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STOMACH CONTENT ANALYSIS OF SOME SELECTED FISH SPECIES FROM GILIMA RIVER, TAURA LOCAL GOVERNMENT, JIGAWA STATE, NIGERIA.

HARUNA M. A.

*[1]Department of Fisheries, Faculty of Agriculture, Federal University Dutse,
P.M.B. 7156, Jigawa State, Nigeria.

auwal3@yahoo.com. obarohio@gmail.com

ABSTRACT

Four hundred (400) samples comprising eighty (80) samples each from five different species of *Oreochromis niloticus, Bagrus bayad, Lates niloticus, Hydrocynus brevis* and *Synodontis vermiculatus* were collected in batches using gill nets from 24th March -16th September, 2014; food and feeding habits were then assessed by analyzing the stomach content. The samples ranged in size from 5–25cm total length and 4.7–45g in weight. The stomach content analysis using frequency of occurrence method revealed that *Oreochromis niloticus* were herbivorous with dietary preference for plants and plant materials (47.27%), detritus (23.21%) and unidentifiable materials (6.06%), *Bagrus bayad* as carnivorous with dietary preference for fishes (52.17%), insects (23.57%), detritus (7.50%), *Lates niloticus* were also carnivorous with fishes (62.00%), fish parts (31.30%), insects (4.6%), *Hydrocynus brevis* proved carnivorous with dietary preference for fishes (42.16%), fish parts (17.83%), and *Synodontis vermiculatus* as an omnivore with dietary preference of plant materials (18.71%), fishes (12.69%), insect (12.19%) and detritus (17.48%).

Keywords: Herbivorous; carnivorous; dietary preference; fishes.

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INTRODUCTION

The food and feeding habits of different fishes often differ widely. The same fish also may show a preference for different types of food as it grows or at different times of the year (Maar *et al*. 1983). The stomachs of many tropical fishes have been studied to ascertain their feeding habits in natural habitats and the relationship between the fishes and their biotic environments (Ugwumba *et al.* 1990). Fagbenro *et al.* (2000) established *Lates niloticus* as a benthic feeder in River Oluwa and a planktonic feeder in Owena Reservoir and Mahin Lagoon. Kouamelan *et al*. (1999) reported that *Bagrus bayad* stomach contents from a man-made lake on River Bia (Côte d'Ivoire) comprised mainly of Chironomid larvae and Bacillariophyceae in young fish. Fawole (2002) reported that the major food items in stomachs of *Oreochromis niloticus* in Lekki Lagoon (Nigeria) were detritus and plants.

Omotosho (1993) reported that *O.niloticus* fed on detritus, algae and macrophytes in Oyun mini-dam (Nigeria) while Ipinjolu *et al.* (2005) reported that *M. rume* in River Rima and Goronyo reservoir (Nigeria) fed on items of both plant and animal origins. Assays of enzymes in the gut of a fish provide information about its nutritional physiology. The quality of a given food item is directly proportional to its ability to support growth and its nutritional value is determined by the ability of the animal to digest and absorb it (Akintunde, 1985). Tengjaroenkul *et al.* (2000) reported that the distribution and specific activity of digestive enzymes along the gut change with feeding habits. Tramati *et al.* (2005) noted that the age and/or stage of development influence the anatomical and physiological development of the digestive organs, and the digestive processes are correlated with the size and type of food items in fishes, thus explaining different feeding habits at various stages of the life cycle (Kuz'mina *et al*. 2002). Under natural conditions, adults tend to capture larger prey, which demands a greater digestive effort due to the smaller surface area exposed to enzymatic action. Uys and Hecht (1987) reported that knowledge of the digestive enzymes enhances the development of more efficient diets and rearing techniques.

MATERIALS AND METHOD

Study area

River Gilima is a fresh water river located in the eastern part of Gilima town in Taura Local Government of Jigawa State, Nigeria. Geographically Gilima is in Sudan savannah region and located on latitude 11^0 20N to 11^0 42N and longitude 9^0 15E to 9^0 35E.

