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NATURAL FOOD FOR NILE TILAPIA (*OREOCHROMIS NILOTICUS* L.) IN THE RUMAITHA RIVER NORTH OF MUTHANNA PROVINCE, SOUTHERN IRAQ

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Abstract

The present study aimed to provide information on the natural food of the Nile tilapia (*Oreochromis niloticus*) in the Rumaitha river on north of Muthanna city, 97 samples were collected with monthly hunting campaigns from July 2017 to June 2018 by using electric fishing, the total length ranged from 4.5 to 26 cm, while the total weight ranged 1.6 to 401.1 g. Analysis was done by using frequency of occurrence (O), point methods(P) and important ranking index (R%), It was found that tilapia tilted Omnivorous with its great tendency to eatingthe plant components, which accounted for 78.52% of the food consumed and that organic matter the most preferred component and 38.74% followed by algae and then plants and their tissues, while the proportion of animal origin components 18.14, the zooplankton were the most preferred component, with 8.31% followed by un examined food component, insects and their larvae. It was found that the fish was highly feeding activity with 91.25% and the feeding intensity was 23.06 degrees/fish.

Key words : Natural food, Nile Tilapia, Al-Rumaitha river, Iraq.

Introduction

Fish and aquaculture are an important food source for the individual either as an ingredients in the manufacture processes of other animal feed, the important of fish returns to their bodies which contain a high rate from protein, unsaturated fatty acids lipids and other nutrients as vitamins, calcium, phosphor and iron (Al-Eze and Abdul Khaliq, 2002). The knowledge of fish biological aspects is necessary to the to improving the fish wealth, and any step to developingthis wealth is futile if it does not includingthe sufficient knowledge of different aspects of lifeand the most important about its are studies on nutrition (Al-Rubaye, 1989). Tilapia is the common name which is called to thegroup of fish within Cichlidae which contain 1524 species (Eli, 2005) which are under three main species as *Oreochromis*, *Sarotherodon*, *Tilapia* (Popma and Masser, 1999). It is one of the intruder species on the Iraqi rivers and water bodies and is currently existing insome of the Iraqi southern cities (Ghazwan, 2016). This fish speared in the southern marshes of Iraq and it began dominated in other local fishes and negatively affected on its reproduction in the southern cities (Scientific Symposium, 2012). The first presence of Grass tilapia, *Tilapia zilli* was recorded by Salih (2007) in Euphrates river at Al-Musayyib city in the middle of Iraq, the first presence of *O. aureus* was recorded by Al-Mutlaq and Faisal (2009) in the southern part of the main outfall in Al-Basrah city, AL-Zaidy (2013) also recorded the first presence of tilapia *Tilapia zilli* in the Al-Delmj marsh at the middle of Iraq, Abulheni and Abbas (2017) also recorded the presence of two species of tilapia *O. niioticus* and *O. aureus* in the Euphrates river at Al-Hindyah barrier, Tilapia fish is an omnivorous fish according to Surrounding condition, it basically feeds on algae and other plant substances as well as detritus that make it the link between the higher nutrition levels and the lower in the food chain in the water, also its feeding depending in small insects and parts of fishes (Turker *et*

al., 2003) and it plays an important role as filtersthrough their ability to filter food by picking up the food particles in the water column. Also, it changes its diet as a result of environmental changes, especially pollution,the types and sizes of consumed food is changed with size and age of fish, the fish eating the food that is suitable with it mouth size and the capacity of intestine and the increasing of fish age make the digestive system becomes more sophisticated besides the increase in length of intestine which making fish able to digestion the most complication food types which cannot be digested at an early age(Benavides *et al*., 1994). There is a huge of small fish tended to eat zooplankton, which can be digested easily as comparing with phytoplankton and other plant parts as well as it needed to foods with high protein ratiobecause of the high growth rate and highly metabolic processes. the importance of fish feedingis necessary to study the massive needed for it as a source forenergy, growth,and survival alive at the first time of fish life's, which is the main source for food is the yolk sac, however, the need for larger quantities to be supplied from the external environment soon arises. The studies about the populationto fish of Cichlidae especially, which was recorded its presence in Iraq did not receive much attention therefore, the present study aims to study the components of natural food, nutritional habits and nutritional efficiency of Nile tilapia in the Rumaitha river in the north of Muthanna city.

