# Food Habit of the Catfish *Chrysichthys auratus* (Geoffrey Saint – Hilaire, 1808) in Kainji Lake, Nigeria

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**ABSTRACT**

The food composition of *Chrysichthys auratus* in Kainji Lake was studied for a period of one year. One hundred and twenty specimens were used for the study. Frequency of occurrence and volumetric methods used to analyze the stomachs contents showed that the species fed on fish fry, insects, crustaceans, sand / mud, algae, vegetable matter, molluscs, detritus, nematode and other unidentified items. Seasonal variations of food items showed that stone particles, *Spirotaenia* spp, molluscs that included *Pila* spp, *Planorbis* spp, *Limnaea* spp, *Bulinus* spp were not ingested during rainy season while human food remains only was not ingested in dry season. There was no significant difference ($p>0.05$) in items ingested in both season. There was high degree of feeding intensity during the study period. *Chrysichthys auratus* could be said to be a bottom dwelling fish and omnivorous in Lake Kainji. [Nature and Science. 2009; 7(3): 17 - 22]. (ISSN: 1545 - 0740).

**Key words**: Food composition, habit, diversity, *Chrysichthys auratus*, Kainji Lake, Nigeria

## INTRODUCTION

Lake Kainji ($9^0$ 50' and $10^0$ 55'N; $4^0$ 25' - $4^0$ 45'E) is the largest man - made lake in Nigeria created after damming River Niger for electricity generation. The lake is blessed with a lot of fish species because of abundant food supply amongst other factors.

Fish just like any other animal require food in order to survive and differ considerably in what they consume as food. Abundance and availability of a potential food item according to Lagler *et al*. (1977) determine what fish consumed as food. Authors such as Arawomo and Fawole (1997), Abdullahi and Abolude (2001), Omoigberale and Aruoture (2002) worked on the food and feeding habits of *Hepsetus odeo*, *Sarotherodon galilaeus*, *Bagrus* species, and *Chromidotilapia guentheri* respectively in different water bodies.

*Chrysichthys auratus* is predominantly an inshore species, abundant in all shallow parts of the lake and commonly found in the commercial catches (Ajayi, 1987). Sturm (1984) reported that *Chrysichthys auratus* in Lake Tiga fed on larvae and pupae of chironomid, nymph and adult of hemipteran, adult of coleopteran and insects larvae as food in addition to ostracods, gastropods, molluscs, fish scales and prawn, higher plant tissues, plant seeds, organic detritus and inorganic matter. However, there is dearth of such information for the species in the lake.

This study tends to look at the food composition of this important fish species in the lake for better management.

## MATERIAL AND METHODS

Fish of different sizes were procured from fishermen's catches. This was done monthly for a period of one year. Lengths (standard and total in cm) and weights (g) were taken using measuring board and weigh balance respectively. Fishes were cut opened and the stomachs carefully removed and preserved separately in 4% formalin solution at the landing sites in labelled sample bottles prior to analysis in the Laboratory.

Stomach contents analysis was assessed using a combination of Frequency of occurrence (Bowen, 1983) and volumetric method (Lima-Junior and Goitein, 2001). Stomach contents were identified using Mellanby (1979), Jeje and Fernando (1986).

Analysis of variance was used to test whether there is significant difference in food ingested based on seasons.

Prey Importance Index was obtained separately for each food item based on the method by Lima - Junior and Goitein (2001).

**RESULTS AND DISCUSSION**

Twenty - two distinct items (Table 1) were ingested by *Chrysichthys auratus*. These were re - classified into ten major groups. This shows that the food of this species is diversified containing both plant and animal materials. The species fed on fish fry, insects especially chironomid and choaborus larvae and pupae, crustacean, sand / mud, algae, vegetable matter, mollusc, detritus, nematode and other unidentified items, which were not significantly different ($p>0.05$). This is inline with the findings of Sturm (1984) and Risch (1986).

The species predominantly fed on detritus, plant tissues / remains and chironomid larvae and pupae. Sturm (1984) did report chironomid larvae and organic debris as most important constituents in the food of this species in Tiga Lake, which is in agreement with this study. The inclusion of sand / mud as food item is an indication that the species feed close or even at the bottom of the lake. Ajayi (1987) did report that *Chrysichthys auratus* fed both at the surface and bottom of the lake, and that the juveniles fed largely on detritus, insects larvae, crustaceans eggs, copepods and cladocerans while the adults preferred detritus, volvox, higher plants, bivalves and a variety of insect. Ikomi and Odum (1998) reported that the species fed predominantly on insects, fish and aquatic macrophytes with crustaceans and algae as minor part of the diet.