Fish sampling

The four hundred (400) samples of *Oreochromis niloticus*, *Synodontis vermiculatus*, *Bagrus bayad*, *Hydrocynus brevis*, and *Lates niloticus* were purchased from the fishermen at gilima river fish landing site. The fish were caught forthnightly with gill nets from 24th March -16th September, 2014.The samples were examined fresh, or otherwise preserved in a freezer until the next day, species identification was with reference to the description of Reed *et al.,* (1967) and Holden and Reed (1972).

Length and weight measurements

Total length and weight for each sample were measured. Total length was measured as the distance from the tip of the snout to the end of the caudal fin to the nearest centimeter using a measuring board graduated in centimeters. Total weight was measured to the nearest gram using an electric top loading balance while gutted weight was obtained after removing the visceral organs.

Food and feeding habits

Removal of gut was done by dissection. The abdominal cavity was split open by making a longitudinal incision along the mid ventral line from the mouth to the anus. This was followed by two cuts dorsally, one behind the pectoral fin and one in front of the anus. This produced two flaps which were pinned at opposite sides to expose the internal organs in the body. The gut was removed carefully from the esophagus by detaching the other internal organs, which were the gonads and the fatty tissues.

Identification of food items

The stomach was slit open and the contents emptied into a petri dish. The contents were then observed under a binocular microscope. The food materials were identified with the aid of identification key provided by Needham and Needham (1962) and Mellanby (1975).

Stomach content analysis

Stomach contents were placed in a petri dish diluted with distilled water and examined under a binocular microscope. The number of stomachs in which each pray item occurred was recorded and expressed as a percentage of the total number of stomachs examined giving the percentage frequency of occurrence. The number of guts in which each food item occurred was listed and expressed as a percentage of the total of guts examined. The proportion of the fish population that fed on a particular food item was estimated according to Odun and Auta (2001).

P = (b/a) as described by Hynes (1950) and Leavastu (1965).

Where:

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P = Percentage of occurrence of each food item.

b = Number of fish containing food item and

a = Total number of fish examined with food in the stomach.

Water quality

Water quality monitored included pH, temperature and dissolved oxygen.

Statistical analysis

Data obtained was analyzed using descriptive statistics.

RESULTS AND DISCUSSION

The results of the stomach content analysis of the fishes of gilima river is presented in Table 1. It revealed that the food items discovered in *Oreochromis niloticus* comprised mainly of plant materials (53.60%), insects (46.86%), while detritus recorded (15%). These agreed with the recent findings of (Adeyemi *et al.,* 2009) and Haruna (2005). Much of the variation in diet composition of this species depended on the availability of food items, which has also been previously described (Ogbeibu and Ezeunara, 2005). It is a well established fact that the composition of different food items utilized by *O. niloticus* changes as the fish grows older.

As shown in Table1, *Bagrus bayad* comprises mainly of fishes (104.34%), insects (47.14%), unidentified material (30%) and detritus (15%). Odum (1968) stated that *B. bayad* had a lot of animal components that included cichlid species, mullets, *Clarias gariepinus,* fish eggs, amphipods, shrimps, aquatic insects and detritus. This is also in agreement with the work of Hashem (1981) in his study of food and feeding habits of *B. bayad* in Nozha dam. He mentioned that this species fed mainly on fish prey, crustaceans and organic detritus that are mostly composed of animal origin which revealed that *B.bayad* is a carnivore. On the other hand, Bishai (1970) in his work on *B. bayad* in Sudan estimated that frequency of occurrence of fish prey was high followed by aquatic insects and crustaceans. According to Hickley and Bailey (1987), *B. bayad* is described as macro-predator in River Nile (Southern Sudan); its diet consists mainly of fish prey, aquatic insects, organic detritus and aquatic higher plants.

Table 1: Stomach content analysis of the fishes of gilima river.

