FOOD AND FEEDING HABITS OF TILAPIA ZILLI (PISCES: CICHLIDAE) IN ONDO STATE UNIVERSITY FISH FARM

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ABSTRACT
The food and feeding habits of Tilapia zilli in the fish farm of Ondo State University, Akungba - Akoko were studied by gut analysis. Examinations of one hundred and fifty members showed that Nymphaea formed the main bulk of food consumed. Spirogyra, Pithophora and Compsopogon occurred frequently while Pistia detritus and plant remains featured less frequently. Variation in the frequency of occurrence of the various food items was observed among the various sizes of samples. The samples within the middle - size group fed on both higher plant and filamentous algae while the young and higher fish consumed exclusively filamentous algae. On the basis of food items found in the gut, T. zilli was classified as primary consumers.

Key words: food, feeding habits, Tilapia

INTRODUCTION:
Tilapia are important in the ecology of tropical waters as well as in the resources of aquatic systems of the sub-tropical regions. Fagade (1971) observed that Tilapia species are suitable for fish culture and are among the commercially important inland water fish of Africa. The outstanding culturable qualities of this fish species in warm waters have been well reported (Fryer and Iles, 1972; Avtalion, 1982 and Ugwumba, 1988). They are a hardy species and can tolerate a wide range of ecological conditions with a high reproductive rate.

Extensive research had been carried out on food and feeding habits of African cichlids (Fish, 1955; Macdonald, 1956; Fagade, 1971; Ugwumba, 1988). These reports showed that some species of Tilapia had diatoms, unicellular algae, filamentous algae debris in their stomach. However, fishery biologists have observed that stomach contents alone may not accurately reflect the consumers diet. This is because some important contents of the diet may be processed so fast that they leave little or no recognisable particles. Some important particles are also destroyed by mastication beyond the level of recognition. In addition, Jobling (1981) observed that the different rates of food progression for various items may lead to selective accumulation of those food items or parts which are digested more slowly. Thus, relative abundance of food items in the gut may not reflect the proportions in which they were ingested.

Nonetheless, the study of the food and feeding habits is useful in determining the population level, in as much as the number of individuals on the population depends on the amount of food available. It also determines the rate of growth of fish species, as well as revealing the status of the foraging fish species. Gut analysis also gives information on seasonal and life history changes of fish because the types and magnitude of food available as well as the season it occurs play an important role in the history of fish.

T. zilli forms a major species in the stockings of the fish of Ondo State University, Akungba - Akoko (OSUA). The farm acquired from its original owners and primarily meant for commercial purposes, is now being used for research and demonstration. There is presently no biological data on the ponds, although established some years ago. The major aim of the research was to study and understand the qualitative and quantitative connections between the fish species in the ponds and their food organisms.

MATERIALS AND METHODS
Fish samples consisting of 150 Tilapia zilli were regularly sorted out during croppings from Ondo State University fish farm. Routine investigations consisted of measurement (in cm), weighing (in gm) and subsequent analysis of stomach content. The total length of fish was measured from the tip of the mouth to the end of the base of the fork of the tail fin in the spread position. Specimens were preserved in the deep freezer at -200 F immediately after measuring and weighing. The preserved fish were later dissected, the gut taken and preserved in 4% formalin for later analysis.

The gut was dissected and washed into a petri-dish with 1ml distilled water. In most of the fish samples, only the stomach contents were examined but in small specimens where the distinction between the stomach and the rest of the gut was not well marked, the whole gut contents were examined. Individual food items were identified and counted under a binocular microscope.

The occurrence method of gut analysis was used as follows:

The number of fish in which each food item occurred was recorded and expressed as a percentage of the total number of fish.

That is: Frequency of Food item X 100 Number of fish with food in stomach 1
RESULTS, DISCUSSION AND CONCLUSION

Figure 1 shows the length frequency distribution of the fish samples. Table 1 shows the occurrence of food items in the stomachs of 150 specimens of *T. zilli*.

