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STUDY ON INDIAN MAJOR CARPS: FOOD AND FEEDING HABITS IN WASHIM DISTRICT REGION, (M. S.), INDIA.

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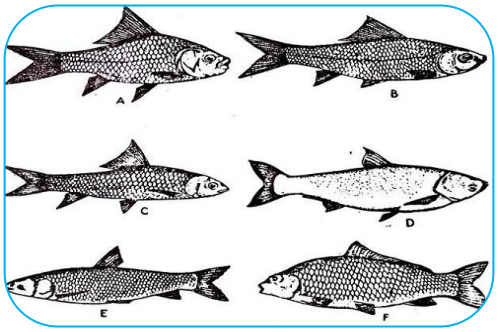
ABSTRACT:



In India different type of fish's culture activity is done, one of the types of fish culture is culture of Indian major carps, which is mostly used as food. In India Indian major carps are culture on large scale in the pond and reservoir. The investigation of feeding habits of Indian major carp is helpful in the aquaculture practices for getting economical production. The study on the feeding habits of Indian major carp is less attempted, especially in washim region. Present study is an attempt to elucidate the feeding habits of the carp, viz. Catla catla (Ham), Labeo rohita (Ham), and Cirrhinus mrigala (Ham) from Washim region in relation to available food and the utilization of the food consumed. The study was carried out in a six month. The samples were collected from nearby dams and brought to the laboratory for further investigation. In present investigation, it has been found that in the gut contents of Labeo rohita about 21 species of plankton, in Catla catla about 14 species of plankton and in Cirrhinus mrigala about 30 species of plankton was observed along with different type of vegetable and animal body parts also reported.

KEY WORDS: *Gut content analysis, Indian major carps.*

INTRODUCTION

Aquaculture is an age old practice that has developed into modern science during recent years. Aquaculture has acquired a special significance, not only of its contribution of food resources but also from the point of view of its contribution to quality of our diet. A fish is a member of a para-phyletic group of organism. Fishes are cold blooded aquatic animals. They can found nearly all aquatic environments. The available literature on the food and feeding habits of fishes was referred so as, Khabad (2015) studied the gut contents of major carps for their food habits from Sidddhewadi lake of Tasgaon tahsil of Sangli district Maharashtra and he found that the gut contents of major carp's species consist of phytoplanktons, zooplanktons and decaying plant and animal organic material which confirms the feeding habits of the major carps. the studies on the food and alimentary canal of the Indian major carps, was done by Kamal (1967) and he suggested the alimentary structure of Indian major carps according to their natural feeding habits. Shakir *et. al.*, (2014) studied the planktonic diversity in gut contents of *Labeo rohita* from Ravi river in Pakistan. Gut Content Analysis of *Wallago attu and Mystus (Sperata) seenghala* The Common Catfishes from Godavari River System in Maharashtra

State was studied by Babare *et. al.,* (2013). The food and feeding habits and condition factor of *Labeo coubie* (african carp) in lower river Benue. Adadu *et. al*., (2014). the natural food of major, common and some chinese carps as influenced by fertilization in composite culture practices and empirically demonstrated the inverse relationship between the type of plankton preferentially consumed by a given fish and the predominant plankton type present in ponds stocked with that fish. Shahid (2009). Food and feeding pattern of *Channa puntactus* in two different habitats at Tarai regi Singh *et. al.* (2012) they found that the Gut content of *Channa punctactus* was mainly consists of crustacean, insects, mollusks, small fishes and semi-digested material.

It is virtually impossible to gather sufficient information of food and feeding habit of fish in their natural habitat without studying its gut contents that's why the above entitled study is undertaken. The present work is carried out to study the feeding habits of Indian Major Carps by analyzing the gut content. Another objective of this study is to check the variation in the feeding habits of Indian Major Carps.

MATERIALS AND METHOD :-

Washim is one of the districts of Maharashtra states of India. It is located at 19^0 30' N and 21^0 13' N latitude and 76^0 38' E and 72^0 44' E longitude. It is 300-600 m above the sea level. The region of the district spared over 5178 sq.km. The district is having 306 numbers of reservoirs, ponds and check dams constituting 5221 hector of area under water with total catchment area of 4718 hector.