	Fish species									
	O. niloticus		*B. bayad*		*L. niloticus*		*H. brevis*		*S. vermiculatus*	
	n= 80		n= 80		n=80		n=80		n= 80	
Food items	f	(%)	f	(%)	f	(%)	f	(%)	f	(%)
No of stomach with food	66		70		60		60		70	
No of empty stomach	14		14		20		20		10	
Plant materials	780	53.60	20		---	---	---	---	410	25.38
Fishes	---	----	740	104.34	360	24.00	1082	64.32	560	37.42
Insects	680	46.86	330	47.14	60	2.68	600	35.66	360	24.38
Detritus	220	15	100	15	140	9.2	---	---	1044	34.96
Unidentified materials	1220	84.12	210	30.00	1740	162.66	1580	100	1488	77.22

n= number of fish examined, f= frequency of occurrence, %= percentage of food items in the stomach

The results of this study revealed that *lates niloticus* fed on fishes (24.00%), insects (2.68%) and detritus (9.2%). This is in agreement with the findings of (Ogari & Dadzie, 1988; Ligtvoet & Mkumbo, 1990). However, the works of (Ogutu-Ohwayo, 1990; Mkumbo & Ligtvoet, 1992; and Okedi, 1970) showed that planktonic crustaceans were the dominant prey for *L. niloticus*.

The findings of this research indicated that the stomach content of *Hydrocynus brevis* comprised of fishes (64.32%) and insects (35.66%). These tallied with the work of Weinreb (1958). Much of the variation in diet composition of this species depended on the availability of food items, which has also been previously described by Kori-Siakpere (1985).

Synodontis vermiculatus comprises mainly of plant materials (25.38%), fishes (37.42%), insects (24.38%), detritus (34.39%) and unidentified material (77.22%).

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REFERENCES:

1. Adeyemi, S.O., Bankole, N.O. and Adikwu, A.I. (2009). Food and feeding habits in Gbedikere lake, Bassa, Kogi State, Nigeria. *Continental J. Biological Sciences* **2**; 7-11.
2. Akintunde, E.A. (1985), Digestive enzymes in the gut of *Sarotherodon galilaeus* (Syn.Tilapia galilee) (Family Cichlidae) of lake Kainji. *Journal of Science* **18**; 22-25
3. Bishai, H.M. and Y.B. Abu-Gideiri (1965). Studies on the biology of the genus Synodontis at Khartoum. 11. Food and feeding habits. *Hydrobiologia*. **26**: 85-97.
4. Fagbenro, O.A. (2004). Assessment of African *Clarid catfishes* for tilapia population control in ponds. Department of fisheries and wildlife, Federal University of Technology, P.M.B. 704; Akure, Nigeria, March 6, 2000.
5. Fawole, O.O. (2002). Morphometry and diet of *Hyperopisus bebe* in the lekki lagoon, Nigeria, Rev. soil Trop. **50**(2):689-694.
6. Haruna, I.M. and A. Usman, (2005). Agronomic practices that enhances increased yield and seed quality of sesame (*Sesamu indicum)*.Proceedings of the agriculture transformation day (sesame and rice), February 4, 2005, Olam. Nigeria Ltd., Makurdi, Nigeria.
7. Hashem. M.T. (1981). The feeding and fatness of *Bagrus bayad*. Bull Institute of Oceanography
8. & Fisheries., 7(**3**):442-454.
9. Hickley, P. and Bailey, R.G. (1987). Food and feeding relationships of fish in the sudan swamps (River Nile Southern Sudan). *J. Fish Biol*., 30:147-159.
10. Holden, M. and W. Reed (1972). West African Fresh Water Fishes. West African nature book longman publications, London, 68p
11. Hynes, H.B.N. (1950). The food of freshwater stickle backs (*Gastrosteus sacculeatus* and *Pygoteus pungistis*) with review of methods used in studies of the food of fishes*. I. Animal Eco*, 19 - 36-58.
12. Ipinjolu, J.K., G.Z. Malami, W.A. Hassan, and I. magawata (2004). Gut systems of some fresh water fish species in River Rima, Northern Nigeria, a paper presented at the 2004 Annual conference of Zoological society of Nigeria, held at Institute of Development Research. Ahmadu Bello University, Zaria. pp,1-13.
13. Kori-Siakpere, P. (1985). Haematological characteristics of *Clarias isheriensis. J. Fish Biol*., 27:259-263.
14. Kouamelan, P.E., Teugels G.G., Gourene G. 0llevier F. and Thysvanden-Audenaerde D.F.E. (1999). The effect of a man made lake on the diet of the African electric fish *Mormyrus rume* valenciennes, 1846 (Osteoglossiformes:Mormyridae). *Hydrobiologia*. 380:141-151.
15. Kuz'mina V.V., Golovanova I.I. & Kovalenko E. (2002). Separate and combined effects of cadmium, temperapture and pH on digestive enzymes in three freshwater teleosts. Bulletin of Environmental Contamination and Toxicology. 69(**2**):302-308.
16. Laevastu, T. (1965). Manual of Methods of Fisheries Biology Fascule 9, FAO Mammals in Fisheries Science No 1 Rome, 1965. pp 40-45.
17. Ligtvoet, W. and O.C Mkumbo, (1990). Synopsis of Ecological and Fishery Research on Nile Perch (*Lates niloticus)* in lake victoria, conducted by HEST/TAFIRI.P. 35-74.
18. Maar A., Mortimer M.A.E. and Van der lingen I. (1983). Fish Culture in Central East Africa. Rome; FAO. 158pp
19. Mellanby, H. (1975). Animal life in freshwater 6'ed. A guide to freshwater invertebrates. Chapman and Hall, London. 323p.
20. Mkumbo, O.C. and W. Ligtvoet, (1992). Changes in the diet of Nile Perch, *Lates niloticus* (L), in the Mwanza Gulf, lake Victoria. *Hydrobiologia.* 232(**1**):79-83.
21. Needham, P.R. and J.E. Needham (1962). A guide to the study of freshwater biology.5th ed.Holdin day Inc.108p.
22. Odum, W.E. (1968). The ecological significance of fine particle selection by the stripped mullet *Mugil cephalus*.limnol.Oceanogr., 13;92-98.
23. Odun, O. and M. Auta (2001). The food and feeding habits of *Phractolaemus ansorgii* (Boulenger) from Warri River, Nigeria*. J. Aquat. Sci*, 16:18-21.
24. Ogari, J.and S.Dadzie, (1988). The food of the Nile Perch, *Lates niloticus (L.)*, after the disappearance of the Haplochromine cichlids in the nyanza gulf of lake victoria (Kenya). *J. Fish Biol.* 32:571-577.
25. Ogbeibu, A.E. and P.U. Ezeunara (2002). Ecological impact of brewery effluent on the ikpoba River, using the fish communities on bioindicators, *J. Aquatic Sci*., 17;35-44.
26. Ogutu-ohwayo, R. (1990).The decline in the native fishes of lakes victoria and kyoga (East Africa) and the impact of introduced fishes, especially nile perch, *Lates niloticus* and tilapia *Oreochromis niloticus. Environmental biology of fishes*. 27:81-96.
27. Okedi, J. (1970). A study of the fecundity of some mormyrid fishes from lake victoria. *E. Afr. Agric. Forest J.* 35; 436-442.
28. Omotosho, J.S. (1993). Analysis of fish species composition of Oyunmini dam, University of Ilorin, Nigeria. *J. W. Afr. Sci. Assoc*. 36: 37-48.
29. Reed, W.J., J. Burcherd, A.J. Hopson, J. Jennes, I.Yaro (1967). Fish and Fisheries of Northern Nigeria. Ist Ed. Ministry of Agriculture, Northern Nigeria. 226p.
30. Tengjaroenkul B., Smith B.J., Caceci T. and Smith S.A. (2000). Distribution of industrial enzymes activities along the intestinal tract of cultured nile tilapia, *Oreochromis niloticus. L. Aquaculture.* 182:317-327.
31. Tramati C., Savona B. and Mazzola A. (2005). A Study of the pattern of digestive enzymes in *Diplodus puntazzo (cetti 1777)* (Osteichthyes, Sparidae): evidence for the definition of nutritional protocols. *Aquaculture International*. 13; 89-95
32. Ugwumba, O.A.,Ugwumba A.A.A. and Mbu-Oben P. (1990). Food and feeding ecology of the mormyrids of Lekki lagoon, lagos, Nigeria. *Nig-J. Nat. Sc*. 5:(**1**):38-46.

33. Uys W. and Hecht T. (1987). Asseys on the digestive enzymes of sharp tooth catfish *Clarias gariepinus (pisces : Clariidae). Aquaculture*. 63:301-313.
34. Weinreb and P.Avivi, (1958). In ‘Liquid scintillation counting’ (C.G. Bell, Jr. and F.N. Hayes, eds.) P.270. Pergamon Press, New York, 1958.