

Studies on Food and Feeding Behaviour of *Cyprinus Carpio* and their Gastro-somatic Index from Govindgarh Lake, Rewa (M.P.), India

^aS.N Shukla, ^aVima Patel

^aDepartment of Zoology, Govt. Science College Rewa -486001 (M.P.), India

Abstract

The aim of this study was to establish the food and feeding behaviour and Gastro-somatic index of *Cyprinus carpio* in Govindgarh Lake from July 2011 to June 2012. On the basis of qualitative and quantitative analysis of gut contents *Cyprinus carpio* has been categorised as omnivorous. Gastro-somatic index were found to be higher during summer month and lower during winter month. The month-wise collection and experiments were made to show the seasonal variation in food choice, and feeding habit of the fish.

KEYWORD: Food and feeding behaviour, *Cyprinus carpio*, Govindgarh Lake and GSI.

INTRODUCTION-

Cyprinus carpio belong to the order *Cypriniformes* and the family Cyprinidae. The family Cyprinidae is one of the most important families of fish distributed throughout the world in almost every type of waters; small streams, rivers, lakes and pools (Blanc et al., 1971; Howes, 1991; Geldiay and Balik, 1996). The *Cyprinus carpio* (common carp) was brought to India in 1939 from Srilanka and introduced into the nilgiris. Later in 1947 this species was introduced in Nainital and other lake of Kumaon and was carried to Bangalore. It is an ideal species for cold water of the hills, and breeds in confined water. In general, 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 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 quantitative analysis of gut contents of a fish and/or by the estimation of gastro-somatic index.

Hora and Pillay (1962) reported the feeding habits of *Catla catla*. Khan and Jhingran (1975) have given a report on the food and feeding habits an Indian major carp *Labeo rohita* (Ham). Rajgopal (1978) described the foods and feeding habits of some commercial fishes from the Tungabhadra reservoir. Sunder et al. (1990) studied the food and feeding habit of the *Cyprinus carpio* var. *specularis* from Dal Lake (Kashmir) in relation to gastro-somatic index, condition factor and length-weight of fish and reported that the monthly fluctuations in feeding activity and gastro-somatic index (GSI) is in agreement with each other. Jhingran (1983) stated that the natural foods of fishes are classified under three groups (i) Main food (ii) Occasional food and (iii) Emergency food.

The food habit of different fish varies from month to month. This variation is due to changes in the composition of food organisms occurring at different seasons of the year. Studies on the food and feeding habit of different fishes have been made by

many workers like Jhingran (1983), Bhuiyan and Haque (1984), Bhuiyan and Islam (1991), Hossain *et al.* (1991) and others.

Material and Methods-

In order to study the food and feeding habits of common carp, sample were collected from the commercial catcher during fishing in the year July 2011 to June 2012 at Govindgarh Lake Rewa. All the fish specimens were weighed separately and then gutted for the collection of gut contents and preserved in 5% formalin. The collected guts were weighed and their content emptied in the watch glass. The same were analysed qualitatively as well as quantitatively by eye estimation and volumetrically (Pillay, 1952) and occurrence method (Hynes, 1950), for evaluating the relative importance of all food items. The various items were examined and sorted out using a binocular microscope and thus identified. The percentage occurrence of different items of food in different months was determined by summing the total number of occurrence of all items from which the percentage occurrence of each item was calculated. To find out the feeding rhythm of *Cyprinus carpio*, Gastro-somatic index (GSI) was calculated using the method given by Biswas (1983).

Result and discussion-

Common carp are omnivorous. They can eat a herbivorous diet of water plants, but prefer to scavenge the bottom for insects, crustaceans (including zooplankton), crawfish, and benthic worms. The findings of the study shown that the food items of *Cyprinus carpio* var. *specularis* consist of aquatic plant parts, phytoplankton, zooplankton, debris and detritus, insects. During the study period monthly gut analysis of *Cyprinus carpio* was carried out at Govindgarh lake and data were collected and monthly percent composition of different food items are shown in table (1) On the basis of observation, following fluctuation of food component were recorded.