The fishes for the present study were collected from local fish markets such as Washim fish market and Risod fish market. Fishes were also collected different water resources such as Supkhela dam, Ekburji dam, Tornala dam, Sonkhas dam in Washim region of Maharashtra. The fish specimens were identified to species level using the available identification key of Talwar and Jhingran (1991). The collected fish samples were preserved in 10% formalin and brought to the laboratory for further investigation. Total 52 specimens of freshwater fishes collected in which 18 numbers of *Catla catla*, 16 *Cirrhinus mrigala* and 18 *Labeo rohita*, All are dissected and gutted at the site of collection. Furthermore the guts removed from fish were preserved in 10% formalin to prevent any further digestion and decomposition of the contents. Afterwards, the gut was dissected and its contents were preserved with 5% formalin. The preserved gut contents were then examined under the microscope and contents were then enumerated and identified to the lowest taxa possible.

For the qualitative study of the food of each species, its gut content was carefully examined under low and high power of the microscope. In order to find out the percentage composition of food, Numerical method Zacharia (1974) was followed where the number of individuals of each food item were recorded and expressed as percentage of the total number of organisms found in all the fish examined.

RESULTS AND DISCUSION :-

The natural food of fishes comes from many groups of plants and animals that inhabit water. The diet of fishes is exceedingly varied. In general, the larger fishes take the larger pray while the small and the young fishes lives on the tiny organisms but there are exceptions and vegetarians occur as well as fresh eaters Kyle H.M (1999).

Nikol'skii (1963) divided food of fishes into four categories according to the relationships between the fishes and their food. These categories are: i) Basic food, which the fish usually consumes comprising the main part of the gut content; ii) Secondary food, which is frequently found in the guts of fishes but in small amounts; iii) Incidental food, which only rarely enters the gut; iv) Obligatory food, which the fish consumes in the absence of basic food.

According to Ravindranathan (2003), the major food of the carps consists of sand, mud, algae and decaying vegetation. *Catla catla* is a surface feeder and plankton feeder. The fry of *Catla* feeds on water fleas and animalcules. Fingerlings feeds on waterfleas, few planktonic algae and some vegetable debris. Adult's fish feed on waterfleas, vegetable debris and some algae. *Labeo rohita* is a column feeder fish. The adults are herbivorous but young fry feed on zooplanktons. Fingerlings feeds vegetable debris

and minute plants. Adults feeds vegetable debris, small plants, detritus and mud. *Cirrhinus mrigala* is a bottom feeding fish. It is an omnivorous type fish. Adults feeds on algae and vegetable detritus and debris. Fingerlings feeds on vegetable debris, unicellular algae, detritus and mud. They also feed on rotifers, insects and their larvae, crustaceans, bryozoans etc.

Present study is an attempt to elucidate the feeding habits of the carp, viz. *Catla catla (Ham), Labeo rohita (Ham), and Cirrhinus mrigala (Ham)* from Washim region in relation to available food and the utilization of the food consumed.

In present investigation, it has been found that in the gut contents of *Catla catla* about 14 species, in the gut contents of *Labeo rohita* about 21 species, and in the gut contents of *Cirrhinus mrigala* about 30 species of phytoplanktons, zooplanktons and other vegetable and animal body parts also reported.

The phytoplankton belongs to *Cyanophyceae* (blue green algae), *Chlorophyceae* (green algae) and *Bacillariophyceae* (diatoms) while the zooplanktons belongs to *Rotifera* and *Crustacea*. The table's number 1, 2 and 3 shows the checklist of gut contents occurred in *Catla catla*, *Labeo rohita*, and *Cirrhinus mrigala* and the results are presented as the mean per cent of different food items present in the gut.

