FUDMA Journal of Sciences (FJS)
ISSN online: 2616-1370
ISSN print: 2645 - 2944
Vol. 3 No. 3, September, 2019, pp 581 –586

STOMACH CONTENTS AND INDEX OF FOOD SIGNIFICANCE OF *PARACHANNA OBSCURA* (GÜNTHER) IN KIRI RESERVOIR, SHELLENG, ADAMAWA STATE, NIGERIA.

***[1]Vandi, P., [2]Daniel, J. L., [1]Chessed, G., [1]Augustine, L.M. and [3]Francis, S.**

[1]Department of Zoology, School Life Sciences, Modibbo Adama University of Technology, P.M.B. 2067, Yola, Nigeria.
[2]Department of Science Laboratory Technology, Gombe State Polytechnic, P.M.B. 0190, Bajoga, Gombe State
[3]Department of Microbiology, School Life Sciences, Modibbo Adama University of Technology, P.M.B. 2067, Yola, Nigeria.

* Corresponding Authors email**:** vandiphilips@yahoo.com

ABSTRACT

The study was conducted to investigate the stomach content and index of food significance of *Parachanna obscura*, in Kiri reservoir, Shelleng, Adamawa state, Nigeria for a period of six months from May to October, 2015. A total 62 fish were collected on the landing site, caught by gill nets of various stretched mesh sizes. In which 46 (74.19 %) had contents with various degree of fullness, while 16 (25.81 %) specimens had empty stomachs. The stomach contents were analyzed using frequency of occurrence, Relative Frequency and the Point's method. The food items in the stomach covered a wide variety, ranging from various types of Algae to insect parts. The major food items in terms of frequency of occurrence were *pithopora* and *spirogyra* had 60.87 % and 55.52 % respectively, which made them the most frequent in occurrence, insect parts appeared the least, with a 10.87 % frequency of occurrence. The Relative Frequency showed that *volvox* had the highest with 13.07 % while insect parts had the lowest with 0.82 %. The Index Food Significance (IFS) of *P. obscura* shows that Filamentous Algae and Colonial Algae are the secondary diet of the species, *spirogyra* (IFS=1.42 %), *Pithopora* (IFS=1.51 %), *Ulothrix* (IFS=1.10 %), *Volvox* (IFS=1.56 %), while its incidental diet include Green Algae, Cyanobacteria and Diatom, with IFS of <0.1. This report could help in measure towards the data needed to create a food web in Kiri reservoir, and eventually a trophic model that can be used in fisheries management.

Keywords: stomach content, index of food significance, *Parachanna obscura,* Kiri Reservoir.

INTRODUCTION

Parachanna is one of the two genera of the family *Channidae* found in Africa. This family consists of a long cylindrical predatory fishes, they are also common in Asia. *Parachanna* is widely distributed in marshy places and all *Parachannids* have accessory respiratory organs (Lowe-McConnell, 1987). In Nigeria, two species are recognized, *Parachanna obscura* also known as obscure snakehead and *Parachanna africana.* The distinguishing features between the two species are the transverse "shaped" dark bars on the flanks in adults, which contrast with the longitudinal blotches seen in *P. obscura* (Teugels and Reid, 1992)

The snakehead, *P. obscura* inhabits freshwaters of tropical Africa and is widely distributed in the region, which ranges from the Nile to the Chad basin and extends to the Congo system. Teugels *et al.* (1992), listed *P. obscura* and *P. africana* as common in stagnant water channels of Cross River, Nigeria. Among the cultured species of Channa known, *P. obscura* is the least cultured species. However, *P. obscura*is one of the species that has potentials for aquaculture in Nigeria. Gonella (2003), suggested that snakeheads being the topmost predators in their habitats cannot be fed primarily on industrially manufactured fish foods but on fresh animal food especially diet of fish.

Investigation on the food and feeding behaviour of *Channa* species in India has been carried out; Srivastava and Srivastava, (1980), studied the feeding habits of the fingerlings of *Channa striatus,* Krishnan and Reddy, (1986), worked on utilization of natural food by juvenile *C. gachua* and Reddy, (1988), studied the food preference of the juvenile of *Channagachua*. Again, Rao *et al,* (1998) investigated the food and feeding habits of *Channa spp.* from East Godavari District. Further, adaptation of alimentary tract to feeding habit in four species of *Channa* was also reported (Dasgupta, 2000). This fish speciesis well known for its taste, high nutritive value and medicinal qualities. It is also recommended as a diet during convalescence (Haniffa *et al.*, 2004). Although, over the last 10 years, its population has undergone a steady decline due to over-exploitation, loss of habitat, pollution as well as destructive fishing. According to International Union for Conservation of Nature status (Molur and Walker, 1998). This research is designed to determine the Stomach content and the preferred diet of *Parachanna obscura* from Kiri reservoir of Shelleng in Adamawa State.

