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Comparative analysis in Gut content of Indian major carps from Baghel Taal, Payagpur, Bahraich, U.P.

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Abstract

The aim of the present study was to have a comparative analysis of the food composition and feeding habits among three Indian major carps. The gut contents of Indian major carp, *Catla catla*, *Labeo rohita* and *Cirrihinus mrigala* collected from Baghel Taal, Payagpur, Bahraich, U.P. has been analyzed. Author recorded zooplankton, phytoplankton, aquatic insects, plant matter and decay matter from the guts of these 3 carps. It was also seen that there were considerable variations in the percentage of different food items in the gut of above fishes.

Keywords: Baghel Taal, Gut Content Analysis, Indian major carps.

Introduction

The qualitative and quantitative food analysis of fish in their natural habitats helps in understanding the growth, abundance, productivity of water body (Nansimole, *et al.* 2014) [7]. Fishes have become adapted to a wide variety of food. The food of fry and fingerlings are generally different from that of the adult fish. Fishes are highly adaptable in their feeding habits and utilize the readily available food. The magnitude of fish population in a region is the function of food potentialities and are varies with the species, seasons, food availability, food preference, maturity stage and spawning season of the fish (Krishna, *et al.* 2016) [4]. Food and Feeding habits of fishes are important factors for selection of fish for culture to avoid competition for food and live in association to utilize all the available food (Dewan and Saha, 1979) [1].

The relationship between the food component and fish is essential for the production and exploitation of the fish stocks (Sunder, *et al.* 1990) [11]. It is not possible to collect sufficient information of food and feeding habit of fish in their natural habitat without studying its gut contents (Hyslop, 1980) [3]. Food and feeding habit of fishes has a great significance in fish farming. It helps to select such species of fishes for culture which will utilize all the available potential food of the water bodies without any competition with each other but will live in association with other fishes. This will allow the best utilization of food sources of waterbody and will give an optimum yield. The feeding intensity of fish changes during the pre-spawning, spawning and post-spawning seasons. The food and feeding habits of fish vary with the time of day and season of the year and depends upon the availability of food components.

The gut content analysis provides an important insight in to the feeding pattern and qualitative as well as quantitative assessment of feeding habits of fish. Analysis of food and feeding patterns of fish is an important aspect of fisheries management because the food, feeding habits and gut content analysis can be used to evaluate the habitat preferences, prey selection, effects of ontogeny and developing conservation strategies (Chipps and Garvey, 2007). The present study is intended to provide baseline information on the food and feeding habit of the species, which provide keys for the selection of cultivable species and successful fish farming.

Study area: Baghel Taal is a large shallow perennial lentic waterbody with irregular margin and dense growth of macrophytes. It is situated in village Baghel, Payagpur block of district Bahraich at a distance of about 1.60 km. To the south - east of Payagpur Railway station. It is about 31 km, away from Gonda, 30 km, from Baahraich and 45 km from Balrampur. It is half oval in shape with maximum diameter of 3800m and connected with three small waterbodies namely Udavra Tal, Sandita Tal and Dekaulia Tal. It receives water from three main streams, Babia nallah from north-west side, Jamvar nallah from north and Sakarpatti nallah from

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north-east side during rainy season. It is also a Bird sanctuary extending around 32 km with total catchment area of wetland 441.5575 acre. Out of this only 121.22 acre is water body in rainy season but in summer its area becomes reduced with maximum depth 3.6m. It is habitat of rich micro- and macro living organisms including *Nymphaea*, *Nelumbo*, Narkul, Tinna rice, vegetation as well as various annelids, molluscs, fishes and amphibians. The abundant food attracts hundreds of resident birds like sarus crane (Verma, 2016a) ^[12] and migratory birds like Siberian crane during winter season. All these flora and fauna enrich the biodiversity that have significant values (Verma, 2016b) ^[13].

Materials and Methods

Total 360 adult specimens of Indian major carps, *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala* were collected from

Baghel Taal, Payagpur, Bahraich, U.P., India with the help of fisherman during August, 2015 to July, 2016. The collected fishes were dissected to collect gut contents for analysis. Gut contents were preserved in 4 % formalin solution and brought to Research laboratory, Department of Zoology, MLKPG College, Balrampur for further analysis under binocular microscope for the food composition, preference and relative importance of various food items. The observation of gut contents were grouped in different categories like zooplankton, phytoplankton, plant material, insects and decay matter. The relative importance of all food contents was quantified by the index of preponderance and was calculated with the help of percent-age composition (volume and occurrence) of food contents to follow the equation of Natrajan and Jhingran (1963) ^[8].

$$\text{Percentage by Volume (\%Vi)} = \frac{\text{Volume of individuals food item (Vi)}}{\text{Total volume of gut contents (Vt)}} \times 100$$

$$\text{Percentage of Occurrence (\% Oi)} = \frac{\text{Number of Stomach containing prey (Ni)}}{\text{Total Number of Stomach examined (Nt)}} \times 100$$

$$\text{Index of Preponderance (I)} = \frac{\text{Vi} \times \text{Oi}}{\sum \text{Vi} \times \text{Oi}} \times 100$$