Table 1 - Monthly variations in percentage values of the gut contents of *Catla catla*

Month	Green algae (31.6%)	Diatoms (15.5%)	Sand and Debris (2.5%)	Zooplanktons and insects ((48.3%)	Macrophytes (2.1%)
December	31.3	17.5	1.5	55.6	1.2
January	30.5	16.0	2.1	50.3	1.9
February	32.5	18.5	2.6	49.1	2.3
March	29.2	19.5	2.9	46.0	2.5
April	31.7	17.5	2.9	39.0	2.9

Table 2 - Monthly variations in percentage values of the gut contents of *Labeo rohita*

Month	Green algae (41.5%)	Diatoms (29.3%)	Sand and Debris (9.4%)	Zooplanktons and insects (3.9%)	Macrophytes (15.7%)
December	45.5	29.7	6.3	5.9	15.2
January	42.3	31.1	5.7	4.7	17.1
February	41.5	30.3	8.3	5.1	15.7
March	40.2	28.2	11.9	4.1	14.2
April	38.3	27.4	15.6	3.1	16.7

Table 3 - Monthly variations in percentage values of the gut contents of *Cirrhinus mrigala*

Month	Green algae (21.8%)	Diatoms (21.4%)	Sand and Debris (30.2%)	Zooplanktons and insects (11%)	Macrophytes (15%)
December	25.5	22.3	25.2	9.5	14.5
January	22.4	24.4	27.1	10.5	15.5
February	21	21.1	33.2	11.6	16.5
March	18.7	20.2	31.4	11.9	14.4
April	17.8	19.4	33.2	12.5	14.5

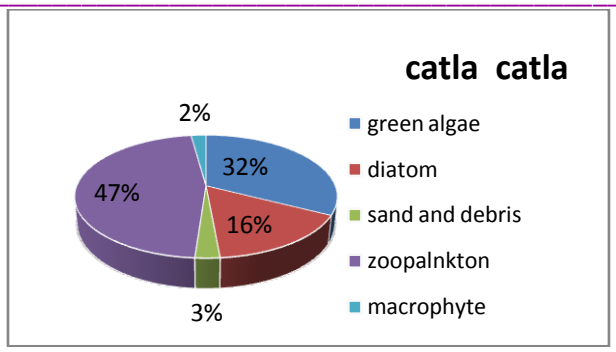


Fig.1: Pie diagram showing the percent composition of food(Gut Content) *Catla catla.*

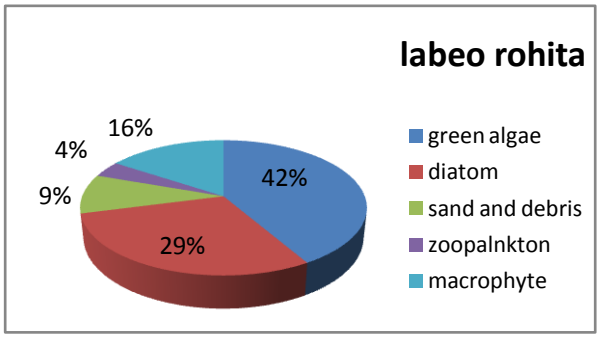


Fig. 2: Pie diagram showing the percent composition of food(Gut Content) of *Labeo rohita.*

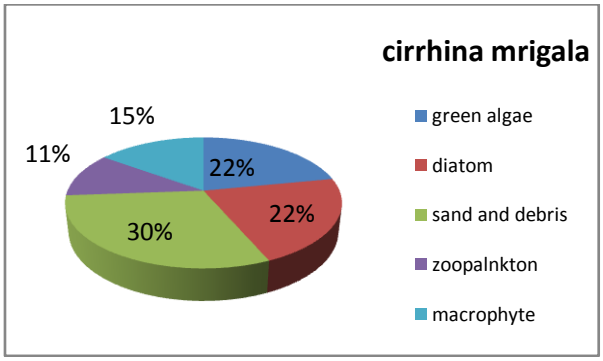


Fig. 3: Pie diagram showing the percent composition of food(Gut Content) of *Cirrhinus mrigala.*

Gut content analysis of catla catla :-

The gut content of C.catla comprised of green algae (22%) diatoms (15.5%), blue-green algae (9.6%), rotifers (20%) crustaceans (22%), and insects (6.4%). The algal component included the members of Chlorophyceae such as Chlorella, Pediastrum spp., Bacillariophyceae comprised such forms as Diatoma vulgaris, Tabellaria, Synedra spp., Amphora ovalis and Nitzschia sp. Cyanophycean which accounted for 8% of the contents, were represented by portions of plants such as, Microcystis and Anabaena. Zooplankton comprising of rotifers and crustaceans constituted 20 to 22% of the volume of the gut. Insects and molluscan eggs formed 6.4% of the food mass. Some amount of diatoms (15.5%), macrophytes (2.1%) and sand and debris is also reported on very low amount (2.5%).