Chlorophyceae – The member of chlorophyceae contributes a second major part of food of common carp during the observation throughout the year. The frequency of its occurrence was found to be more during the months of May (27.55%) and minimum (9.78%) in the month of November were recorded during study period.

Bacillariophyceae - The member of bacillariophyceae contributes a major part of the food of common carp. During the observation diatoms were most abundant and occurred regularly in the food. The availability was maximum during March (26.65%) and Minimum during April (11.05%).

Myxophyceae – Myxophyceae stood in third place as food item of common carp in the lake. Their maximum (15.79%) and minimum (7.11%) were recorded in the months of April and July.

Protozoa- This group was present throughout the year except August and May. Its availability being maximum in June (15.79%) and minimum in December (6.49%).

Crustacea (Cladocera and Copepoda) – During the gut content analysis insects, their larvae were also found in the gut of common carp at the water body. But their occurrence were not regular and percentage as food component was low (table1).It was found maximum during April (15.21%) and minimum during October (2.93%).

Rotifera – This group too formed an significant component of the food items occurring throughout the year except in February it was maximum during May (19.16%) and minimum during January (10.06%)

Decayed organic matter – This item mainly consisted of unidentifiable plant matter in decayed or semi decayed stage. It was found in appreciable quantities throughout the year. During the study period its percentage of occurrences was highest in November (35.28) and lowest in June (17.54).

Miscellaneous – The other micro and macro organisms found in the guts of common carp were occasional and not a common feature. They included semi digested fishes, fish scales, aquatic insects, insect appendages, nematodes, Oligochaetes etc.

It has been found that natural food material is not available in equal quantity throughout the year, and there is a clear fluctuation in it. Decayed organic matter (35.28) and Chlorophyceae (27.55) formed a major food item of *cyprinus carpio*.

It was observed that the feeding intensity of *C. carpio* in matured fish was poor and the feeding intensity was very poor in spawning period. The food and feeding habits of fishes vary from month to month. This variation is due to the changes in the composition of food organisms occurring at different seasons of the year (Bhuiyan *et al.*, 1999).

Table (1) Monthly percentage of different food components in the gut of *Cyprinus carpio* at Govindgarh Lake from July 2011 to June 2012

S.No.	Months	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
	No. of fishes Food items	12	15	9	16	14	18	12	17	14	11	10	16
1	Chlorophyceae	10.15	14.03	17.29	20.75	9.78	15.23	10.18	20.17	23.17	10.25	27.55	13.71
2	Bacillariophyceae	22.17	23.13	16.15	11.15	13.18	13.14	25.15	21.79	26.65	11.05	12.18	17.88
3	Myxophyceae	7.11	10.25	11.05	12.48	8.29	9.75	10.32	10.79	10.32	15.79	8.15	11.28
4	Protozoa	8.97	—	10.72	8.89	7.65	6.49	8.29	15.17	9.26	11.49		15.79
5	Crustaceans (Copepoda and Cladocera)	8.69	4.05	7.5	2.93	8.27	15.02	5.79	7.89	—	15.21	7.04	—
6	Rotifera	10.16	12.27	11.06	10.78	13.36	15.18	10.06	—	12.06	17.01	19.16	13.55
7	Decayed organic matter	21.15	26.02	20.73	23.87	35.28	19.55	21.07	18.16	18.54	19.2	23.05	17.54
8	Miscellaneous	11.6	10.25	5.5	9.15	4.19	5.64	9.14	6.03	—	—	2.87	10.25

