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Food habits of common carp (Cyprinus carpio L.,1758) in Main Outfall Drain ,Al-Nassiriya, Iraq.

Afrah A. Maktoof Al-Awady

Biology Department –Science Collage-Thi-Qar University

Abstracts

The, alimentary canal contents of 360 common carp (*Cyprinus carpio*) caught from MOD between January 2010 to December 2010 were examined. The phytoplankton, zooplanktons, detritus, diatoms, insects, unidentified digestive foods were identified in the alimentary canal of fish.

The results of analysis showed that the *C.carpio,* was omnivorous. Food contents consist of plant. The species of fish tend to consumed more plant origin food. The aquatic plants and tissues were the main part of the food followed by chlorophyta and cyanophyta.

The results revealed that the species obtained or fallen their food items from the bottom or the near of it.

طبيعة غذاء أسماك الكارب الاعتيادي في المصب العام ,الناصرية, العراق

أفراح عبد مكطوف العوادي

قسم علوم الحياة –كلية العلوم – جامعة ذي قار

الخلاصة

فحصت محتويات القناة الهضمية ٣٦٠ سمكه من الكارب الاعتيادي جمعت من المصب العام, قرب مدينة الناصريه للفترة من كانون الثاني ٢٠١٠ لغاية كانون الاول ٢٠١٠. حددت طبيعة الغذاء من خلال وجود الهائمات النباتية والهائمات الحيوانيه والفتات العضوي والدايتومات والغذاء المهضوم غير المشخص والحشرات في القناة الهضمية للأسماك.

أظهرت نتائج تحليل الغذاء, بأن سمكة الكارب من القوارت, اذ تألف غذائها من المكونات النباتية والحيوانية والفتات العضوي.

ظهر أن هناك ميل الى الغذاء النباتي اللأصل في السمة المدروسة, اذ شكلت النباتات المائية الجزء الاكبر من غذائها, تليها الطحالب الخضر والخضر المزرقة. وتبين من الدراسة ان اسماك الكارب الاعتيادي تتناول غذائها من القاع او قريبا منه.

1–Introduction:

Fish are key elements in many natural food webs and an important source of food and recreation. They have impacts on the physicochemical properties of the system in which they occur and affect plankton, macrophytes and other aquatic organisms [1]. They also can serve as environmental indicators.

Feeding behavior of fish is the major important factor affecting their nutrition and growth. Changing environmental conditions such as those resulting from eutrophication affect the fish species differently, these changing conditions affect the availability of food types. Quantitative determination of the components of the diet, their nutritive value and seasonal availability are the basic parts for understanding of environmental impacts on the condition and growth of fish. Therefore, an understanding of fish diet and its influences growth can be essential for understanding the ecological role and the productive capacity of fish populations [2].

Studying feeding can be considered as an important step to make growing fish more successful [3]. [4, 5] mentioned that the habits of feeding for common carp (*Cyprinus carpio*) can be classified under mixed feeding or omnivores as [6] conducted some experiments on the feeding of common carp and they found that the food content falls into two types: either provide energy (fat and carbohydrate) or to achieve growth in organisms (proteins) in addition to other materials (metals and vitamins). Thus, protein is considered to be the main food constituent (component) required to achieve growth.

[4] Stated that the common carp, feed on zooplankton and phytoplankton matter which indicate a mixed feeding [7] it prefers animals rather than plants [8]. [9] Studied the seasonal variations of the food of fish in Al-Qadisiya dam reservoir. During examining the food contents in intestine, *Barbus grypus*, *Barbus xanthopterus, C. carpio* and *Barbus sharpeyi* depend on mixed feeding and found that two species of fish *Barbus grypus* and *Barbus xanthopterus* depend on the clam and insects, whereas the *C.carpio* and *Barbus sharpeyi* depend on higher plants with their seeds and detritus as well as Zooplankton. On the other side, *Barbus luteus* depend on aquatic plants with their seeds, chlorophyta and cyanophyta as well as the detritus. [10] studied the type of algae in some type of the Iraqi fish in Al-Chubayish and Abu Zarak Marshes which included the diagnosis of types of algae in the content of alimentary canal of four types of Iraqi freshwater fish, three of which belong to cyprindine (*Barbus luteus*, *Barbus sharpeyi* and *C.carpio*) and the other type belongs to mugillidae (*Liza abu*).