The gut content analysis of Catla Catla fish revealed that among the food items zooplanktons, green algae, and diatoms were the dominant components followed by the sand and debris and macrophytes hence the catla catla fish is reported to be planktonic omnivorous surface feeder.

Gut content analysis of of *Labeo rohita* :-

The gut content of *L. rohita* comprised of algae (41.5 %), submerged macrophytes (15.7 %), sand and debris (9.4 %), zooplankton (2.9%) and insects (1.1 %). The algal component included the members of Chlorophyceae such as *Chlorella, Zygnema* sp., and *Pediastrum*. Bacillariophyceae such as *Melosira, Tabellaria, Diatoma and Pinnularia* sp. Green algae and diatoms form the main component of the gut content. Submerged macrophytes, which accounted for 15.7 % of the gut contents, were represented by portions of plants such as, *Chara* sp. *Hydrilla verticillata* and *Vallisnaria spiralis*. In addition, some parts of leaves and roots of unidentified species were also noted. Zooplankton, comprising of rotifers and cladocerans, constituted 2.9 % of the volume of the gut. Insects crustacean appendages and molluscan eggs formed 1 % of the food mass.

The gut content analysis of *Labeo rohita* fish revealed that among the food items green algae, diatoms and macrophytes were the dominant components followed by the zooplanktons, insects and sand and debris, hence the *Labeo rohita* fish is reported to be herbivorous column feeder.

Gut content analysis of *Cirrhinus mrigala* :-

In case of *Cirrhinus mrigala*, the gut contents included , diatoms (21.4 %), blue-green algae (21.8), zooplankton (7 %), insects (4 %) , submerged macrophytes (15 %), and sand and debris (30.2%) is dominant among the gut content. The identified species of diatoms comprised *Melosira* spp., *Pinnularia* sp. *and Fragillaria* sp. Among the blue-green algae *Microcystis* was recorded as the dominant component. The green algae were represented by *Volvox* sp. and *Cosmarium* sp. The detritus on the other hand, was mainly represented by dead algal cells and leaf fragments of submerged aquatics. The zooplanktons were represented by the individuals of cladocera, copepoda and rotifera. Main forms of zooplankton were *Brachionus, Keratella* sp., *Cyclops* and nauplius larvae. The submerged aquatics such as *Chara* sp., *Hydrilla* sp. and *Vallisnaria* sp. were also observed.

The gut content analysis of *Cirrhina mrigala* fish revealed that the food items algae, diatoms, macrophytes, zooplankton and debris are present in approximately the same proportion. Hence *Cirrhinus mrigala* is a bottom feeding fish with omnivorous feeding habit.

SUMMARY AND CONCLUSION :-

The knowledge of food of fishes, their feeding behavior and physiology of digestion is of great importance for planning fishery programs for successful fish culture and to obtain maximum yield. In view of this fact in mind, the present study was undertaken to study the feeding habits of Indian major carps.

The results obtained during the present study clearly demonstrate that feeding habits and Habitat of the Indian major carp varies from species to species. *Catla catla* is Planktonic omnivorous fish feeding at the surface of water mainly on Zooplanktons. *Labeo rohita* is Herbivorous fish feeding in the midwater to surface area on Algal and plant material. *Cirrhinus mrigala* is Omnivorous fish feeding at the bottom of water body on Zooplankton, and Sand debris. Thus due to variation in food Habit and feeding Habitat, these three species are easy to culture together as competition for food is avoided and these species are cultured together in one and the same water body.

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