Materials and Methods

Study region

Euphrates river is the longest rivers in Asia and It is ranked 24th in the world (Whitton, 1975) the total length of it from the upstream until when it meeting Tigris river at the Qurnaattained 2940 Km, 1159 from it flows in Iraqi lands, Euphrates river is branching at the beginning of Al- Hindyah barrier into two main branches ShattAlhilla and ShattAl-Hindyah, ShattAlhilla flows south which it passing Alhilla and Al Diwaniyah cities and almost disappear in the agricultural lands south of Rumaytha (Ministry of Water Resources, personal contact), the length of Al-Rumaitha river starting from entering the administrative borders of the region until it faded In the outskirts of Al-Rumaitha district attained about 36.60 Km and the yearling rate of the river drainage attained 14.4 M^3\Second (The Directorate of Water Resources, personal contact). The surface of area which Al-Rumaitha river flow on it tends to general level that leads to the slow flow of water which was the reason for the increased concentration of pollutants and weakening the ability of the river to self-purification as well as increasing the percentage of water leaks into soil and ground water, the sediments of the river are characterized as heterogeneous and consisting of clay, silt and sand a station on the Al-Rumaitha river was chosen within the coordinates 31°31'35.8" N 45°11'20.2" E for the samples collection, the width of the river at the study region amount to (30-35 M) and the depth (3-5 M). There are many aquatic plants in the study region as Reeds *Phragmites australis*, Ceratophyllum *Ceratophyllum demersum* and Typha *Typha domenyenasis* (Mohamed and Al-Jubouri, 2017) and Utricularia *Potamogeton pectinatus* (Al-Amari, 2011). Different natural plant appears along the river and its branches as Willow, Tamarisk and Populous as well as other plants which randomly distributed (Al-Abadi, 2017), whereas the important fish which existing in study region as *Aspius vorax*, *Planiliza abu*, *Silurus triostegus*, *Mesopotamichthys sharpyei*, *Alburnus caeruleus*, *Cyprinus carpio*, *Carasobarbus lutues* and *Carassius auratus* (Al-Daham, 1977) as well as all three species of tilapia fish *O. niloticus*, *O. aureus* and *Coptodon zilli* (Trewevas, 1983; FAO, 2012).

Field and laboratory work

The samples of fish were collected monthly from July 2017 to June 2018, by using electric fishing and fishing effort was limited by one hour per month. Fish were placed in ice-cored containers in the summer months and storage frozen until measurements of life were made, the fish were classified according to (FAO, 2012; Trewavas, 1983), the frozen fish were washed by water to remove the ice then they dried and the total length was measured close to 1mm by using a wooden ruler , the measurement was recorded by using the digital vernier. fish were weighted closed to 0.1 gm, then the fish was dissection from the abdominal region and the gut was extracted and the third front of gut was cutting to representing the stomach (Al-Shammaa, 1993) and samples were placed in small containers that recorded on it the information each fish. The contents were emptied in a glass dish and examined under the dissecting microscopeat x40 magnification and the microscope under the magnification x 450 to identify on the food components in the gut, the food elements was diagnosed according to (Edmondson, 1966). Two methods were used to analyze the content of the gut as the point method and occurrence method according to Hyslop (1980) and important Ranking Index (IRI) was calculated to each food component through equation :

$$R = (O\%P\%/\Sigma P\% \times \Sigma O\%) \times 100$$ (Stergiou, 1988).