This wide and great diversity (variety) of the quantity of food contents of *C.carpio* indicates that this species has a wide food base. Therefore, the purpose of this study was to investigate food composition and to determine monthly variations in the diet of the species in main outfall drain, south Iraq.

2– Materials and Methods:

2-1 Description of study area:

Main Outfall Drain is a river use to discharge the effluents of agriculture activities from its both sides. It is extended from Al-Shaklawiya near Baghdad north until Al-Basrah at the south with length about 565 km [11]. It is dividing into three sectors (North, Mid and South), the south sector (study area) extended from the end of the mid sector until Shatt Al-Basarah in the south, with length about 165 km. The discharge of water is must be mention the range or monthly or annually mean 220m^3/sec in this sector [12]. New branch was constructed this sector with length 7 km, use to feed to the marshes south Al-Nassiriya city.

Three stations were selected in the south sector of this river to implement, the present study, these are station 1(St.1) was near Al-Holandee bridge and the general caragge in the center of Al-Nassiriya city, St.2 was 20 km far from the first station, while St.3 was in the beginning of the new branch (Figure1).

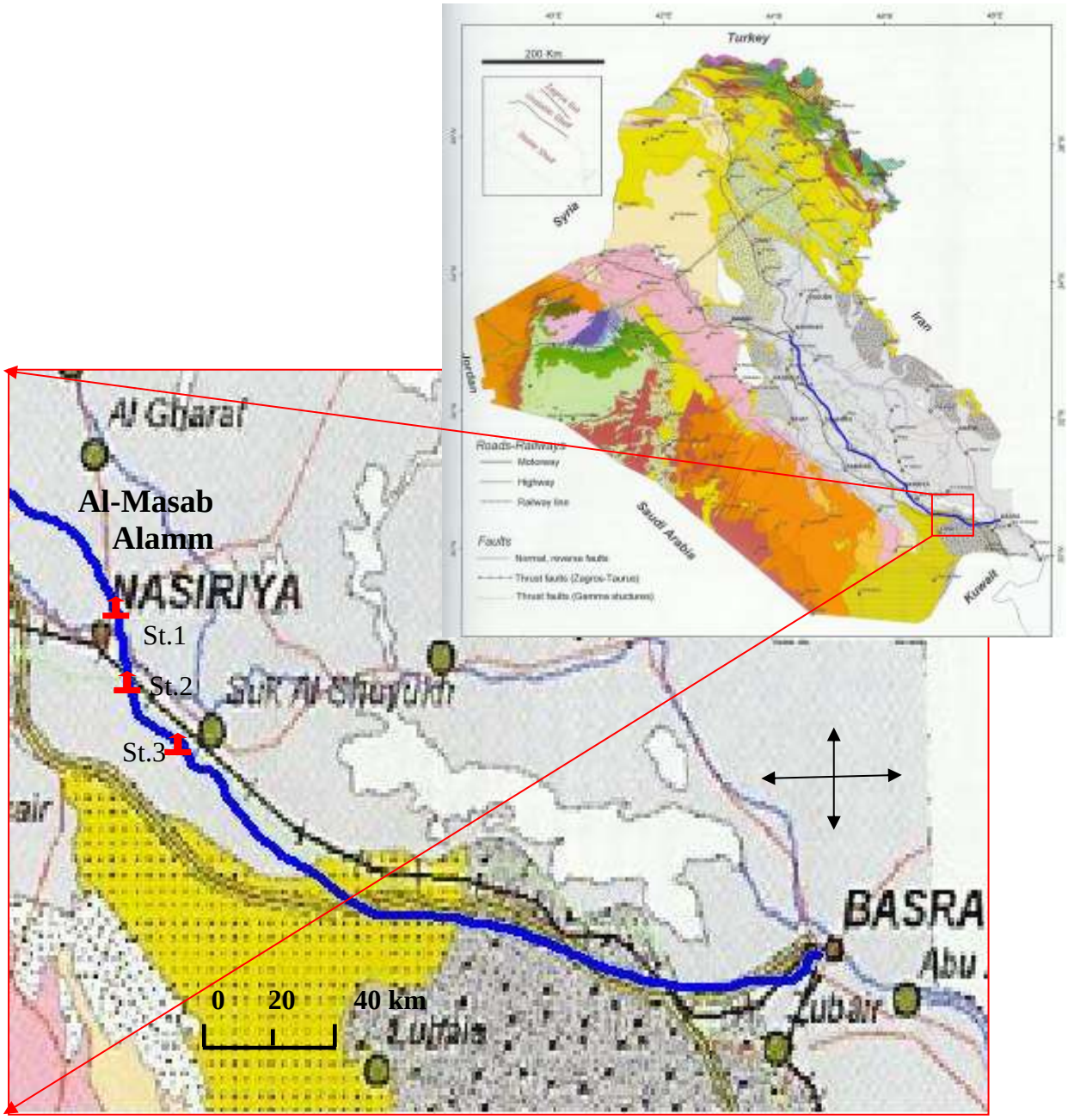

Figure 1: Map of the study area showed the study stations

Materials and Methods :

Fish samples were collected monthly by sein nets (5*5) mm mesh size from the three stations. Nets were set for overnight and removed on the following mourning, captured were reserved in ice box.

Fish were immediately taken to the laboratory. The total length and weight of fish were measured. The data of length and weight have been recorded to the nearest millimeter and milligram respectively. A longitudinal crack has been made in abdominal side towards vertebrate column from head side. After that, alimentary canal of *C.carpio* has been removed. Since there is no real stomach in cyprinidiae species, the foregut (the anterior part of the alimentary canal) was cut and preserved in 5 % formalin for next tests. The gut was dissected and washed well in a petri dish in 10 ml of water. The gut was examined under microscope (Olympus type). Identification of food organisms was done depending on [13, 14, 15, 16].

Frequency of occurrence method [17] and points analysis method ([18] were used in order to calculate the proportions of food organisms found in total food, which is based on the following formula:

F % : (n/N)*100
F %: frequency of occurrence of the species
n: number of existence of the species
N = number of the examined fish.

Ranking index [19] was calculated using the following equation:

Ranking Index (RI %) = Points % × Occurrence %

Percentage of Ranking index for each food content has been calculated and used in comparison with percentage of points because of the food exposure to grinding resulted from digestion. In most of the year it was not possible to use Numerical method for food content analysis.

3–Results:

The range of the lengths and weights of fish in this study were 16-3) cm, and (300-1050) grespectively.

Stomach content of 360 fish were classified into seven main categories based on organisms from study area (Table 1). Aquatic plants were consisted 66.91 %, 68.74 % by points and Ranking Index monthly. The highest frequency aquatic plants were 83.66 % (Fig. 2). The aquatic plant has recorded high ratio in spring by points and Ranking Index methods, while the lowest ratios recorded in winter season (Table 2). Chlorophyta and Cyanophyta have formed 13.55 %, 13.99 % and 90.89 %, respectively (Fig. 2). Seasonal changes showed that the maximum percentage of chlorophyta and cyanophyta were 15.74, 17.20 in winter, whereas the lowest ratios were 11.67 and 84.42 in spring ,and highest frequency during summer 97.74 %. (Table 2).

Detritus (unidentified part of dead plants) formed 5.88%, 4.01% from points and Ranking Index (Fig. 2). The seasonal changes showed that the highest ratios of were recorded during autumn, while the lowest ratios were observed in winter (Table 2). Zooplankton formed 3.39 %, 3.36 % by the two same analysis methods (Fig. 2). Seasonal changes showed that the maximum ratio in winter were 5.01% and 11.29 %, while the minimum ratio during spring, 1.64 % and 1.45% (Table 1).The seasonal changes showed that the highest ratios were recorded during autumn, while the lowest ratios were observed in winter (Table 2).

Diet of the species included diatoms which form a small ratio of contents food points represented by different genus of *Clotella, Navicula, Nitzchia, Cymbella, Diatoma, Amphora*, these genera formed 2.99 %, 2.84 % respectively (Fig. 2). The maximum ratio of diatoms were 4.51 % and 5.21 % in winter, whereas the minimum percents recorded in autumn were 2.44 % and 1.02 % from points method and Ranking Index . (Table 2).