Welcomme (2001) reported that unspecialized feeders eat insects, zooplankton, detritus and plant matter according to their abundance, while Strum (1984) did report *Chrysichthys auratus* as a non - selective bottom feeder, which is inline with the findings of this study.

Prey importance index shows the importance of an item in the diet of fish. Detritus had the highest index (51%). This indicates that it is the most relevant item in the diet of the species during the period of study (Table 2). This was followed by plant tissues / remains (44.88%), chironomid larvae and pupae (31.3%), fish fry (26.40%), while the least was *Spirotaenia* spp (0.05%), which were positively correlated ($p<0.05$). The reliance on detritus could be due to its abundance, preference or the species being a bottom dweller as reported by Ogeibu and Ezeunara (2005). Ajayi (1987) did report that detritus was swallowed by *Chrysichthys auratus* at all the times.

Feeding intensity of fish can be determined based on degree of fullness of stomach. A total of one hundred and twenty stomachs were examined, where by eighty - seven contained food and thirty- three without food (Table 3). 43(35.83%) of the stomachs were full, 6 (5.0%) almost full, 27(22.5%) half full, 9 (7.5%) almost empty and 35 (29.17%) were empty. The relatively high percentage of full stomach suggests that food was abundant throughout the period of study. This indicates that there was high feeding intensity. Ogbeibu and Ezeunara (2005) reported that if percentage of full stomach was more than that of empty stomach there is high degree of feeding intensity, which is inline with the study.

Seasonal variation influences abundance and diversity in the diet of most tropical fishes. During rainy season *Bosmonia* spp, stone particles, S*pirotaenia* spp, *Pila* spp, *Planorbis* spp, *Limnaea* spp and *Bulinus* spp were not ingested, while human food remains was not ingested in dry season (Figure 1). This could be due to unavailability of such items during these seasons. Ogbeibu and Ezenuara (2005) did report that seasonal diversity of food items could influence food habits, diet and feeding intensity of fish.

Fish can broadly be classified into categories based on their predominant feeding habits (Welcomme, 1979). *Chrysichthys auratus* fed on wide range of items from plant to animal materials. Detritus is the predominant item ingested by the species in the lake. The species can be considered as omnivorous detrivore. This is in agreement with the findings of Welcomme (2001), Idodo – Umeh (2003) and Oronsaye and Nakpodia (2005).

Table1: Analysis of stomach contents of *Chrysichthys auratus auratus* by frequency of occurrence and volumetric methods.

| | **Items** | **% Frequency of occurrences** | **% Volume** |
|---|---|---|---|
| FISH | | | |
| | Fish fry | 17. 6 | 1.5 |
| INSECTA | | | |
| | Chironomid larvae and pupae | 20.6 | 1.76 |
| | Choaborus larvae and pupae | 4.6 | 0.39 |
| | Insect fragments (limb, head, wing) | 9.2 | 0.79 |
| CRUSTACEAN | | | |
| | *Diaptomus* spp | | |
| | *Cyclops* spp | 3.8 | 0.33 |
| | *Daphnia* spp | 2.3 | 0.20 |
| | *Bosmonia* spp | 4.6 | 0.33 |
| | | 2.3 | 0.02 |
| Sand / Mud | Stone particles | | |
| | | 3.8 | 0.33 |
| Algae | | | |
| | Filamentous ( green) | | |
| | *Spirotaenia* spp | 16.0 | 1.37 |
| | | 2.3 | 0.02 |
| Vegetable Matter | Plant tissues / remains | | |
| | Seed / seed chaff | 22.9 | 1.96 |
| | Human food remains | 10.7 | 0.92 |
| | | 16.8 | 1.44 |
| MOLLUSCA | *Pila* spp | | |
| | *Viviparous* spp | 3.1 | 0.26 |
| | *Planorbis* spp | 1.5 | 0.13 |
| | *Limnaea* spp | 3.1 | 0.26 |
| | *Bulinus* spp | 1.5 | 0.13 |
| | | 0.8 | 0.07 |
| Detritus | | 24.4 | 2.09 |
| Nematode | | 9.9 | 0.85 |
| Others | Unidentified items | 13.6 | 0.25 |