Results and Discussion

Table 1: Gut content and grading of various food items of Indian Major carps

Food item	% composition of items		Vi x Oi	Preponderance Index (I)	Grading
	Volume (Vi)	Occurrence (Oi)			
<i>Catla catla</i>					
Zooplankton	53.03	50.24	2664.227	72.31	I
Phytoplankton	30.15	29.03	875.255	23.76	II
Insects	10.24	9.58	98.099	2.66	III
Plant Matter	4.78	9.03	43.163	1.17	IV
Decay Matter	1.80	2.12	3.816	0.10	V
Total Σ	100.0	100.0	3684.56	100.0	
<i>Labeo rohita</i>					
Zooplankton	24.29	21.82	530.007	18.28	III
Phytoplankton	35.58	37.74	1342.789	46.33	I
Insects	4.62	4.91	22.684	0.78	IV
Plant Matter	31.92	30.91	986.647	34.04	II
Decay Matter	3.59	4.62	16.585	0.57	V
Total Σ	100.0	100.0	2898.712	100.0	
<i>Cirrhinus mrigala</i>					
Zooplankton	16.45	16.91	278.17	12.15	IV
Phytoplankton	21.95	21.17	464.68	20.30	II
Insects	10.82	10.55	114.15	4.99	V
Plant Matter	17.92	17.11	306.61	13.39	III
Decay Matter	32.86	34.26	1125.78	49.17	I
Total Σ	100.0	100.0	2289.39	100.0	

The analysis of food and feeding habits along with grading of various food items of gut contents of Indian major carps was given in Table 1. The Percentage composition (by Volume and Occurrence), Preponderance and Grading of the various food items found in the gut content of 360 Indian major carps was revealed that the food items found in the gut of these carps consists of Zooplankton, Phytoplankton, Insects, Plant Matter and Decay Matter.

The gut content analysis of 120 *Catla catla* was revealed that

zooplankton formed the main item of gut contents forming 53.03% by volume and 50.04% by occurrence in the gut contents of *Catla catla*. The phytoplankton formed the next important food items and forming 30.15% by volume and 29.03% by occurrence. Insect was another important food items in the gut contents forming 10.24% by volume and 9.58 % by occurrence. Plant matter formed a part of gut by constituting 4.78 % by volume and 9.03% by occurrence. Decayed and semidecayed organic matter constituted only

1.80 % by volume and 2012% by occurrence. From the present study gut content analysis of Indian major carp, *Catla catla*, it appears that the basic food of this fish in Bagwanpur reservoir is mainly comprised of Zooplankton (72.31%), phytoplankton (23.76%), aquatic insect (2.66) and the plant matter (1.17). The decayed organic matter formed a negligible amount (0.10%) in the gut content of *Catla catla*. Thus the present study revealed that the adult *Catla catla* is a zooplankton feeder. Thus the present study revealed that the adult *Labeo rohita* is a zooplanktonic and surface feeder. Earlier, Hora and Pillay (1962) [2] assigned Bhakur (*Catla catla*) as a plankton and detritus feeder and reported it to consume primarily phytoplankton and zooplankton, decayed micro-vegetation and detritus. Kumar, *et al.*, (2015) [5] also used the index of preponderance to classify *Catla catla* as planktivorous from Udai Sagar, Rajasthan.

The gut content analysis of 120 fish, *Labeo rohita* was revealed that phytoplankton formed the main food item and forming 35.58 % by volume and 37.74 % by occurrence. The plant matter formed the next important food items in the gut contents forming 31.92% by volume and 30.91 % by occurrence. Zooplankton was another important food items in the gut contents forming 24.29 % by volume and 21.82 % by occurrence. Aquatic insect formed a part of gut by constituting 4.62 % by volume and 4.91% by occurrence. Decayed and semidecayed organic matter constituted only 3.59 % by volume and 4.62% by occurrence. From the present study gut content analysis of Indian major carp, *Labeo rohita*, it appears that the basic food of this fish in Bagwanpur reservoir is mainly comprised of phytoplankton (46.33%), plant matter (34.04%) and zooplankton (18.28 %). The aquatic insect (0.78%) and decayed organic matter (0.57%) formed a negligible amount in the gut content of *Labeo rohita*. On the basis of present study it can be concluded that the adult *Labeo rohita* is a herbivorous and column feeder, preferring phytoplankton and submerged aquatic plants. Rahman *et al.* (2008) [10] reported that *Labeo rohita* had a positive selection for most phytoplanktonic organisms as well as submerged macrovegetation.

The gut content analysis of 120 fish, *Cirrhinus mrigala* was revealed that decay organic matter formed the main food item and forming 32.86 % by volume and 34.26 % by occurrence. The phytoplankton formed the next important food items in the gut contents forming 21.95 % by volume and 21.17 % by occurrence. Plant matter was another important food items in the gut contents forming 17.92 % by volume and 17.11 % by occurrence. Zooplankton formed a part of gut by constituting 16.45 % by volume and 16.91% by occurrence. Aquatic insects constituted only 10.82 % by volume and 10.55 % by occurrence. From the present study gut content analysis of Indian major carp, *Labeo rohita*, it appears that the basic food of this fish in Bagwanpur reservoir is mainly comprised of decayed organic matter (49.17%), phytoplankton (20.30%), plant matter (13.39%), zooplankton (12.15 %) and aquatic insects (4.99%). On the basis of present study it can be concluded that the adult *Labeo rohita* is a herbivorous and column feeder, preferring phytoplankton and submerged aquatic plants. Rahman *et al.* (2008) [10] reported that *Labeo rohita* had a positive selection for most phytoplanktonic organisms as well as submerged macrovegetation. The present gut contents analysis shows that the major carps, *Cirrhinus mrigala* was omnivorous and bottom feeder. Pradhan and Patra, (2015) [9] studied the index of preponderance of *Cirrhinus mrigala* from Pond of Tankapani village, Odisha

and classify fish as Omnivorous. On the basis of these observations, it can be concluded that the major carp, *Cirrhinus mrigala* is bottom feeder and omnivorous in nature. Gut content analysis of the present study showed that the availability and preference of food items by the fish helps to find out the feeding habit of fish and accordingly fisheries management in the water-body.

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