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Food And Feeding Habits Of Freshwater Teleost: Ompok Bimaculatus, Xenentodon Cancila, Puntius Sarana And Labeo Boggut From Tighra Reservoir, Gwalior (M.P.)

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Abstract

The food composition of Ompok bimaculatus, Xenentodon cancila, Puntius sarana and Labeo boggut were studied for a period of one year i.e., from May, 2012 to April, 2013. All the four fishes feed on both types of foods plant origin as well as animal origin. The food and feeding habit of three freshwater fishes has revealed that O. bimaculatus and X. cancila are carnivorous, Puntius sarana is eury-omnivorous and Labeo boggut is a herbivorous fish. In O. bimaculatus the phytoplanktonic groups are the main contributors of the fish food were 54.37%, macro-invertebrate 21.69%, zooplankton 17.82%, vertebrate 0.92% and miscellaneous items 5.17%. The phytoplankton was found dominant group (58.05%) in X. cancila followed by, zooplankton 23.39%, macro-invertebrate 12.14%, vertebrate 1.22% and miscellaneous items 5.19%. Total food items of Puntius sarana, divided into four groups phytoplankton (67.94%) followed by zooplankton (19.31%), macroinvertebrate (7.61%) and miscellaneous items (5.15%). phytoplankton was the first preference of the Labeo boggut and it was observed for 84.95% of the total food items. The percent composition of remaining groups was zooplankton 10.13%, macroinvertebrate 0.94% and miscellaneous items 3.97%.

Key words: *Food and feeding habits, Carnivorous, Herbivorous and Omnivorous and Tighra reservoir.*

Introduction

All organisms need food for their survival. Food is the main source of energy and plays an important role in determining the abundance of population, rate of growth and condition of fishes. Feeding is a dominant activity of most of the organisms through their entire life cycle and same is true with the fish also (Royce, 1972). The study of food and feeding habits of fishes have manifold importance in fishery biology. A thorough knowledge of food and feeding habit is also necessary for understanding biochemical composition of fish on one hand and for a successful fish forming or aquaculture on the other. The food and feeding habits of fish vary with time of day, season, species and size of the fish with different food substances present in the water body and its ecological factors. The knowledge of food and feeding habit helps to select such species of fish for cultures, which are optimum yielding varieties, utilizing the available potential food of the water bodies properly without any competition among themselves. The importance of study of food and feeding habit of fish lies in the fact that one can decide as to what programme should be taken up for the development of the water bodies to get more fish. Recent work on food and feeding habits of fish has done by several workers viz., Begum *et al.* (2008), Emmanuel and Ajibola (2010), Arthi *et al.* (2011), Masdeu *et al.* (2011), Saikia *et al.* (2012), Priyadarsini *et al.* (2012), Allison and Sikoki (2013), Dutta *et al.* (2013),

Mushahida-Al-Noor *et al.* (2013). Chaturvedi and Saksena (2013), Akombo *et al*. (2014) and Singh *et al. (*2014). In view of above information, study of food and feeding habits of four freshwater fishes, viz., *Ompok bimaculatus*, *Xenentodon cancila, Puntius sarana* and *Labeo boggut* from Tighra reservoir, Gwalior has been conducted and is presented in this paper.

Materials and methods

Collection of the fish samples:

Fish samples were collected on monthly basis from May 2012 to April 2013 from Tighra reservoir. The field collections were done by using cast nets with the help of local fishermen. The fish specimens were dissected out and the gut was removed. It was stretched out and adhering viscera and mesenteries were removed by using brush and blunt forceps to prevent injury to the gut. The total length and weight of gut was taken after soaked up the gut by means of towel. Complete stomach was removed from the gut and weight of stomach was recorded. The stomach was cut and opens to remove its contents. The contents were collected in a glass vials making up the volume to 1 ml. Different food items eaten by the fish were found out qualitatively as well as quantitatively.

Numerical count method:

The food items were identified taking a portion of the gut material. The whole volume of the sample was scanned under a microscope. The number of individuals identified was counted and a total number of food items were found out. The percentage of individual food item was also determined and recorded. This method was given by Hynes (1950).

Percentage of numerical count = Number of individual food item x 100 / Total number of food items

Results and Discussion

Analysis of gut content was made both qualitatively and quantitatively. The gut content of all four species was observed on monthly basis by applying percentage numerical count methods. The minimum quality of food items were observed during summer, especially in April, May and June while the maximum during winter, especially in November, December and January.