![Length frequency distribution of Tilapia zilli](image)

**Fig. 1.** Length-frequecy distribution of Tilapia zilli.

**Table 1. Occurrence of food items in stomach of Tilapia zilli**

<table>
<thead>
<tr>
<th>Food item</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closterium</td>
<td>33.3</td>
</tr>
<tr>
<td>Spirogyra</td>
<td>100.0</td>
</tr>
<tr>
<td>Pithophora</td>
<td>100.0</td>
</tr>
<tr>
<td>Comsopogon</td>
<td>33.0</td>
</tr>
<tr>
<td><strong>Higher Plants:</strong></td>
<td></td>
</tr>
<tr>
<td>Nympha</td>
<td>100.0</td>
</tr>
<tr>
<td>Pistia</td>
<td>11.1</td>
</tr>
<tr>
<td><strong>Others:</strong></td>
<td></td>
</tr>
<tr>
<td>Detritus</td>
<td>26.6</td>
</tr>
<tr>
<td>Plant remains</td>
<td>22.2</td>
</tr>
<tr>
<td>Sand particles</td>
<td>40.0</td>
</tr>
<tr>
<td><strong>Total fish examined</strong></td>
<td>150</td>
</tr>
<tr>
<td><strong>Number with food in gut</strong></td>
<td>150</td>
</tr>
</tbody>
</table>
The commonest higher plant frequently found in the stom-ach was Nymphea. Spirogyra and Pithophora both fila-
mentous algae occurred frequently in the gut of T. zilli.
Closterium and Compsopogon also filamentous algae,
occcurred less frequently. It was difficult to estimate the 
amount of filamentous algae taken since they were mixed 
with the macerated fragments of Nymphea. It was pos-
sible that the algae were taken by the fish because they 
were growing on the petioles of Nymphea. Microscope 
examination of the stomach and rectal contents showed 
that most of the fragments and filamentous algae appeared 
to pass through the gut undigested. Observation showed 
that digestion occurred in T. zilli whenever plant or algae 
cell was ruptured. Only a small proportion of the cells in 
the rectum were broken down and where the cell - wall 
was damaged, no digestion appeared to take place. It 
appears therefore that the amount of digestible food sub-
stance obtained from plants depends on the degree of 
maceration prior to passing into the stomach.

Figure 2 shows the variation in the frequency of occur-
rence of the various food item in the stomach of T. zilli.
There is some similarity both in the types and the fre-
quency of occurrence of food consumed by the length 
groups 10.0 -12.4cm and over 16.0cm and also between 
12.5 - 14.4cm and 14.5 - 16.0cm. The figure shows that 
the two middle size groups consumed both higher plants 
and filamentous algae and also detritus. While the juve-
nile (10.0 - 12.4cm) and adult groups (over 16.0cm) de-
pended exclusively on filamentous algae.
The feeding habit of Tilapia has been found to be over-
lapping (Crozier, 1985; Ugwumba, 1988). They utilize vari-
ous materials found in the environment, thus can live as 
herbivores, predators, detrivores as well as plantivores 
(Brown, 1986). A number of factors are attributable to 
changes in the feeding habits of fish species. Fryer and 
Iles (1972) and Jobling (1981) listed the size of the fish, 
sex, season, water temperature, habitat and competition 
as some of these factors. Morphological changes in the 
feeding apparatus of the fish as a result of age may also 
lead to a change in the feeding habits. As a result of the 
feeding habits, members of T. zilli have been variously 
classified as plankton feeders, higher plant and algae feed-
ers or macrophagous as well as mud suckers (Fagade, 
1971; Brown and Colgan, 1984). This study revealed that 
T. zilli fed mostly on higher plants. The feeding habits 
changed with size (or age) of the fish. The middle sized 
group fed on both higher plants, filamentous algae and 
detritus while the juvenile and adult groups depended 
exclusively on filamentous algae.

<table>
<thead>
<tr>
<th>Length (cm)</th>
<th>Food Items</th>
</tr>
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<tbody>
<tr>
<td>10.0-12.4</td>
<td>PPPPPP</td>
</tr>
<tr>
<td>12.5-14.4</td>
<td>DDDDD</td>
</tr>
<tr>
<td>14.5-16.0</td>
<td>DDDDD</td>
</tr>
<tr>
<td>&gt;16.0</td>
<td>OOOOO</td>
</tr>
</tbody>
</table>

Fig. 2 Diagrammatic representation of variation in food items in Tilapia zilli
Key

<table>
<thead>
<tr>
<th>Key</th>
<th>Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>......</td>
<td>Spirogyra</td>
</tr>
<tr>
<td>/////</td>
<td>Closterium</td>
</tr>
<tr>
<td>NNN</td>
<td>Cosmopogon</td>
</tr>
<tr>
<td>QOO</td>
<td>Nymphea</td>
</tr>
<tr>
<td>PPP</td>
<td>Pithophora</td>
</tr>
<tr>
<td>CCC</td>
<td>Pistia</td>
</tr>
<tr>
<td>DDD</td>
<td>Detritus</td>
</tr>
<tr>
<td>prPr</td>
<td>Plant remains</td>
</tr>
</tbody>
</table>

REFERENCES