The fullness degree of the stomach was recorded by visual observation (Sinha and Jones, 1967) and gave the

points 0, 5, 10, 15, 20, 30 depending on the fullness degree as (empty, rare ¼full, $^{2}/_{1}$ full, $^{4}/_{3}$ full, full) sequentially according to feeding activity by using the equation :

$$\text{Feeding activity \%} = \frac{\text{The number of feeding fish}}{\text{The total number of examined fish}} \times 100$$

(Gordan, 1977) and the feeding intensity by using the equation :

$$\text{The feeding intensity(Degree\Fish)} = \frac{\text{The total scores obtained from the fullness index}}{\text{The number of feeding fish}}$$

(Dipper *et al*., 1977). Statistical Package of Social Science (SPSS) was used for the statistical analysis and finding the correlation values and comparing between means (Al-Aqili and Al-Shayeb, 1988) and the differences were examined according to Duncan test (Duncan, 1955).

Results and Discussion

The food components according to length groups

The fish was divided into two longitudinal groups , the more than 12 cm and the less than 12 cm (table 1), the result of the statistical analysis showed there was significant differences in the feeding of the longitudinal groups on the algae and the zooplankton and there was no significant differences in the feeding of longitudinal groups on other food components and when we examined the gut components of the fish with a length less than 12 cm, Algae was ranked first in the points method (P) and occurrence method (O) moreover important ranking index (R), Algae accounted 35.69% for the (R), 19.07% for the (O) and 29.04% for the (P), whereas ranked second 18.42%, 25.90%, 30.73 by the three methods sequentially whilst the ratios of zooplankton were 13.15%, 15.17%, 12.85% sequentially, the other components and its tissues according to (R) were accounted %8.6 ,unexamined food substances 7.47%, Diatoms 1.92 and insect and its larvae 1.52%.

The high percentage of algae in the longitudinal groups less than 12 cm may be its return to easier digest by fish than other aquatic plants (Almukhtar, 1982), which is proportional with the age of fish and the development degree of fish digestive system (Benavides *et al*., 1994), small fish also avoid diatoms that have a hard wall that is hard to digest as compared with algae (Otieno *et al*., 2014) and this explained the low ratio of diatoms in the food of small fish, whilst the detritus in the longitudinal group fish more than 12 cm was ranked first by three methods and the ratio of (R) theratio of it was about half of the amount of food intake attained 46.72% followed by algae by 13.84% the plants and their tissues occupied third with ratio 11.50% and the insects and larvae were recorded 1.67%. It is noted decreasing the ratio of micro size food components as zooplankton and increasing the ratio of complicated structure component with large parts as plants and their tissues ,the reason may be due to the increasing the development of the digestivesystem, as well as increasing of sand granules in big size fish as compared with small size fish ,which supporting this opinion its help in the digestion processes as Al-Mukhtar (1982) pointed there is a positive relationship between the size of the prey and the length of fish generally .the results of this study differed with the results of Khalifa (2017), who pointed that the detritus ranked first at ratio 61.62% and the algae occupied 11.13% and its ranked second from the importance to Nile tilapia fish at Tigris river southern Baghdad , the result agreed with Abulheni *et al.* (2017), as for detritus it ranked first to fish group more than 15 cm by (R) at ratio 46.85% and it differed with the results by the first occupied by the component itself in the juvenile food and in the recordingof the mollusks presence in the little ratio in the content of Gut in the two longitudinal groups and by all using methods, whereas not recorded any presence of it in the results of current study, the table 2 showed that the Nile tilapia in Al-Rumaitha river was Omnivorus with their tendency to eating the plant components, which recorded in the fish group less than 12 cm ata ratio 76.94% and the animal component 21.84% whereas it ratios in the fish with length more than 12 cm 80.03% and 14.47% for the plant and animals components sequentially, the consumption of small fish of animal components at higher rates than big fish is due to the needing of the body in the initial stages of growth to foods with high content of energy and protein. These requirements are available in the animal origin foods (Benavides *et al.*,1994). This result agreed with Abulheni *et al*. (2017), this species of fish is anomnivorous with a preference to eating the plant components with it a large and small sizes generally, the ratio of plant components in the small length groups 82.46% and the animal components 517.53%, whereas it ratio in the big length group 82.32% and 17.64% to the plant and animal components sequentially.

