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Study of gut contents of major carps for their food habits from Siddhewadi lake of Tasgaon tahsil of Sangli district Maharashtra

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Abstract

Tasgaon tahsil of Sangli district lies between 16° 43 to 17° 15 north latitude and 73° 41 to 74° 15 east longitude. It is a draught prone region of the district Sangli, having average rain fall of about 540.5mm. Siddhewadi water reservoir was constructed in the eastern part of the tahsil and it is used for a aquaculture practice from 1978. The cultivated fish varieties of the lake includes *Catla*, *catla* *Labeo rohita*, and *Cirrhinus mrigala*.

In present investigation, the gut contents of some cultivated selected major carps were analyzed in the laboratory for confirming their food habits during 2013-2014. In present study, it was 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.

Keywords: gut content, major carps, food habit, Siddhewadi lake, Tasgaon tahsil, Sangli district, Maharashtra, India.

1. Introduction

Fish is a valuable source of protein and occupies a significant position in the socio-economic fabric of the South-Asian countries. Most of the countries in the world depend on fisheries as a source of food supply and protein foods. In many tropical countries fish consumption now exceeds that of all other animal protein.

There has been significant growth in fish production in India in the recent years and it is now the third largest producer of fish and second largest producer of fresh water fish in the world.

The growth of the fish is optimum when the environmental conditions are in optimum quantity. Naturally growth of the fish is governed by the parameter such as availability of sufficient food resources.

The food of the various fish species varies with life history stage, the kind of food available and change with the season. The food studies may show details of the ecological relationships among organisms. The food relationships determine population levels, rates of growth and conditions of fish.

Feeding of most fishes in nature may presumed to be upon bacteria, desmids, diatoms and other microscopic plankters, both plant and animal. Open water pelagic organisms eaten includes algae, protozoans and microcrustaceans, debris and plant stems and leaves.

The gut content analysis gives an idea about the actual diet of the fish species. In aquaculture practice, to increase the yield of cultured fish the accurate knowledge of food and feeding is essential. Still today nobody has studied the contents of the major carps from Siddhewadi lake. Keeping in view above facts the present study was carried out which provides the information of actual food of major carps.

2. Material and Methods

The major carps *Catla catla*, *Labeo rohita*, and *Cirrhinus mrigala* from Siddhewadi lake were collected monthly and studied for their gut content during 2013-2014. According to the availability of fishes and the availability of water in the lake the fishes were collected and carried to the laboratory for study of gut content.

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The fishes were dissected and their stomach were removed and preserved in 4% formalin. Then the preserved material from the stomach was removed and identified under the microscope for confirming the food habits of the major carps.

3. Results and Discussion

The natural food of fishes comes from many groups of plants and animals that inhabit water as well as from other that do not.

The diet of fishes like every other character, is exceedingly varied. In general, the larger fishes take the larger pray while the small and the young fishes live on the tiny organisms but there are exceptions and vegetarians occur as well as fresh eaters (Kyle H.M, 1999) [5].

Nikol'skii (1963) [9]. 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) [11], the major food of the carps consists of sand, mud, algae and decaying vegetation. *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. *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. *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 Siddhewadi lake 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 *Labeo rohita* about 21 species, in the gut contents of *Catla catla* about 14 species and in the gut contents of *Cirrhinus mrigala* about 30 species of phytoplanktons, zooplanktons and other vegetable and animal body parts were 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 nos.1 2 & 3 shows the checklist of gut contents occurred in *Catla catla*, *Labeo rohita*, and *Cirrhinus mrigala*.

