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Food and Feeding Habits of *Catla Catla* (Hamilton) From Lake Udai Sagar, Udaipur

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Abstract
In the present study, an attempt has been made to investigate the food and feeding habits of an Indian major carp *Catla catla* from Udai Sagar, Udaipur. On the basis of qualitative and quantitative analysis of gut contents, *Catla catla* has been categorised as planktivorous (zooplankton feeder). Gastrosomatic index (GaSI) of *Catla catla* species of this lake was calculated and found to be higher during study period.

Keywords: Food and feeding habits, Gastrosomatic index, Catla catla, Lake

1. Introduction
In general, the growth of a fish is influenced by the quality and quantity of food materials available and consumed. Thus, any variation in quality and quantity of food materials will affect the growth rate of the fish. The qualitative and quantitative variations of natural food materials in a water body are under the influence of several abiotic and biotic factors. These variations could be known by qualitative and quantitative analysis of gut contents of a fish and/or by the estimation of gastrosomatic index.

Food and feeding habits of carps have been a field of interest to fisheries researchers since very long. Natarajan and Jhingran (1961) [7] studied the food habits of *Catla catla* and reported a zooplankton dominated food preference for *Catla catla*. Hora and Pillay (1962) [3] reported the feeding habits of *Catla catla*. Khan and Jhingran (1975) [6] have given a report on the food and feeding habits of an Indian major carp *Labeo rohita* (Ham). Rajgopal (1978) [10] described the foods and feeding habits of some commercial fishes from the Tungabhadra reservoir. Sunder *et al.* (1990) [13] studied the food and feeding habit of the *Cyprinus carpio* var. *specularis* from Dal lake (Kashmir) in relation to Gastrosomatic index, condition factor and length-weight of fish and reported that the monthly fluctuations in feeding activity and Gastrosomatic index (GaSI) is in agreement with each other.

Jhingran (1991) [5] has summarised the feeding habits of several Indian species *viz*., *Catla catla, Cirrhinus mrigala, Hypophthalmichthys molitrix* and *Puntius* species. Yadav (1997) [15] reported the food and feeding habits of *Catla catla* and *Labeo rohita*. Panicker (2000) [8] reported the food and feeding habits of several important fish species including *Catla catla* and *Labeo rohita* from Chulliar and Malampuzha reservoirs of Kerala. Selvaraj *et al.* (2000) [12] conducted the study on the food and feeding habits of several important fishes of Thirumoorthy reservoir. Hatikakoty and Biswas (2003) [2] reported the food and feeding habits of *Oreochromis mossambicus* (Peters) in relation to seasonal changes and gonadal maturity from a small pond situated in upper Assam. Ujjania (2003) [14] studied the Gastrosomatic index of *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala* from Mahi bajaj sagar, Surwania dam and Aasan pond of Southern Rajasthan.

2. Materials and methods
For the study of these aspects, 12 fish specimens of *Catla catla* were collected from the landing centre of Udai Sagar Lake. All these fish specimens were weighed separately and then gutted for the collection of gut. The collected guts were weighed and their contents emptied in the watch glass. The same were analysed qualitatively as well as quantitatively by eye estimation volumetrically (Pilly, 1952) [9] and occurrence method (Hynes, 1950) [4]. For evaluating the relative importance of all food items, the index of preponderance (Natarajan and Jhingran, 1961) [7] was obtained using following formula.

$$I = \frac{V_I O_I}{\Sigma V_I O_I} \times 100$$

Where,

I = Index of preponderance
V_I = Volume percentage
O_I = Occurrence percentage
Σ = Summation

Gastrosomatic Index (GaSI) was calculated using the formula given by Biswas (1993) [1]

$$GaSI\ (\%) = \frac{\text{Weight of gut (g)}}{\text{Weight of fish (g)}} \times 100$$

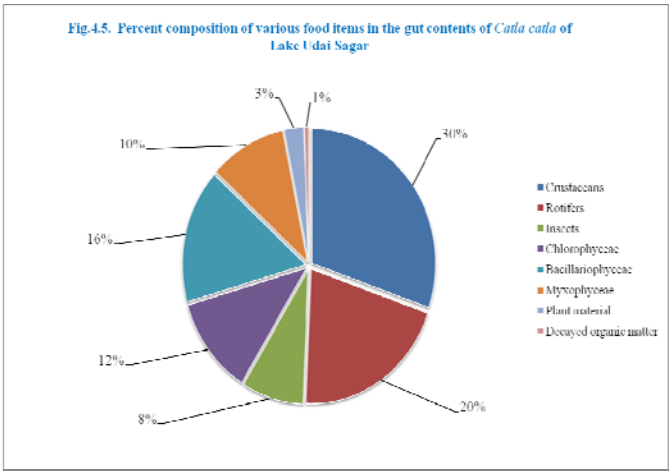
3. Results and Discussion

3.1 Composition of gut contents

Various food items and their percentage composition (by volume and occurrence) found in the gut of *Catla catla* are enumerated in Table 1. The Table 1 and fig.1.also shows the preponderance indices of different food items observed in the guts of *Catla catla*.