Months	No. of examined	Mean total weight of fish (g)	Mean weight of gut (g)	Gastrosomatic index (GSI)
Jul	9	1267	30	2.37
Aug	14	1305	40	3.07
Sep	16	1277	45	3.52
Oct	11	850	37	4.35
Nov	8	566	25.5	4.41
Dec	13	895	35	3.91
Jan	9	665	25	3.75
Feb	8	2493	70	2.80
Mar	10	1675	60	3.58
Apr	9	3600	195	5.42
May	12	895	55	6.15
Jun	8	1595	95	5.95
Max.	16	3600	176	6.15
Min.	8	566	25	2.37
Seasonal variations				
Rainy	12.5	1174.75	38	3.33
Winter	9.5	1154.75	38.88	3.71
Summer	9.75	1941.25	101.25	5.28

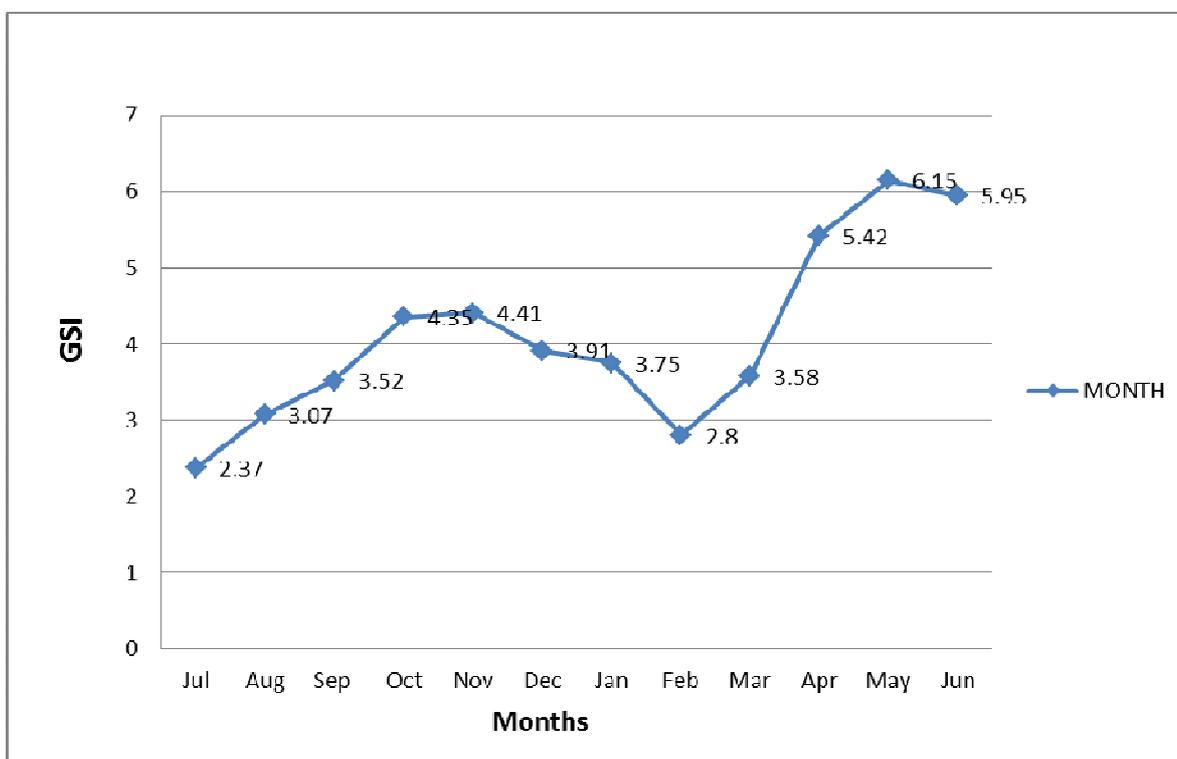


Fig. 1 Monthly and seasonal variation of Gastrosomatic Index (GSI)



Fig. 2 Gut of *Cyprinus carpio*

Gastro-somatic index of *Cyprinus carpio* was showed in Table (2). The value of GSI was low during the spawning months (January to March) and (July to August) (Fig. 1). Because, during spawning period when the gonads have attained their maximum size. After spawning, there is a distinct increase in the feeding activity of the fish. Studies on gastro-somatic index (GSI) of *C. carpio* revealed that the feeding intensity remained high during summer months (non spawning period). It is reported that during spawning season, feeding rate would be relatively lower and it increases immediately after spawning as the organisms feed voraciously to recover from fast (Rao et al. 1998). Low feeding rate during spawning has also been reported by Hatikakoty and Biswas (2003). The findings of present study are in confirmation to the observations of Rao et al. (1998) and Hatikakoty and Biswas (2003).

