Research Article

Feeding biology of *Cyprinus carpio* from Keenjhar Lake, District Thatta Sindh, Pakistan

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Abstract

Feeding biology of *Cyprinus carpio* (Lin.) was explored from Keenjhar Lake District Thatta, Sindh, Pakistan. In total 110 samples were accessed at different length groups during March – August 2015. The range of sample was between 5.1 to 70.0 cm and 8.1- 2990.4g in total length and weight respectively. Results of the present study revealed that the feeding habit of *Cyprinus carpio* was found to be omnivorous with high feeding preference of invertebrates (61.63%) followed by plant matter (30.0%) and 3rd preferred food was debris (9.0 %). It was also noted that the feeding activity of the fish was found to be increased with the increase in size.

Keywords: Feeding biology; Keenjhar Lake; Omnivorous; Invertebrates

Introduction

Food and feeding habit of fish are important biological factors for selecting a group of fish for culture in ponds to avoid competition for food among them and live in association to utilize all the available foods [1]. The determination of food and feeding habit in fish is vital need for commercial production. It varies with season, size, ecological factors and the food composition in aquatic habitat also varies throughout the year [2]. Knowledge on the food and feeding habit of fishes provide keys for the selection of culturable species and the importance of such information is necessary for successful fish farming. The experimental fish, *Cyprinus carpio* belongs to the order Cypriniformes of the family Cyprinidae. The family Cyprinidae is one of the most important

families of carp fish which is widely distributed throughout the world found almost every type of water small streams, rivers, lakes, ponds and pools [3]. Common carp *Cyprinus carpio* are among the most successful cultured finfish species in the world because of their fast growth rate. Studies on the food and feeding habit of different fishes have been made by many workers like [4-13] but no literature is available on food and feeding habit of *Cyprinus carpio* from Keenjhar Lake District, Thatta, Sindh, Pakistan.

Materials and methods

110 fish specimens were collected and preserved in 10% formalin in polythene bags. Preserved fishes were then taken out, measured, the body cavity was carefully opened and gut fullness was assessed on a scale of 0 (empty) to 4 (full). The point

method was used as described by [14, 15]. The volume of stomach content as estimated by eye observation was record on an absolute scale and points were allotted to each stomach according to the volume of its contents. The preserved stomach (gizzard) from each fish were dissected and the material containing plankton were analyzed by using a Sedgewick-Rafter Counting Cell (model 550, Fisons), following the standard methods [16] for counting plankton, which was identified up to genus level through different keys. The gut contents from the anterior portion of the gut that is stomach were carefully washed into a Petri dish and observed under a light microscope (Olympus, model B-2000) by using Sedgwick-Rafter counting Cell. Analysis was followed by the method of [17].

Ivlev's index, Electivity (E) was calculated according to following formulae:

$$E = \frac{r_1 - P_1}{r_1 + P_1}$$

Where r_1 is the relative contents of any items in the ration, expressed, as a percentage of total numbers in the ration and P_1 is the relative proportion of the same items in the environment.

The resultant values of electivity from +1 to -1, positive values indicating selection for

certain food items, negative values indicating avoidance

Results

Feeding biology of *Cyprinus carpio* were studied with respect to quality and quantity of food items eaten, size and pattern of feeding in relationship to total length stomach weight. The food groups recorded in the gut contents of the fishes were *Invertebrates*, *Debris*, *Chlorophyceae*, *Bacillariophyceae*, *Myxophyceae* and *Miscellaneous*. Among % of food items invertebrates (61.0%) was the most dominant food items found in the stomach of the fish by percentage of total points followed by plant matter (30.0%) and least observed food was debris (9.0%) from stomach of *Cyprinus carpio*, the percentages of food items and their categories are shown in (Table 1 and 2) respectively. It was observed that *Cyprinus carpio* is mainly invertebrate feeder at every length group with a pronounced tendency found to be invertebrate feeder (60.0%). It was also noted that the feeding activity of the fish was found to be increased with the increase in size. The standard length and stomach weight ratio were calculated and presented in (Table 3) which indicated that the ratio of stomach weight and standard length increased with increase of fish in size.

Table 1. Percentage (%) of food item observed from stomach of *Cyprinus carpio* from Keenjhar Lake, District Thatta Sindh, Pakistan