Table 1: Grading of various food items of gut contents in *Catla catla* from Lake Udai Sagar, Udaipur

S.NO.	Food items	%Composition of items by		V_1O_1	Index of preponderance $I' = V_1O_1 \times 100/\Sigma V_1O_1$	Grading
		Volume (V_1)	Occurrence (O_1)			
1.	Crustaceans	26.32	16.67	438.754	30.313	I
2.	Rotifers	19.29	15.27	294.558	20.350	II
3.	Insects	10.53	11.11	116.988	8.082	VI
4.	Chlorophyceae	12.28	13.89	170.569	11.784	IV
5.	Bacillariophyceae	14.04	16.67	234.046	16.169	III
6.	Myxophyceae	10.53	13.89	146.261	10.105	V
7.	Plant material	5.26	6.94	36.504	2.522	VII
8.	Decayed organic matter	1.75	5.56	9.730	0.672	VIII
				$\Sigma V_1O_1 = 1447.41$		



Crustaceans (cladocerans and copepods) group formed the main item of gut contents forming 26.32 per cent by volume and 16.67 per cent by occurrence. The major genera of cladocerans and copepods in the diet of the species were *Daphnia, Moina, Macrothrix, Bosmina,* Cyclops, *Diaptomus*, Nauplius larvae and *Canthocamptus*. The rotifers were next in the order of dominance forming 19.29 per cent by volume and 15.27 per cent by occurrence in the gut contents of *Catla catla*. This group was mainly respresented by *Keratella, Brachionus, Hexarthra, Trichocerca* and *Filina*. Bacillariophyceae (diatoms) formed the next important item in the gut contents forming 14.04 per cent by volume and 16.67 per cent by occurrence. Amongst the bacillariophyceae, the abundant genera were *Fragilaria, Synedra, Pinnularia, Diatoma* and *Navicula*. Aquatic insects and their instars formed 10.53 per cent by volume and 11.11 per cent by occurrence. Chlorophyceae (green algae and desmids) group also formed a part of gut content by constituting only 12.28 per cent by volume and 13.89 per cent by occurrence. The major genera of chlorophyceae in the diet of the species were *Pediastrum, Cosmarium, Gonatozygon, Hydrodictyon, Protococcus* and *Coelastrum*. Percentage of Myxophyceae (blue green algae) in the gut contents of species were 10.53 per cent by volume and 13.89 per cent by occurrence. In myxophyceae, the major genera were *Nostoc, Polycystis, Anabaena*, and *Aphanizomenon*. Remnants of macrovegetation were next in the order of occurrence and represented by 5.26 per cent by volume and 6.94 per cent by occurrence. These plant remnants include the fragments of *Typha*. Decayed and semi-decayed organic matter constituted only 1.75 per cent by volume and 5.56 per cent by occurrence.

3.2 Gastrosomatic index (GaSI)

Gastrosomatic index (GaSI) of *Catla catla* were calculated from the 12 fish samples randomly collected from the landing centre of Udai Sagar during the study period from (February to April 2015) for the study of feeding intensity. The values of GaSI are given in Table 2.

Table 2: Gastrosomatic Index (GaSI) of *Catla catla* from Lake Udai Sagar, Udaipur

	Weight of fish (g)	Weight of gut (g)	GaSI
1	3000	69.07	2.302
2	2500	46.03	1.841
3	1800	34.03	1.891
4	1700	32.98	1.940
5	1750	35.66	2.038
6	2600	48.50	1.865
7	1900	36.45	1.918
8	1750	35.66	2.038
9	2500	46.03	1.841
10	2250	46.20	2.053
11	2500	46.03	1.841
12	3000	80.09	2.670
Mean	2270.833		2.019

From the present study on the food and feeding habits of catla, it appears that the basic food of this fish in Udai Sagar Lake is

mainly comprised of crustaceans (30.313%) and rotifers (20.350%) followed by insects (8.082%), bacillariophyceae (16.169%), chlorophyceae (11.784%), myxophyceae (10.105%) and plant material (2.522%). The decayed organic matter formed a negligible (0.672%) amount of the gut content.

Earlier, Hora and Pillay (1962) [3] assigned *Catla catla* as a plankton and detritus feeder and reported it to consume primarily phytoplankton and zooplankton, decayed micro vegetation and detritus. Yadav (1997) [15], however, reported that the adult catla feed mainly on algae, crustaceans, some plants, rotifers and insects and hence he categoried the same as a plankton feeder. The present observations are in consonance with those reported by earlier workers that the catla is planktophagus and feeds primarily on zooplankton.

Studies on gastrosomatic index (GaSI) of *Catla catla* further revealed the feeding intensity. It is reported by Rao *et al.* (1998) [11] in general that during spawning season, feeding rate lowers and increases immediately after spawning as the fish feeds voraciously to recover from fast (Rao *et al*. (1998) [11]. Low feeding rate during spawning has also been reported by Hatikakoty and Biswas (2003) [2].

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