Ompok bimaculatus

On the basis of gut content analysis it was observed that this fish was feeding on both plant and animal material. Fish feeds on different types of food items. In the stomach content of *Ompok bimaculatus* phytoplankton, zooplankton, aquatic insect (adult), insect larvae, insect body parts, roundworm, crustaceans, molluscs, fishes and miscellaneous items have been observed. Food items intake by the fish indicates the diverse variety. Phytoplankton belongs to five different groups like Chlorophyceae, Bacillariophyceae, Cyanophyceae, Euglenophyceae, Dinophyceae and zooplankton also belongs to five different groups like Protozoa, Rotifera, Cladocera, Copepoda and Ostracoda have been identified. Bacillariophycean were dominant over others throughout the study. Two different groups viz., Diptera and Coleoptera belong to insect larvae have been identified. Fishes, adult aquatic insect and crustacean like prawn present in semi digested form in the gut of *Ompok bimaculatus.* The phytoplanktonic groups are the main contributors of the fish food were 54.37%, macro-invertebrate 21.69%, zooplankton 17.82%, vertebrate 0.92% and miscellaneous items 5.17%. Bacillariophyceae was the dominant group with 30.53% as far as the number of organisms is concerned. The worm, aquatic insect, crustacean, mollusc and fishes found in the stomach contributed maximum when biomass of food is considered. Bacillariophyceae which was the dominant group contributing (30.53) followed by Chlorophyceae with 11.53%, Cyanophyceae with 6.84%, Euglenophyceae with 5.28 % and Dinophyceae with 0.26%. Among the food organisms the next group after the phytoplankton was macro- invertebrates, which included Aquatic insects 0.79%, dipteran larvae 1.05%, Coleopteran larvae 0.85%, Insects part 5.86%, Roundworm 7.9%, Crustaceans 1.6%, Molluscan 3.64%. Zooplankton belonging to the

members of Protozoa, Rotifera, Cladocera, Copepoda and Ostracoda. The Copepoda was dominant zooplanktonic group encountered (7.01 %) which was followed by rotifera (with 5.25 %) Protozoa (with 3.53 %), Cladocera (with 1.78 %) and Ostracoda (with 0.23%) was observed as the least contributing food group. Vertebrates (fishes) contributed 0.92% of the total food items. The miscellaneous food items (remained unidentified) contributed of about 5.17 % of the total food groups (Table 1).

Xenentodon cancila

In the gut of *X. cancila* Chlorophyceae contributes 11.13%, Bacillariophyceae 32.80%, Cyanophyceae 8.4%, Eugleenophyceae 5.72%, Protozoa 3.01%, Rotifera 8.63%, Cladocera 2.45%, Copepoda 8.89%, Ostracoda 0.41%, Aquatic insects 0.44%, Insects part 3.29%, Roundworm 5.4%, Crustaceans 1.07%, Molluscan 1.94%, Fishes 1.22% and Miscellaneous items 5.19% (Table 2).

The worm, aquatic insect, crustacean, mollusc and fishes found in the stomach contributes the maximum when biomass of food is considered. Thus, on the basis of number of items, it may be concluding that both fishes are eury- omnivorous but on the basis of biomass of food items both The phytoplankton was found dominant group (58.05%) followed by, zooplankton 23.39%, macro-invertebrate 12.14%, vertebrate 1.22% and miscellaneous items 5.19%. fishes can be easily categorised as carnivorous fish.

Puntius sarana

In the stomach content of *Puntius sarana*, phytoplankton, zooplankton, insect larvae, roundworms, crustaceans, molluscs and miscellaneous items have been identified.

On the basis of percentage numerical count it was observed that in the stomach content of *Puntius sarana*, phytoplankton was the first preference of the fish contributes 67.94% to the total food items. The percent composition of other groups included zooplankton (19.31%), macroinvertebrate (7.61%) and miscellaneous items (5.15%).

The mean numerical percentage count of different groups was Chlorophyceae 13.11%, Bacillariophyceae 39.32%, Cyanophyceae 8.82%, Eugleenophyceae 6.69%, Protozoa 1.84%, Rotifera 7.02%, Cladocera 2.15%, Copepoda 8.3%, Dipteran larvae 0.33%, Coleopteran larvae 0.16%, Roundworm 4.31%, Crustaceans 0.32%, Molluscan 2.49%, and Miscellaneous items 5.15% (Table 3).