Table 1: Gut Contents of *Labeo rohita* during July 2013 to April 2014

| Sr. No. | Name of the gut content | July 2013 | Aug. 2013 | Sept. 2013 | Oct. 2013 | Nov. 2013 | Dec. 2013 | Jan. 2014 | Feb. 2014 | Mar. 2014 | Apr. 2014 |
|---------|--------------------------------------|-----------|-----------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1 | <i>Scenedesmus accuminatus</i> | ++ | ++ | ++ | ++ | -- | -- | -- | -- | ++ | ++ |
| 2 | <i>Amphora</i> sp. | -- | -- | -- | -- | -- | ++ | -- | -- | -- | -- |
| 3 | <i>Synedra</i> sp. | ++ | -- | -- | ++ | ++ | ++ | ++ | ++ | -- | -- |
| 4 | <i>Plant tissue</i> | ++ | ++ | -- | -- | -- | -- | -- | -- | -- | ++ |
| 5 | <i>Gomphonema</i> sp. | ++ | -- | -- | -- | -- | ++ | ++ | -- | -- | -- |
| 6 | <i>Crustacean append.</i> | ++ | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 7 | <i>Fragilaria</i> sp. | ++ | ++ | -- | ++ | -- | -- | -- | -- | ++ | ++ |
| 8 | <i>Navicula</i> sp. | ++ | ++ | -- | ++ | -- | ++ | ++ | ++ | ++ | ++ |
| 9 | <i>Oscillatoria</i> sp. | ++ | ++ | ++ | -- | -- | -- | -- | -- | -- | ++ |
| 10 | <i>Spirogyra</i> sp. | -- | -- | -- | -- | -- | -- | -- | ++ | -- | -- |
| 11 | <i>Anabaena</i> sp. | -- | -- | -- | -- | -- | -- | -- | ++ | -- | -- |
| 12 | <i>Brachionus</i> sp. | -- | -- | -- | -- | -- | -- | -- | ++ | -- | -- |
| 13 | <i>Pediastrum</i> (2,8,11,16-celled) | ++ | -- | -- | ++ | -- | -- | -- | -- | -- | ++ |
| 14 | <i>Euglena</i> sp. | ++ | ++ | ++ | ++ | -- | -- | ++ | -- | -- | ++ |
| 15 | <i>Surirella</i> sp. | -- | ++ | -- | -- | -- | -- | -- | -- | -- | -- |
| 16 | <i>Keratella</i> sp. | -- | -- | -- | -- | -- | -- | -- | -- | -- | ++ |
| 17 | <i>Epithemia</i> sp. | -- | ++ | ++ | -- | -- | -- | -- | -- | -- | ++ |
| 18 | <i>Spirulina</i> sp. | -- | ++ | -- | -- | -- | -- | -- | -- | -- | -- |
| 19 | <i>Merismopedia tenuissima</i> | -- | -- | -- | -- | -- | -- | -- | -- | -- | ++ |
| 20 | <i>Cyclops</i> sp. | -- | ++ | -- | -- | -- | -- | -- | -- | ++ | -- |
| 21 | <i>Cosmarium reniformie</i> | -- | -- | -- | -- | -- | -- | -- | -- | ++ | -- |
| | NO. OF FISHES EXAMINED | 08 | 07 | 04 | 05 | 02 | 05 | 06 | 07 | 08 | 09 |

++ = Present

-- = Absent

Table 2: Gut Contents of *Catla catla* during July 2013 to April 2014

| Sr. No. | Name of the gut content | July 2013 | Aug. 2013 | Sept. 2013 | Oct. 2013 | Nov. 2013 | Dec. 2013 | Jan. 2014 | Feb. 2014 | Mar. 2014 | Apr. 2014 |
|---------|-----------------------------------|-----------|-----------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1 | <i>Amphora</i> sp. | -- | -- | -- | -- | -- | -- | -- | ++ | -- | -- |
| 2 | <i>Synedra</i> sp. | ++ | -- | -- | -- | -- | ++ | ++ | ++ | -- | -- |
| 3 | <i>Gomphonema</i> sp. | ++ | -- | ++ | -- | -- | ++ | -- | ++ | ++ | -- |
| 4 | Crustacean append. | ++ | ++ | ++ | ++ | -- | ++ | ++ | ++ | ++ | ++ |
| 5 | <i>Fragilaria</i> sp. | ++ | ++ | -- | -- | -- | -- | -- | ++ | -- | ++ |
| 6 | <i>Navicula</i> sp. | ++ | ++ | -- | -- | -- | ++ | -- | ++ | -- | ++ |
| 7 | <i>Oscillatoria</i> sp. | -- | ++ | ++ | -- | -- | ++ | -- | -- | -- | ++ |
| 8 | <i>Pediastrum</i> (2,8,11-celled) | ++ | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9 | <i>Euglena</i> sp. | -- | ++ | -- | -- | -- | -- | -- | -- | -- | -- |
| 10 | <i>Moina</i> sp. | -- | -- | -- | -- | -- | -- | ++ | -- | -- | -- |
| 11 | <i>Microcystis aeruginosa</i> | -- | -- | -- | -- | -- | -- | ++ | -- | ++ | ++ |
| 12 | <i>Cyclops</i> sp. | -- | -- | -- | -- | -- | -- | -- | -- | -- | ++ |
| 13 | <i>Diatoma</i> sp. | -- | ++ | -- | -- | -- | -- | -- | -- | ++ | -- |
| 14 | Plant tissue | -- | -- | -- | -- | -- | -- | ++ | ++ | -- | ++ |
| | NO. OF FISHES EXAMINED | 04 | 04 | 05 | 03 | 02 | 03 | 03 | 05 | 04 | 06 |