Table 2: Measure of prey importance index of *Chrysichthys auratus*

| **Items** | | **% Importance Index of Prey** |
|---|---|---|
| FISH | | |
| | Fish fry | 26.40 |
| INSECTA | | |
| | Chironomid larvae and pupae | 31.33 |
| | Choaborus larvae and pupae | 1.01 |
| | Insect fragments (limb, head, wing) | 5.52 |
| CRUSTACEAN | | |
| | *Diaptomus* spp | 1.25 |
| | *Cyclops* spp | 0.46 |
| | *Daphnia* spp | 1.79 |
| | *Bosmonia* spp | 0.07 |
| Sand / Mud | | |
| | Stone particles | 1.25 |
| Algae | | |
| | Filamentous ( green) | 21.92 |
| | *Spirotaenia* spp | 0.05 |
| Vegetable Matter | | |
| | Plant tissues / remains | 44.88 |
| | Seed / seed chaff | 8.48 |
| | Human food remains | 24.19 |
| MOLLUSCA | | |
| | *Pila* spp | 0.81 |
| | *Viviparous* spp | 0.20 |
| | *Planorbis* spp | 0.81 |
| | *Limnaea* spp | 0.20 |
| | *Bulinus* spp | 0.06 |
| Detritus | | 51.00 |
| Nematode | | 8.42 |
| Others | Unidentified items | 7.9 |

Table 3: Stomach contents classification of *Chrysichthys auratus* based on degree of fullness

| | |
|---|---|
| No. of stomach examined | 120 |
| % stomach with food | 87 (72.5) |
| % stomach without food | 33 (27.5) |
| **% Degree of Fullness** | |
| Full (4/4) | 43 (35.83) |
| Almost full (3/4) | 6 ( 5.0) |
| Half (2/4) | 27 (22.5) |
| Almost empty (1/4) | 9 (7.5) |
| Empty (0/4) | 35 (29.17) |

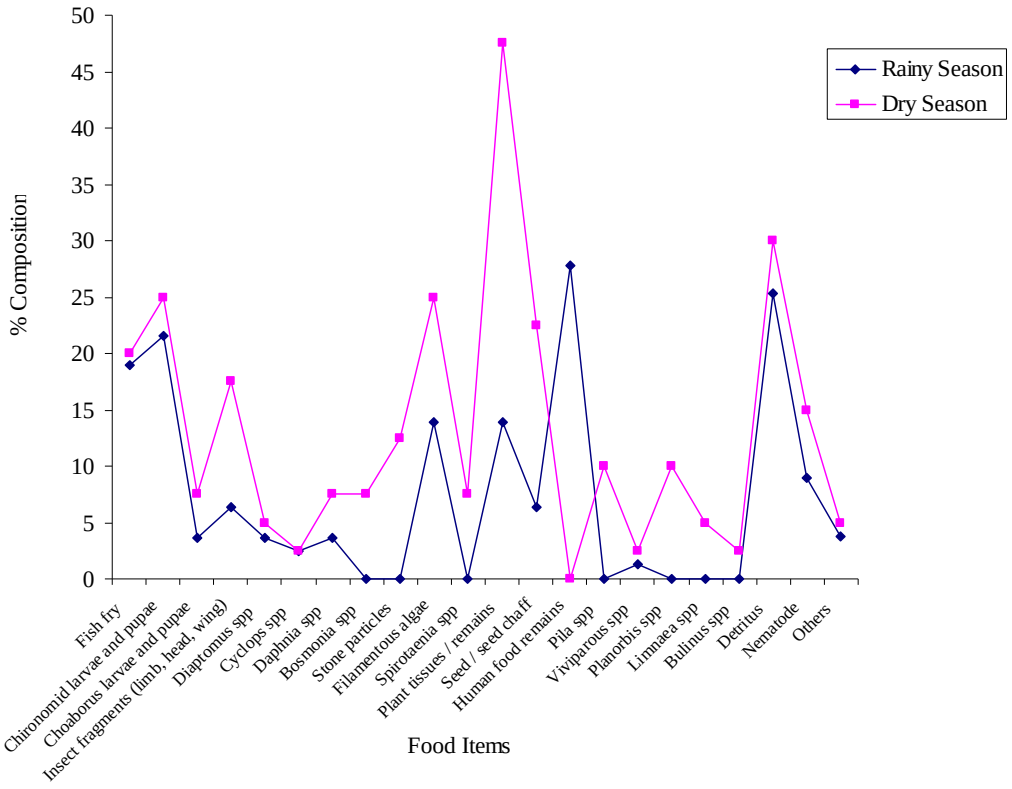


Figure 1: Seasonal variation of the percentage composition of items ingested by *Chrysichthys auratus*

**CONCLUSION**

*Chrysichthys auratus* fed on wide range of food items from plant to animal materials and can therefore be said to be omnivorous detrivore in the lake. Season had influence on items eaten by *Chrysichthys auratus* in the lake

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