MATERIALS AND METHODS

The study area was Kiri reservoir in Shelleng Local Government Area of Adamawa State, Nigeria. It is located within; Longitude 9^0 40' 47" N 12^0 00' 51" E. The reservoir was built by damming the Gongola River to provide irrigation to Savannah Sugar

Company (SSC) a large scale sugarcane plantation and processing company set up as a joint venture between the Nigerian Federal Government and the Commonwealth Development Corporation (CDC), London. The CDC was the managing agent for the project and the construction contract was awarded to NECCO, a company largely owned by the government. The savannah sugar company was acquired by Dangote industries in 2002. The reservoir is 11.2km long, 20m high zoned embankment, with an internal clay blanket. The reservoir was completed in 1982 (ICE, 1990). The reservoir has a capacity of 615m3 (Enplan, 2004). Fish specimens were procured from artisanal fishers and middlemen at their landing site for the study. Sampling of landed catches was done twice in a month for a period of six months from May to October, 2015. The fishers used a wide range of fishing gear such as hook and line, long line, cast nets, gill nets and traps. On the landing site, fish specimen was randomly sort and identified using keys and descriptions by Olaosebikan and Raji, (1998) and Idodo-Umeh, (2003). Both male and female species were bought and conveyed immediately to the laboratory in plastic containers with ice-block for laboratory analysis on the same day as they were bought. A total of 200 species were sampled for this study. In the laboratory, the Total Length (cm) of each fish was taken from the tip of the mouth to the extended tip of the caudal fin using a measuring ruler to the nearest 0.1 cm. Standard Length (cm) for each fish was taken as measurement from the tip of the mouth to the caudal peduncle to the nearest 0.1 cm. The total body weight in grams was measured for each fish species to the nearest 0.01 g using a top loading Mettler balance. In the laboratory, each specimen was dissected using a pair of scissors to remove the gut. The entire stomach of the fishes was removed and graded according to fullness. The graded stomach of each specimen was dissected length wise and emptied into a petri-dish for examination and identification. Each stomach content was dispersed with small amount of distil water, sub-samples was taken from the stock and observed under a binocular dissecting microscope.

Stomach Content Analysis

The dissected stomach of each specimen and its degree of fullness was estimated by an arbitrary 0 – 20 point scale: thus 0, 2.5, 5, 10, 15 and 20 points was allotted to empty, trace, quarter-full, half-full, three quarter-full and fully distended stomachs respectively. Stomach contents sorted into categories and analyzed using Relative Frequency (RF) and point's method as described by Hyslop, (1980) and used by Chipps *et al.* (2002). In the RF, the frequency of a particular food item in all stomachs was expressed as a percentage of the frequencies of all food items. For the point's scheme, each stomach was allotted 20 points regardless of the fish size and these was shared amongst the various contents, taking account of their relative proportion by volume. The points gained by each food item in all stomachs examined was computed and expressed as a percentage of the total points of all food items. The point scheme gave an indication of bulk contribution of each food category to the diet composition. % RF and % PP (Percentage of total Points) was then used to determine the Index of Food Significance IFS as follows:

Relative Frequency= f/n x100%. Where,

f= frequency of individual food item

n= frequency of all food items

$$IFS = \frac{\%RFX\%PP}{\sum(\%RFX\%PP)}X100$$

Food with IFS ≥3% will be regarded as primary, ≥ 0.1 to <3% as secondary, whereas food with <0.1% will be regarded as incidental. (Odo *et al.,* 2012)

RESULTS AND DISCUSSION

A total of 62 *P. obscura* specimens were examined for their stomach contents, out of which 28 (45.16%) were Males and 34 (54.84%) Females. In which 46 (74.19%) had contents with various degree of fullness, while 16 (25.81%) specimens had empty stomachs. Males had 2 species with full stomach, 5 had three-quarter full, 5 had half-full, 6 had one-quarter full while only 10 had empty stomach. The females had 8 species with full stomach, 4 had three-quarter full. 6 had half-full, 10 had one-quarter full while 6 had empty stomach (Table 1)

The stomach content of *P. obscura* showed that, *pithopora* and *spirogyra* had 60.87% and 55.52% respectively, which made them the most frequent in occurrence, insect parts appeared the least, with a 10.87% frequency of occurrence. The Relative Frequency showed that *volvox* had the highest with 13.07% while insect parts had the lowest with 0.82%.

The Index Food Significance (IFS) of *P. obscura* shows that Filamentous Algae and Colonial Algae are the secondary diet of the species, *spirogyra* (IFS=1.42%), *Pithopora* (IFS=1.51%), *Ulothrix* (IFS=1.10%), *Volvox* (IFS=1.56%), while its incidental diet include Green Algae, Cyanobacteria and Diatom, with IFS of <0.1 (Table 2)

The condition factor (K) for *P. obscura* males ranges from 0.52-1.92 (mean value of K= 0.90±0.42) females has a range of 0.33-1.74 (mean value of K=0.93 ± 0.35) and combined sexes have a range of 0.33-1.92 (mean value of K= 0.91 ± 0.38). (Table 3)

Table 1: Degree of Stomach Fullness of *Parachanna obscura*

Sex	Full	Three-quarter	Half-full	One-quarter	Empty	Total
Male	2	5	5	6	10	28
Female	8	4	6	10	6	34
Total	10	9	11	16	16	62

