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Seasonal variation in food and feeding habit of Indian major carp (*Labeo calbasu*) in Baghel Taal, Bahraich, U.P.

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Abstract
In present study, the qualitative and quantitative analysis of gut content of Indian carp Kalbasu (*Labeo calbasu* Ham. 1822) from Baghel Taal were conducted during July, 2014 to June, 2015. The results on gut content shows that qualitative changes in food component were not found but quantitative changes were observed during the study period. In the gut of fish, food contents i.e. decay matter (39.15%), zooplankton (20.07%) phytoplankton (16.18%), plant materials (14.41%), and Insects (10.19%), were observed. The quantitative changes of food contents were also verified by the analysis of gastrosomatic index (GSI) and it was maximum (5.874±0.145) during post monsoon season and minimum (3.425±0.152) during monsoon season as fish feeds voraciously to compensate the energy loss during breeding. Hence, it can be concluded that *L. calbasu* was omnivorous in feeding habit and findings were also verified by the index of preponderance.

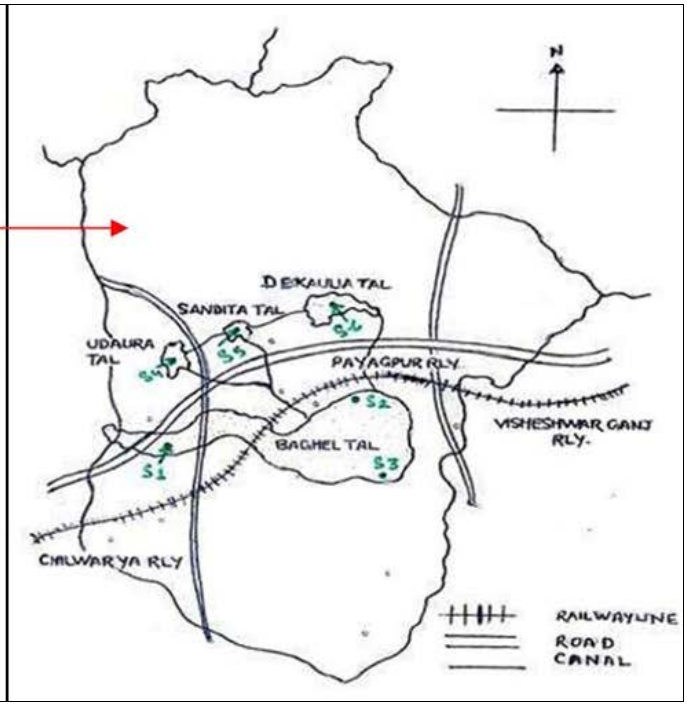
Keywords: Food and feeding, gastrosomatic index, gut content analysis, preponderance index, *Labeo calbasu*

Introduction
Labeo calbasu is a fresh water fish belonging to the family Cyprinidae under the order Cypriniformes. It is the most important carp next to the three Indian major carps i.e. *Labeo rohita, Catla catla* and *Cirrhinus mrigala* (Chondar, 1999) [1]. It is a popular food fish having good taste, less intramuscular bones and high protein content (Chondar, 1999) [1]. This fish species supports an important commercial fishery in rivers and reservoirs. It is accepted as a potential aquaculture species in different parts of the world including India, Pakistan, Bangladesh, Myanmar and other southern Asian countries.
It inhibits in the mud of ponds and occasionally comes to the surface and near the edge of the pond for feeding (Mookerjee and Mazumdar, 1944) [9]. The gut content analysis provides the information on food components and feeding habit of fish which is an important factor 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) [3]. Fish performs their various physiological activities such as growth, reproduction, restoration etc. with the help of energy obtained from the food and are highly adopted in their feeding habits with utilizing most of the readily available food components. 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) [10] and used to describe food habits, feeding patterns of fishes (Ekpo *et al.*, 2014) [4].
The feeding intensity of mature fish de-creases during the spawning season, as compared to the non-spawning season (Ujjania, 2003) [16]. The relationship between the food component and fish is essential for the production and exploitation of the fish stocks (Sunder, *et al.* 1990). 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) [6]. 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 water body 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. Thus, the pre-sent study was conducted to collect the information on quality, quantity of food contents and feeding habit of black rohu (*L. calbasu*) in large taal with reference to seasonal variation and it would be helpful to prepare the management strategy and policies for sustainable management of reservoir fishery.

Study area: Baghel Taal is a large shallow perennial lentic water body 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 Bahraich and 45 km. from Balrampur.