Labeo boggut

On the basis of percentage numerical count it was found that phytoplankton was the first preference of the *Labeo boggut* and it was observed for 84.95% of the total food items. The percent composition of remaining groups was zooplankton 10.13%, macroinvertebrate 0.94% and miscellaneous items 3.97%. The mean percentage numerical count of different groups was observed as Chlorophyceae 25.72%, Bacillariophyceae 40.77%, Cyanophyceae 11.85%, Eugleenophyceae 6.61%, Protozoa 0.74%, Rotifera 4.47%, Cladocera 0.32%, Copepoda 4 .49%, Ostracoda 0.11%, Roundworms 0.94%, and Miscellaneous items 3.97% (Table 4).

According to the character of diet, adult fish have been classified into herbivores, if they feed on vegetable matter, carnivore, if their food comprise of animal matter, and omnivore if they subsist on mixed diet comprised of both vegetable as well as animal food. From our observations on the gut contents of *O. bimaculatus* and *X. cancila* it can be concluded that both fishes are carnivorous, feeding on wide range of food items *i.e.,* phytoplankton, zooplankton, insects, their larvae and their parts, roundworms, molluscs, crustaceans and fishes. Insects, molluscs, crustaceans and fishes contribute the major portion of their food on the basis of biomass.

A number of workers have described the food and feeding habits in carnivorous fishes Pillay (1953), Das and Moitra (1955), Bhatt (1970), Srivastava *et al.* (2000), Islam *et al.* (2004), Malami and Magawata (2010). Sinha (1984) reported that *Plotosus canius* is a predatory carnivore. The food of the fish mainly consists of crabs, prawns, fishes, molluscs and aquatic insects. Zooplankton and phytoplankton also observed in the gut contents. Uwem *et al.* (2011) have

revealed that *Ophiocephalis obscura* feeds mainly on the food from animal origin, although phytoplankton were also be identified in its gut content and considered as voracious carnivore.

In *Puntius sarana*, percentage of phytoplankton was maximum (67.94%) and small animals like zooplankton, insect larvae, crustaceans, roundworms, molluscs were also present in the stomach of fish so that this fish categorised as eury-omnivorous fish. *Sizothorax niger* is considered as herbi-omnivore, as zooplankton was preferred food item in the gut of fish (Jyoti, 1976). Mondol *et al.* (2005) have reported that *Puntius gonionotus*, a habitant of rice fields, feeds on phytoplankton with least preference for zooplankton. *Mystus gulio* have been classified as euryphagus and omnivorous in food habits (Begum *et al.* 2008). Hanjavanit C. and Sangpradub N. (2009) observed that *Barbonymus altus*, *Notopterus notopterus* and *Ompok bimaculatus* were feeding on phytoplankton, zooplankton, insects and miscellaneous food items hence come under the category of omnivorous. Agbabiaka LA. (2012) observed that *Tilapia zilli* is an omnivorous fish with dietary preference for Algae.

Labeo boggut mainly feeds on phytoplankton (84.95%). Small percentage of zooplankton and macro-invertebrate were present in the gut of *Labeo boggut*, so that this fish was categorised as herbivore fish. Gupta and Banerjee (2013) have revealed that *Amblypharyngodon mola* as herbivorous fish, as phytoplankton was dominant food group in its gut. *Oreochromis niloticus* was found to be herbivorous fish mainly feeds on phytoplankton, detritus and macrophytes (Engdaw *et al.*, 2013). *Labeo dyocheilus* feeds on zooplankton along with insects and macrophytes and classified as herbi-omnivore (Verma, 2013). On the basis of qualitative and quantitative analysis of gut contents of *Tilapia sp.* has been categorised as herbivourous (Singh *et al.*, 2014). Onyeche *et al.* (2014) observed 19 species in Anwai stream and considered them as herbivorous in their feeding habits, as their gut have major portion of blue green algae, green algae and diatoms.

Conclusion

It may be inferred that study on the gut content of four teleost viz., *Ompok bimaculatus*, *Xenentedon cancila*, *Puntius sarana* and *Labeo boggut* was based on percentage numerical count method and suggested that all four fishes feed on plant material and animal material both. Numerically, plant material was higher in comparison to animal material. Higher plant material was not observed during analysis. Animal material including aquatic insect, prawn and fishes were preferred by the *Ompok bimaculatus* and *Xenentedon cancila.* In the stomach content of *Ompok bimaculatus* and *Xenentedon cancila*, if we look the food on the basis of biomass, the animal material is in high proportion. Thus, on the basis of number of items, it may be concluded that both fishes are omnivorous but on the basis of biomass of food items both fishes can be easily categorised as carnivorous fish. In *Puntius sarana*, percentage of phytoplankton was maximum and large animals like fishes and aquatic insect were not present in the stomach of fish so this fish was categorised as eury- omnivorous fish. *Labeo boggut* mainly feeds on phytoplankton. Small percentage of zooplankton and macro-invertebrate were present in the gut of *Labeo boggut*, this fish categorised as herbivorous fish.

