyalinus*, *M. leuckarti*, and *D. orientalis*. Aquatic insects formed 5 percent and were represented by *Gryllus* and mosquito larvae.

**Figure 1**: Percentage composition of the food items of juveniles of *Oreochromis mossambicus*

**Figure 2**: Percentage composition of the food items of adults of *Oreochromis mossambicus*

**DISCUSSION**

According to Aravindan (1980), *O. mossambica* is selective in its feeding habits in different environments. Even though filamentous algae, unicellular algae, copepods and detritus are abundant in the pond, the fish showed a marked preference for aquatic plant material. In the river though unicellular algae were available in fair amount, the fish showed a noticeable preference for filamentous algae, ostracods and copepods. In the estuary the fish ate plant matter, but supplemented it with fish eggs and larvae, and mysids.

According to De Moor et al. (1986) small sized tilapias fed initially on zoobenthos and zooplankton, but fish with a mass of over 4 g fed increasingly on *Microcystis aeroginosa* kutzing and detritus until these food items formed the dominant food source in *O. mossambicus* over 8 g. De Moor et al. (1986) also observed some cannibalism in fish up to 64 g in the summer months. There was an ontogenetic adaptation from a carnivorous to a phytoplanktivorous/detritivorous diet. During present study it was found that the juveniles of *O. mossambicus* mainly feed on zooplankton, and adults on phytoplankton. During present investigation cannibalism was not observed. According to Hora and Pillay (1962) the fry of *T. mossambica* feeds on zooplankton and phytoplankton but, the adults are chiefly herbivorous (Vass and Hofestede 1952). Indira et al. (2013) studied food and feeding habits of *O. mossambicus* from Pichavaram mangrove of south east coast of India and observed crustacean, fish, zooplankton, phytoplankton, polychaetes, nematodes, gastropods, bivalves, sand and miscellaneous items in the gut of fish.

Intense feeding in juveniles was observed in early morning and later afternoon but remained high throughout daylight hours decreasing considerably at night (De Moor et al. 1986). Singh and Shukla (2014) observed increase in feeding intensity with rise in water temperature and also observed that the medium sized specimens being more active feeder than larger ones. During present study intense feeding was noticed during summer season and juveniles were the active feeders. Indira et al. (2013) also noticed decrease in feeding intensity with increase in size of *O. mossambicus*.

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**CONTRIBUTION OF THE AUTHORS**

**Vishwas Balasaheb Sakhare**

Drafting and editing of manuscript.

**Shivaji Gyanba Jetithor**

Study of food and feeding.