Length group (cm)	Rotifera %	Annelida %	Porifera %	Mollusca %	Chlro %	Bascillario %	Myxo %	Decay %	Miscellaneous %
15.1-20.0	28.8	32.8	10.5	8.5	7.0	6.5	5.5	5.0	5.0
20.1-25.0	25.4	28.30	8.1	8.2	6.11	6.3	6.2	4.2	5.2
25.1-30.0	24.4	26.10	8.0	8.7	5.4	7.2	5.7	2.1	10.9
30.1-35.0	20.60	27.02	8.60	-	6.5	9.18	8.15	9.34	10.2
35.1-40.0	13.8	30.68	-	1.22	10.71	10.28	11.79	8.42	14.34
40.1-45.0	-	34.66	10.21	5.17	11.04	12.10	8.21	9.14	15.21
45.1-50.0	-	39.0	10.04	6.17	11.03	12.20	8.13	10.21	4.22
50.1-55.0	7.03	32.13	9.2	6.52	10.25	11.05	7.29	12.66	2.87
55.1-60.0	-	35.04	1.67	10.68	14.03	13.0	8.29	13.04	4.25
60.1-65.0	8.00	36.24	2.12	8.32	12.03	10.20	8.04	11.05	4.00
65.1-70.0	-	36.91	-	9.00	17.00	9.39	9.24	10.27	8.19

Table 2. Categories of food item (%) observed from stomach of *Cyprinus carpio* from Keenjhar Lake, District Thatta Sindh, Pakistan

Length group (cm)	Invertebrates %	Plant matter %	Decay organic matter %	Miscellaneous %
15.1-20.0	69.3	19.0	8.0	3.0
20.1-25.0	69.9	18.61	8.0	2.0
25.1-30.0	67.2	20.3	9.2	3.3
30.1-35.0	56.4	23.8	9.3	10.2
35.1-40.0	54.4	22.7	13.4	9.5
40.1-45.0	56.0	21.3	13.1	11.2
45.1-50.0	64.2	21.3	10.3	4.2
50.1-55.0	62.8	20.5	12.6	4.1
55.1-60.0	57.3	25.3	13.2	4.2
60.1-65.0	64.6	20.2	11.0	4.2
65.1-70.0	55.9	25.6	10.2	8.3

Table 3. Relationship of stomach weight, gape of mouth with total length of *Cyprinus carpio* from Keenjhar Lake District Thatta Sindh, Pakistan

Length group	Total length (cm)	Stomach weight (g)	Gape of mouth (cm)
15.1-20.0	14.1	1.0	1.5
20.1-25.0	18.0	1.5	1.5
25.1-30.0	24.6	1.5	1.6
30.1-35.0	26.0	1.6	1.7
35.1-40.0	32.02	3.3	2.0
40.1-45.0	38.43	3.2	2.5
45.1-50.0	43.0	3.5	3.0
50.1-55.0	48.48	5.16	3.12
55.1-60.0	51.0	6.5	3.85
60.1-65.0	60.0	8.7	4.0
65.1-70.0	65.5	8.9	4.5

Discussion

The present investigation on feeding biology of *Cyprinus carpio* from Keenjhar Lake District Thatta was enumerated and found that *Cyprinus carpio* is mostly omnivorous in feeding habit. The food of *Cyprinus carpio* was classified into 4 groups. Among the food items it was observed that *Cyprinus carpio* is mainly invertebrate feeder at every length group with high preference of invertebrates (60.0%) followed by plant matter (30.0%) and 3rd preference was found to be debris (9.0%). [18, 19] reported similar observation in *C. carpio* from Bangladesh. The phytoplankton population recorded from the gut contents of *C. carpio* was under 3 groups (viz., *Chlorophyceae*, *Cyanophyceae*, *Bacillariophyceae*) and the zooplankton under 1 group (*Rotifer*) *Bacillariophyceae* and *Chlorophyceae* were the dominant phytoplankton group while *Rotifer* was the dominant zooplankton group in the present study that also revealed by various authors in different fish species like [11] sorted out gut of *Tenualosa ilisha* and observed the avoidance of zooplankton and strongly selected some genera of phytoplankton such as *Bacillariophyceae*, *Cyanophyceae*, and *Chlorophyceae*. [1] studied feeding habit of *Gudusia chapra* and determined that the *G. chapra* is mainly detritivorous feeder and 2nd preference was zooplankton and also some genera of phytoplankton. [20] assessed food ingredients of *C. carpio* and exposed debris and detritus (22.00%), zooplankton (19.69%), aquatic plant parts (20.12%), phytoplankton (16.46%), semi-digested materials (14.83%) and insects (6.78%) as the feed items noticed in gut of fish. Above findings are in support of the present study.

Conclusion

Feed analysis of Gulfam, *Cyprinus carpio* (lin.) was tallied. In total 110 samples were accessed at different length group during March – August 2015 ranged between 15.1

to 70.0cm from Keenjhar Lake District Thatta, Sindh, Pakistan. Results on the feeding behavior *C. carpio* was found to be omnivorous with higher preferences of invertebrates (60.0%) followed by plant matter (30.0%) and 3rd preferred food was debris (9.0%).

Authors' contributions

Conceived and designed the experiments: NT Narejo, Performed the experiments: P Khan, Analyzed the data: S Jalbani, Contributed reagents/ materials/ analysis tools: UoS Jamshoro, Wrote the paper: NT Narejo.

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