Referances-

- Bhuiyan, A. S. and Haque, M. S. 1984: Studies on the seasonal changes of food habit of *Mystus vittatus* (Bloch) (Bagridae: Cypriniformes). *Proc. 4th Nat. Zool. Conf. Bangladesh*. 88-91.
- Bhuiyan, A. S. and Islam, M. N. 1991: Observation on the food and feeding habit of *Ompok pabda* (Ham.) from the river Padma (Siluridae: Cypriniformes). *Pakistan J. Zool.* **23**(1): 75-77.
- Biswas, S.P (1983). *Manual of methods in fish biology*. South Asian Publisher Pvt. Ltd., Delhi: 65-77.
- Blanc MP, Banarescu J, Gaudet L, Hureu JC (1971): *European Inland Water Fish. A Multilingual Catalogue*. FAO, Fishing News Ltd, London, England p. 187.
- Geldiay R, Balık S., 1996: *Freshwater Fishes in Turkey*, (in Turkish). Ege Üniv. Su Ürünleri Fakültesi Yayınları No: 16, İzmir, p. 532.
- Hatikakoty, G. and Biswas, S.P., 2003: *J. Inland Fish. Soc. India*, **35**:57-61.

- Hora, S.L. and Pillay, T.V.R., 1962: Handbook on Fish Culture in the Indo-Pacific Region. FAO Fish. Biol. Tech. Paper, **14**: 204.
- Hossain, M. A., Rahman, M. H. and Parween, S., 1991: Notes on the length-weight relationship of *Lepidocephalus guntea*. *Bangladesh J. Zool.* **19**(1): 145-146.
- Howes G.J., 1991: Systematics and Biogeography: An overview. [In:] Winfield, I.J., Nelson J.S., (Eds)–Cyprinid Fishes: Systematics, Biology and Explanation. Chapman & Hall, London, pp. 1-33.
- Hynes, H. B. N., 1950: The food of freshwater sticklebacks (*Gasterosteus aculeatus* and *Pygosteus pungitius*) with a review of methods used in studies of the food of fishes. *J. Anim. Ecol.*, **19**: 26-28.
- Jhingran, V. G., 1983: Fish and Fisheries of India (Revised and enlarged 2nd ed). Hindustan Publishing Corporation (India) Delhi. 645 pp.
- Khan, H.A. and Jhingran, V.G., 1975: Synopsis of biological data on the Rohu, Labeo rohita (Hamilton, 1822). Fishery Synopsis, FAO, Rome
- Kumar, Raj, B.K. Sharma and L.L. Sharma, 2007: Food and Feeding Habits of *Catla catla* (Hamilton-Buchanan) from Daya Reservoir, Udaipur, Rajasthan. *Indian J. Anim. Res.*, **41** (4): 266-269.
- M R Manon and M D Hossain, 2011: Food and Feeding habit of *Cyprinus carpio* var. *Specularis*, *J. Sci. Foundation*, **9**(1&2): 163-181.
- Pillay, T.V.R., 1952: Proc. Nat. Inst. Sci., India, **19**: 777-827.
- Rajgopal, K.V., 1978: In: Proc. Ecol.Ffish. Freshwater Reservoir, 27-29, November, 1969 (Eds. Jhingran, V.G.)CIFRI, Barrackpore: 389-422.
- Rao, L.M. et al. 1998: Indian J. Fish., **45**: 349-353.
- Sunder, S. et al. 1990: Indian J. Fish., **31**: 90-99.