Map of U.P Showing District Bahraich



Location of Baghel Taal in Payagpur Block of Bahraich District

It is half oval in shape with maximum diameter of 3800m and connected with three small water bodies 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 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, Tina rice, vegetation as well as various annelids, molluscs, fishes and amphibians. The abundant food attracts hundreds of resident and migratory birds including Siberian crane during winter season.

Image of Baghel Taal

Materials and Methods

Total 120 adult specimens of indigenous carps, *Labeo calbasu* was collected from Baghel Taal, Payagpur, Bahraich, U.P., India with the help of fisherman during July, 2014 to June, 2015. Each fish was weighed to the nearest 1.0gm with the help of top loading single pan balance and dissect the fish to collect gut. Weight of gut was measured and its 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. Gastro somatic Index (GASI) for each month was obtained through the equation of Desai (1970) [2]. 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).

$$\text{Gastro Somatic Index (GSI)} = \frac{\text{Weight of the gut}}{\text{Total weight of the fish}} \times 100$$

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

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

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

Results and Discussion

Preponderance index give summary information of the frequency of occurrence and bulk of various food items. Similarly, it also provides the definite and measurable grading basis of various food elements.

Table 1: Preponderance Index of *Labeo calbasu* from Baghel Taal

Food Components	Index of Preponderance			
	Monsoon	Post Monsoon	Pre Monsoon	Pooled
Decay matter	44.34	34.51	64.29	39.15
Zooplankton	19.93	23.18	8.92	20.07
Phytoplankton	13.43	20.12	13.18	16.18
Plant Materials	18.92	15.18	14.41	14.41
Insects	8.19	7.01	3.12	10.19

The result showed that in gut contents, decay matter (44.34%) > zooplankton (19.93%) > plant material (18.92%) > phytoplankton (13.43%) > Insects (8.19%) were found during monsoon season; decay matter (34.51%) > zooplankton (23.18%) > phytoplankton (20.12%) > plant material (15.18%) and > Insects (7.01%) during postmonsoon season (Table1) whereas decay matter (64.29%) > plant material (14.41%) > phytoplankton (13.18%) > zooplankton (8.92%) and > Insects (10.19%) were observed during pre-breeding season (Table1). The observations of pooled data showed that the decay matter remain as main ingested food consisting 39.15% of total consumed food followed by zooplankton 20.07%, phytoplankton 16.18%, plant material 14.41% and insects 10.19%. Results showed that the seasonal qualitative changes in feeding composition was not observed while quantitatively food content was dominated by decay matter, zooplankton, phytoplankton, plant material and insects which may be due to food preference, feeding zone of fish and availability of different food contents in the water body.

Singh and Singh (2000) [14] reported that *L. calbasu* feeds mainly organic detritus which was recorded in the gut contents more than 80% throughout work. He observed that the gut content varied monthly. More than 83-94% organic detritus, 4-16% sand and mud, 0.5-2.5% diatom and 0.0-3.0% miscellaneous in the gut of *L. calbasu* (January to December). The highest percentage of organic detritus was recorded in April whereas minimum value was recorded in September. The seasonal and pooled variations in gut contents showed the feeding habit of the fish which was also confirmed by the preponderance index value which reveals that the experimental fish, *Labeo calbasu* was omnivorous and bottom feeder.

Kumar and Siddiqui (1989) [8] noted that decaying organic matter 44.08%, molluscs 19.52%, sand and mud particles 12.24%, diatoms 8.34%, in the gut of adult *Labeo calbasu* of the river Ganga while decaying organic matter 45.2, molluscs 19.27%, and sand and mud particles 11.76%, diatoms 8.24%, from the Yamuna rivers. He also reported that the decaying organic matter 46.09% and 70.72%; molluscs 19.67% and 8.64% sand and mud particles 11.32 and 5.40%; diatoms 7.73% and4.75% in the gut of adult *Labeo rohita* of the river Kali and reservoir, respectively. It may be concluded that the occurrence of decayed organic matter, zooplankton, phytoplankton, plant matter and remains in the gut of *Labeo calbasu* indicated that the fishes feeds on a large variety of food items.