Unidentified digestive food items formest 0.96 %, 0.27 % by both analysis methods, respectively (Fig. 2). Insects constituted about 0.7 %, 0.60 % (Fig. 2). Seasonal changes showed that the

maximum ratios were 1.70 % and 1.40 % in winter, whereas the minimum ratio was 0.48% and 0.033% in spring (Table 2). Food content of *C.carpio* included debris and mud that were had accidentally by being found with food contents and have recorded (5.38%, 4.97 %) by analysis methods (Figure 2). The seasonal changes showed that the highest ratio recorded in summer were 5.70 % and 5.89 %, while the lowest ratios in spring were 4.98 % and 3.48 % by both analysis methods (Table 2).

Chlorophyta and Cyanophate algae formed 90.89 %, while aquatic plants and tissues formed 83.66 % and debris and Mud 81.14 % which are more frequently in alimentary canal of *C.carpio* during study period. Fish was showed to be omnivores with preference of plant food (%) while animal food formed 24.65 % from Ranking Index.

Table(1): Plant and animal organisms identified in the stomach of *C.carpio* in main outfall drain.

Food Category	**Organism**
Aquatic plants and tissues	Stem, leaves, root of number of submergent plant and parts of terrestrial plants
Chlorophyta and Cyanophyta	*Mougeotia, Spirogyra, Pediastrum* (Chlorophyta). *Chrococcus, Oscillatoria, Anabaena* (Cyanophyta)
Detritus	Non-living particulates and debris
Diatoms	*Clotella, Navicula, Nitzchia, Cymbella, Diatoma, Amphora,*
Unidentified digestive food	animal tissues remained from digestion
Insects	larvae of diptera such as chironomid larvae and some dragon fly numph
debris and mud	Sand grains and mud