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Table 1: Mean percentage numerical count along with Standard Error (S. E.) of various food items in *O.bimaculatus* from May, 2012 to April, 2013

Group Name	Mean ± S. E.

Plant material	
Phytoplankton	
Chlorophyceae	11.59 ± 1.24
Bacillariophyceae	30.53 ± 1.99
Cyanophyceae	6.84± 0.75
Euglenophyceae	5.18 ± 0.62
Dinophyceae	0.26 ± 0.97
Animal material	
Zooplankton	
Protozoa	3.53 ± 0.86
Rotifera	5.25 ± 1.14
Cladocera	1.78 ± 1.00
Copepoda	7.01 ± 0.75
Ostracoda	0.23 ± 0.71
Macroinvertebrates	
Aquatic insect/adult	0.79 ± 0.71
Dipteran larvae	1.05 ± 0.82
colepteran larvae	0.85 ± 0.76
Insect part	5.86 ± 0.91
Roundworm	7.9 ± 1.54
Crustacean	1.6 ± 0.64
Molluscan	3.64 ± 1.00
Vertebrates	
Fishes	0.92 ± 1.14
Miscellaneous items	5.17 ± 0.68

Table 2: Mean percentage numerical count along with Standard Error (S. E.) of various food items in *X. cancila* from May, 2012 to April, 2013

Group Name	Mean ± S. E.
Plant material	
Phytoplankton	
Chlorophyceae	11.13 ± 1.24
Bacillariophyceae	32.80 ± 2.01
Cyanophyceae	8.40 ± 0.75
Euglenophyceae	5.72 ± 0.75
Animal material	
Zooplankton	
Protozoa	3.01 ± 0.80
Rotifera	8.63 ± 1.17

Cladocera	2.45 ± 0.38
Copepoda	8.89 ± 0.94
Ostracoda	0.41 ± 0.22
Macroinvertebrates	
Aquatic insect	0.44 ± 0.09
Insect part	3.29 ± 0.66
Roundworm	5.40 ± 0.46
Crustacean	1.07 ± 0.10
Molluscan	1.94 ± 0.67
Vertebrates	
Fishes	1.22 ± 0.14
Miscellaneous items	5.19 ± 0.56

Table 3: Mean percentage numerical count along with Standard Error (S. E.) of various food items in *P.sarana* from May, 2012 to April, 2013

Group Name	Mean ± S. E.
Plant material	
Phytoplankton	
Chlorophyceae	13.11 ± 1.23
Bacillariophyceae	39.32 ± 2.37
Cyanophyceae	8.82 ± 1.03
Euglenophyceae	6.69 ± 0.61
Animal material	
Zooplankton	
Protozoa	1.84 ± 0.52
Rotifera	7.02 ± 0.75
Cladocera	2.15 ± 0.31
Copepoda	8.30 ± 0.77
Macroinvertebrates	
Dipteran larvae	0.33 ± 0.09
coelepteran larvae	0.16 ± 0.06
Roundworm	4.31 ± 0. 43
Crustacean	0.32 ± 0.08
Molluscans	2.49 ± 0.49
Miscellaneous items	5.15 ± 0.28

Table 4: Mean percentage numerical count along with Standard Error (S. E.) of various food items in *L. boggut* from May, 2012 to April, 2013

Group Name	Mean ± S. E.
Plant material	
Phytoplankton	
Chlorophyceae	25.72 ± 1.49
Bacillariophyceae	40.77 ± 1.7
Cyanophyceae	11.85 ± 1.14
Euglenophyceae	6.61 ± 0.64
Animal material	
Zooplankton	

Protozoa	0.74 ± 0.24
Rotifera	4.47 ± 0.56
Cladocera	0.32 ± 0.09
Copepoda	4.49 ± 0.57
Ostracoda	0.11 ± 0.06
Macroinvertebrates	
Roundworm	0.94 ± 0.20
Miscellaneous items	3.97 ± 0.32

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