The general food components

Table 3 showed that the detritus and algae ranked first and second in an importance index which formed 34.74% and 24.77% sequentially, the plants and their tissues ranked third 10.05% and the zooplankton 8.31% followed by unexamined food substances at a very close rate attained 8.24% then the diatoms which formed about

Table 1 : The percentages of the natural food components of the two longitudinal groups of Nile tilapia in the Rumaitha river are calculated by the points (P), The occurrence (O) and The Important Ranking Index (R) methods.

Food components	Length more than 12 cm			Length less than 12 cm			X2
	O %	P %	R %	O %	P %	R %	
Plants and their tissues	10.82	15.45	11.5	12.5	10.69	8.6	0.4 ns
Insects and larvae	4.76	5.1	1.67	5.92	4	1.52	0 ns
Algae	13.41	15	13.84	19.07	29.04	35.69	9.6*
Diatoms	15.15	7.68	8	11.18	2.67	1.92	3.6 ns
Detritus	19.48	34.92	46.72	18.42	25.9	30.73	3.2 ns
Sand and Clay granules	12.55	6.27	5.41	8.55	2.12	1.16	2.66 ns
Un examined food substances	12.12	10.83	9.02	11.18	10.37	7.47	0.25 ns
Zooplankton	11.68	4.72	3.78	13.15	15.17	12.85	4.7*

*Referred to significant differences at probability level (0.05), N.S referred to no significant differences at probability level.(0.05).

Table 2 : Feeding habitat of Nile tilapia fish according to Important Ranking Index (R) in Rumaitha river during studying period.

Length group	Food components	
	Animal %	Plant%
Less than 12 cm	21.84	76.94
More than 12 cm	14.47	80.03
General	18.14	78.52

Table 3 : The percentage of Gut contents from natural food which calculated by the points method (P), occurrence method (O), the Important Ranking Index (R), activity and feeding intensity of Nile tilapia fish which caught in Al-Rumaitha river during studying period.

Food components	Examined method%		
	O	P	R
Plants and their tissues	11.66	13.07	10.05
Insects and larvae	5.34	4.55	1.59
Algae	16.24	22.02	24.77
Diatoms	13.16	5.17	4.96
Detritus	18.95	30.41	38.74
Sand and Clay granules	10.55	4.19	3.28
Unexamined food substances	11.65	10.60	8.24
Zooplankton	12.41	9.94	8.31
The number of examined fish	80		
The number of feeding fish	73		
Total points	1684		
Feeding activity	%91.25		
Feeding intensity	23.06-degree \ fish		

4.96%, insects and larvae ranked last attained 1.59%, in many studies Nile tilapia classified as a herbivorous and several researchers agree that despite the diversity of it feeding include fish, insects, etc. but the plant components still contribute the largest compenont in its food (Otieno *et al*., 2014), the results of the study agreed with what was found by Khalifa (2017), who pointed that the highest percentage of this fish food is detritus 61.79%, followed by algae 10.22% and plants and their tissues (9.13%). the difference in the ratios of food components between study and other or between site and other maybe return to the effect of environmental factors and the food abundance, as well as the dominance of the food component to anotherwas the result of selective feeding on different types of fish depending on the nutritional benefit or maybe these differences resulted from the dominance of the component on other in the water body (Canonico *et al*., 2005). Table 3 showed the tilapia fish has a high nutritional activity attained 91.25% and a feeding intensity attained 23.06 degrees/fish. The increasing therate of feeding activity may be due to the efficiency of the used fishing equipment, the using of gill nets leads to return part of the food from the stomach while it trying to escape from the nets or may be due to the feeding habitat which it depending on it this species also it enables the fish to take available advantage of the food groups in the environment which lives on itas well as it considered asravenous fish fed continuously if food available (Shola *et al*., 2017). This result agreed with Abulheni *et al*. (2017), who pointed that the Nile tilapia fish in the Euphrates river, Al-Musayyib at highly feeding activity on throughout the year attained 97.43% and feeding intensity attained 23.28 degree\fish this result agreed with Khalifa (2017) result who recorded the higher feeding activity of Nile tilapia in Tigris river attained %100 and the lowest feeding activity for it was recorded at winter season attained 83.00%.

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