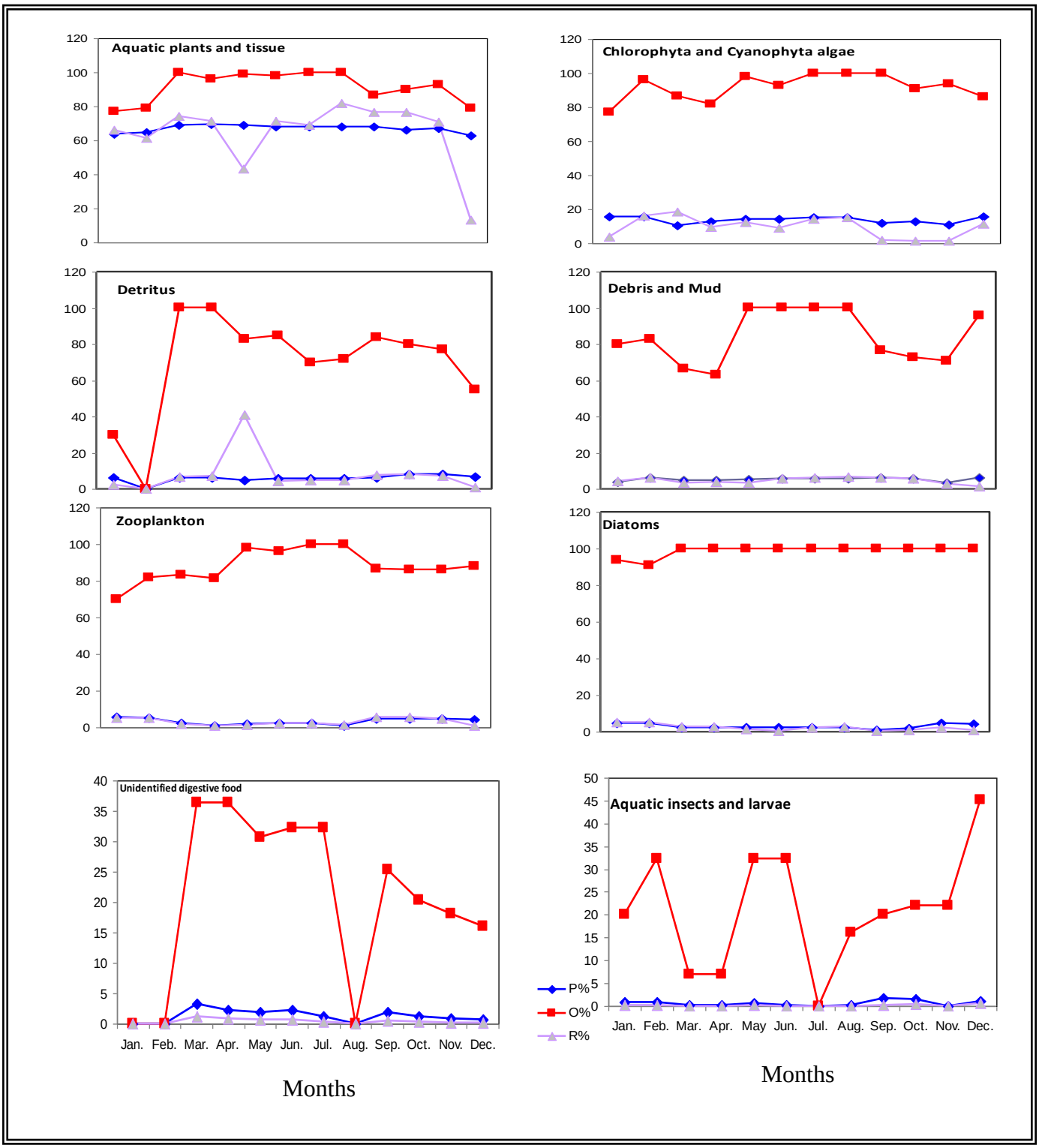

Figure (2): Fore gut content of alimentary canal of *C. carpio* and variations for food content during the study period.

Table (2): Seasonal variations of food content as percentage (%) for *C.carpio* .

Food content	Winter			Spring			Summer			Autumn			All season		
	P%	O%	R%	P%	O%	R%	P%	O%	R%	P%	O%	R%	P%	O%	R%
Aquatic plant and tissue	63.09	78.30	62.20	70.15	98	74.05	68.03	99.24	69.82	66.36	89.93	68.79	66.91	83.66	68.74
Chlorophyta and Cyanophyta algae	15.74	86.44	17.20	11.67	84.42	10.61	14.87	97.74	5.03	11.91	94.96	13.04	13.55	90.89	13.99
Detritus	4.21	28.28	1.50	6.35	100	6.84	5.56	77.51	4.46	7.42	80. 27	6.86	5.88	7.51	4.01
Debris and Mud	5.50	86.34	6.00	4.98	64.8	3.48	5.70	100	5.89	5.33	73.42	4.51	5.38	81.14	4.97
Zooplankton	5.01	80.00	5.06	1.64	82.28	1.45	1.95	98.48	1.99	4.97	86.33	4.94	3.39	86.44	3.36
Diatoms	4.51	91.42	5.21	2.56	100	2.76	2.46	94.03	2.39	2.44	36.36	1.02	2.99	80.45	2.84
Unidentified digestive food	0.24	6.6	0.02	2.17	33.33	0.78	0.80	19.95	0.16	0.62	16.50	0.12	0.96	19.09	0.27
Aquatic insects and larvae	1.70	64.95	1.40	0.48	6.49	0.033	0.63	39.19	0.25	0.95	64.64	0.71	0.7	43.82	0.60

P%: Points, O %: Occurrence R%: Ranking index

4–Discussion:

According to the analysis of results, *C. carpio* were typically omnivorous, feed on higher aquatic plant, algae, detritus, diatoms, debris and mud, insects, zooplankton and non-classified digestive food. Therefore, it seems that *C.carpio* feed on various aquatic organisms. [20] mentioned that existence of certain food items in fish guts probably dependent on its availability in the natural habitat. High level of higher aquatic plant and tissues was presented in gut of *C.carpio* indicates a wide adapted ability to the habitat in which they live and followed by phytoplankton (Blue-green and Green algae). The species in this study appear to be a relatively unselective and their diet varies seasonally. These results correlated the finding of the cyprinids can feed a wide large of food. Proportions of food types in the diet content were similar to those recorded for the species in other regions or studies, which consumed large amount of plant material, algae, organic detritus [21, 22, 23, 5, 24, 25, 26, 27, 28, 29].

Sand grains in the food may be due to browsing on the dead organic matter. The adhering sand particles would have been accidentally present a long with detritus or this is an indication that these species are bottom feeders. This is agree

with the study on *C.carpio* [5] and study on *Carassius carassius* [30]

Non-classified digestive food in gut of *C.carpio* may due to pharyngeal teeth found that use to food particles grinding.

Major food categories were found to be the main food items of *C.carpio* in Main Outfall Drain. Aquatic insects and zooplankton were found on bottom [31], in addition to phytoplantonic, debris and mud and detritus formed proportion of food fish emphasized.

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