Table 2: Gastrosomatic index of *Labeo calbasu* from Baghel Taal

Seasons	Minimum	Maximum	Mean ± SE
Monsoon	2.412	5.684	3.425±0.152
Post Monsoon	4.154	7.485	5.874±0.145
Pre Monsoon	2.568	7.024	4.239±0.123
Pooled	2.412	7.485	4.257±0.141

Quantitative variation in food contends during the study was observed and verified by the analysis of gastrosomatic index (GSI). It was minimum (3.425±0.152) during the monsoon season and maximum (5.874±0.145) during the post monsoon season whereas annual mean of it was 4.257±0.141 (Table 2). Result depict that during monsoon season i.e. breeding season, feeding rate decreases and increases immediately after spawning i.e. post monsoon season as the fish feeds voraciously to compensate the energy loss during the breeding (monsoon season). Similar observation was documented by Rao *et al.* (1998) [12] on Channa, Hatikakoty and Biswas (2003) [5] on Tilapia and by Kumar *et al.* (2015) [7] on Catla. Sarkar and Deepak (2009) [13] studied the gastrosomatic index value of *Chitala chitala* and reported it maximum during pre-monsoon and minimum during monsoon season. According to Pathak (1975) [11] *Labeo calbasu* is a bottom feeder in habit.

Hence, it can be concluded that *L. calbasu* was omnivorous and detritus feeder. But, it feeds in the bottom (bottom feeder) in feeding habit and findings were also verified by the index of preponderance.

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References

1. Chondar SL. Biology of Finfish and Shellfish. SCSC Publishers, India, 1999, 514.
2. Desai VR. Studies on the fishery and biology of Tor tor (Ham.) from river Narbada, J Inland Fish. Soc. India. 1970; 2:101-112.
3. Dewan S, Shaha SN. Food and feeding habit of Tilapia nilotica (L) (Perciformes: Chichlidae). II. Diet and seasonal patterns of feeding. Bangladesh J Zool. 1979; 7(2):75-80.
4. Ekpo IE, Mandu A, Essien-Ibok, Joseph N Nkwoji. Food and feeding habits and condition factor of fish species in Qua Iboe River estuary, Akwa Ibom State, Southeastern Nigeria, Int. J Fish. Aquatic Studies. 2014; 2(2):38-46.
5. Hatikakoty G, Biswas SP. Food and feeding habits of Oreochromis mossambicus (Peters) from a subtropical environment, J Inland Fish. Soc. India. 2003; 35(2):57-61.
6. Hyslop EJ. Stomach contents analysis - A review of methods and their application, J. Fish. Biol. 1980; 17:411-

429.
7. Kumar L, Sharma BK, Sharma SK, Upadhyay B, Mishra V. Food and Feeding Habits of Catla Catla (Hamilton) From Lake Udai Sagar, Udaipur, Int. J Fauna & Biol. Studies. 2015; 2(5):06-08.
8. Kumar K, Siddiqui MS. Food and feeding habits of the carp, Labeo calbasu (Ham.) in north Indian waters. Acta Icthyol. Pisc. 1989; 19:33-48.
9. Mookerjee HK, Mazumdar TC. On the life history of Labeo calbasu (Ham.), Journal of Department of Science Calcutta University. 1944; 1(4):59-69.
10. Nansimole A, Sruthi Gayathri TV, Lekshmi S, Bal-asubramaniam NK, Radhakrishnan. Studies on morphometry feeding biology and sex ratio of Saurida undosquamis (Richardson, 1884) from Neenda-kara area, Kollam, south west coast of India, Indian J Sci. Res. 2014; 5(2):51-58.
11. Pathak SC. Length-weight relationship, condition factor study of Labeo calbasu (Hamilton) from Loni reservoir (M.P.), J Inland Fish. Soc. India. 1975; 7:58-64.
12. Rao LM, Ramaneswari K, Rao LV. Food and feeding habits of Channa species from East Godavari district (Andhra Pradesh), Indian J Fish. 1998; 45(3):349-353.
13. Sarkar UK, Deepak PK. The diet of clown knife fish Chitala chitala (Hamilton-Buchanan) an endangered notopterid from different wild population, E J. Icht. 2009; 1:11-20.
14. Singh PR, Singh HR. Feeding biology of Labeo calbasu (ham.). Proc. Nat. Acad. Sci. India. 2000; 70(B)II:179-183.
15. Sunder S, Kumar K, Raina HS. Food and Feeding Habit and length-weight relationship of Cyprinus carpio specularis L. of Dal Lake, Kashmir, Indian J Fish. 1990; 31(1):90-99.
16. Ujjania NC. Comparative performance of Indian major carps (Catla Catla, Labeo rohita and Cirrhinus mrigala) Ph.D. Thesis, Central Institute of Fisheries Education (ICAR) Mumbai, 2003.