++ = Present
 -- = Absent

Table 3: Gut Contents of *Cirrhinus mrigala* during July 2013 to April 2014

| Sr. No. | Name of the gut content | July 2013 | Aug. 2013 | Sept. 2013 | Oct. 2013 | Nov. 2013 | Dec. 2013 | Jan. 2014 | Feb. 2014 | Mar. 2014 | Apr. 2014 |
|---------|-------------------------------|-----------|-----------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1 | <i>Zygnema</i> sp. | -- | ++ | ++ | -- | -- | ++ | -- | ++ | -- | ++ |
| 2 | <i>Synedra</i> sp. | ++ | -- | -- | -- | -- | -- | -- | ++ | -- | -- |
| 3 | Plant tissue | ++ | ++ | ++ | ++ | -- | ++ | ++ | ++ | ++ | ++ |
| 4 | <i>Gomphonema</i> sp. | -- | -- | -- | -- | ++ | -- | ++ | ++ | -- | -- |
| 5 | Crustacean append. | -- | -- | -- | ++ | -- | -- | -- | ++ | -- | -- |
| 6 | <i>Nostoc</i> sp. | ++ | -- | ++ | ++ | -- | ++ | ++ | -- | -- | -- |
| 7 | <i>Fragilaria</i> sp. | ++ | -- | ++ | -- | -- | -- | -- | -- | -- | -- |
| 8 | <i>Navicula</i> sp. | ++ | -- | ++ | -- | -- | -- | ++ | ++ | -- | -- |
| 9 | <i>Oscillatoria</i> sp. | ++ | ++ | ++ | -- | -- | -- | ++ | -- | -- | ++ |
| 10 | <i>Pediastrum</i> (8-celled) | ++ | -- | -- | ++ | -- | -- | -- | -- | -- | ++ |
| 11 | <i>Euglena</i> sp. | ++ | ++ | ++ | ++ | -- | -- | -- | -- | -- | -- |
| 12 | <i>Surirella</i> sp. | -- | -- | -- | -- | -- | ++ | -- | -- | -- | -- |
| 13 | <i>Microcystis aeruginosa</i> | -- | -- | ++ | -- | -- | -- | -- | ++ | -- | ++ |
| 14 | <i>Keratella</i> sp. | -- | -- | ++ | -- | -- | -- | -- | -- | -- | -- |
| 15 | <i>Epithemia</i> sp. | -- | -- | ++ | -- | -- | -- | -- | -- | -- | -- |
| 16 | <i>Spirulina</i> sp. | ++ | -- | -- | ++ | -- | -- | -- | -- | -- | -- |
| 17 | <i>Diatoma</i> sp. | ++ | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 18 | <i>Chlorella</i> sp. | ++ | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 19 | <i>Coelastrum</i> sp. | ++ | -- | -- | -- | -- | -- | -- | -- | ++ | -- |
| 20 | <i>Crucigenia</i> sp. | ++ | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 21 | <i>Netrium</i> sp. | ++ | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 22 | <i>Microspora</i> sp. | ++ | -- | -- | ++ | -- | -- | -- | -- | -- | -- |
| 23 | <i>Mugeotia</i> sp. | ++ | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 24 | Insect wing | ++ | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 25 | <i>Selenastrum</i> sp. | ++ | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 26 | <i>Cylindrocystis</i> sp. | ++ | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 27 | <i>Phormidium tenue</i> | ++ | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 28 | <i>Lyngbya majuscula</i> | ++ | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 29 | <i>Cosmarium reniforme</i> | ++ | -- | -- | -- | -- | -- | -- | -- | ++ | -- |
| 30 | <i>Calothrix epiphytica</i> | ++ | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | NO. OF FISHES EXAMINED | 06 | 03 | 05 | 03 | 02 | 04 | 04 | 05 | 04 | 03 |

++ = Present
 -- = Absent

Present study indicates that the major carps feeds mostly on the phytoplanktons and vegetable matter. The *Labeo rohita* shows the vegetarian food habit. The *Keratella* species and

Cyclops species were reported in the gut content of the fingerlings of *Labeo rohita*. *Catla catla* and *Cirrhinus mrigala* both carp's shows the omnivorous food habit.

In analysis of stomach content of *Cirrhinus mrigala* about 65% to 72% zooplanktons reported out of the total count. However it depends upon the size (Dholakia, 2004).

The similar type of work on the foods and related aspects of these fishes was carried out by many workers – Mookerjee (1944) ^[7], Mookerjee, Gupta and Choudhary (1946) ^[8], Chacko and Kurien (1950-51) ^[2], Misra (1953) ^[6], Das and Moitra (1955) ^[3], Prowse (1957) ^[10], and Vasisht (1959) ^[12]. Alikunhi (1952) ^[1]. has given a detailed account on the food of carp fry under experimental conditions.

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