Table 2: Index Food Significance of *P. obscura*

Food Items	Total point (%)	Relative Frequency (%)	$IFS = \frac{\%PPX\%RF}{\sum(\%PPX\%RF)} X100$	
Green Algae				
Clamydomonas	3.43	4.63	0.16	
Closterium sp	7.42	8.31	0.62	
Pediastrum	1.38	1.36	0.02	
Filamentous Algae				
Spirogyra	11.87	11.99	1.42	
Cladophora	8.04	8.31	0.67	
Ulothrix	10.48	10.49	1.10	
Pithopora	13.89	10.89	1.51	
Colonial green algae				
Volvox	11.95	13.07	1.56	
Cyanobacteria				
Lyngbya	4.70	5.45	0.26	
Spirulina	2.94	3.95	0.19	
Oscillatoria	6.25	4.49	0.28	
Diatom				
Synedra	5.71	5.72	0.33	
Sand grains	9.18	9.40	0.86	
Scale	1.67	1.09	0.02	
Insect parts	1.09	0.82	0.01	
Total	100	100		

Table 3: Condition Factor of all the Fish Species

Sex	Number Examined	Range value	Mean value
Male	28	0.52-1.92	0.90±0.42
Female	34	0.33-1.74	0.93±0.35
Combine	62	0.33-1.92	0.91±0.38

On the report on the degree of fullness show a slight contrast the report of Bolaji *et al.*, (2011) who reported that, 57 (23.36 %) had full stomachs, 184 (75.41 %) Three-Quarter full stomachs and 3 (1.23 %) had empty stomachs out of the 244 specimens of *P. obscura* studied and as much as 241 (98.77 %) had non-empty stomachs. Odo *et al.,* (2012) examined 550 stomachs and reported that; 56 (10.2 %) had full stomachs, 396 (72.0 %) had partially-filled stomachs, whereas 97 (17.8 %) had empty stomachs. Among the partially-filled stomachs, 41(I0.35 %) were One-Quarter full, 120 (30.30 %) Half-full, 193 (48.74 %) Three-Quarter full and 42 (10.61%) obtained traces of food.

The stomach content of *P. obscura* in Kiri reservoir was sorted into group; the Frequency of Occurrence shows that it was in contrast with the report of Bolaji *et al.* (2011) who reported a diet that was comprised of insects (31.61 %), fish (28.67 %), earthworm (25.26 %) and mud (10.54%), also is in contrast with

the report of Olasunkanmi and Ipinmoroti (2014), who reported; phytoplankton (30.5 %) protozoan (13.8 %), diatom (12.9 %), desmids (6.5 %) and green algae (6.8 %), and also is in contrast with what George *et al.,* (2011) reported; who reported, plant materials (15.95 %), diatoms (8.24 %) insect larvae (0.21 %), adult insects (0.21 %), daphnia (6.63 %)

The Index Food Significance (IFS) of *P. obscura* shows that the report is different from Bolaji *et al.,* (2011) that recorded the Food Preponderal Index (FPI %) during the wet season of *P. obscura*, which shows; Fine detritus (5.88 %), Macrophyte materials (3.53 %) and Sand grain (5.88 %) as its Secondary diet. while Saikia *et al.,* (2012) reported that; Fishes (69.13 %) were the most preferred food items of *Channa punctatus* followed by insects (14.36 %), crustaceans (9.36 %), plant matter (3.06 %), and unidentified materials (2.67 %) constitute its Secondary diet, while the incidental diets include; annelids (0.16 %) and molluscs (0.07 %). Odo *et al.,* (2012), reported that the primary important food item of *P. obscura* in Anambra River was Chiromomidae (IFS = 36.95 %), the secondary diet are; Fish egg (IFS=0.24 %) and Tadpole (IFS=0.43 %) while Crustacean; *Ostracoda* (0.53 %) and Fish Alestes (0.01 %) constitute the incidental diet.

The mean condition factor for combined sexes of *P. obscura* is in agreement with Obasohan *et al.,* (2012), who recorded 0.9 as the condition factor of *P. obscura* inIbiekuma stream, Ekpoma, Edo state, The value is less than 1, this imply that the fish are not in good state of well-being in the stream. Many factors such as sex, age, state of maturity, size, state of stomach fullness, sampling methods and sample sizes and environmental conditions affect fish condition and parameters of length-weight relationships in fish (Ama-Abasi, 2007; Yem *et al.,* 2007; Adeyemi *et al.,* 2009).

CONCLUSION

This report revealed the stomach content and index of food significance of *P. obscura* in Kiri Reservoir, it showed that the food composed mainly of plant origin; this could help in important measure towards the data needed to create a food web in Kiri reservoir, and eventually a trophic model that can be used in fisheries management.

Recommendations

More studies should be done on the general parasites prevalence on these species in Kiri Reservoir and proximate analysis should be done on these species to determine the effect of these food items on the fish.

Acknowledgement:

The authors are grateful to Mal. Sadiq, Abubakar for his assistance during the laboratory nalysis.

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