

Diet Composition and Feeding Intensity of Pond Reared Tilapia, *Oreochromis niloticus*

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Abstract: *Oreochromis niloticus* is a commercially important freshwater exotic fish of Bangladesh. The diet composition and feeding intensity of the fish was observed for a period of 12 months. The fish fed on varieties of food items. The average dietary contents were obtained as aquatic plants (19.95%), phytoplankton (17.36%), zooplankton (18.41%), debris and detritus (22.61%), sand and mud (6.00%) and semi digested food materials (15.67%). During the study period 76.66% fish showed active feeding. In case of categorized feeding intensity 19.91% stomachs were found full, 29.06% were semi-full, 27.69% were moderately full, 15.13% were semi-empty and 8.21 % were empty. The fish also showed monthly variation in feeding intensity.

Keywords: Diet, Feeding intensity, *Oreochromis*, Tilapia.

Introduction

The Nile Tilapia *Oreochromis niloticus* is an exotic fish of Bangladesh, commonly known as Tilapia or Nilotica. It was introduced into Bangladesh from Thailand in 1974. The fish is one of the most widely cultured species in the world (Rahman, 2005). The fish is known to be omnivorous, feeds on almost anything from algae to insects. The juveniles are reported carnivorous and the adults tend to be herbivorous (Siddiqui *et al.* 2007).

It is rarely possible to observe the feeding habit of an aquatic animal under natural condition but study of stomach content of a sample can determine its habitual food or diet. The types of food and the mode of food intake differ from species to species even in different stages of life (Lagler, 1966). This variation is due to the changes in the composition of food organisms occurring at different seasons of the year.

Therefore, food and feeding habit of fishes are important biological factors for selecting a group of fish for culture in ponds to avoid competition for food among themselves, and live in association and to utilize all the available foods (Dewan & Saha, 1979). A thorough knowledge on the food and feeding habit of fishes provide keys for the selection of culturable species and the importance

of having much information is immensely needed for successful fish farming.

A scanty research work has been done regarding the food and feeding habit of the species which is not satisfactory to provide the basic information. Considering the actual need, the research work is aimed to obtain some new information about food and feeding habit of *O. niloticus* which may help to select such species for culture and produce an optimum yield by utilizing all the potential food of the water bodies without any competition.

Materials and Methods

Sampling was done fortnightly to collect *O. niloticus* from the farmers of different fish ponds of Rajshahi, Bangladesh for one year. A total of 185 specimens were collected during daytime. Just after collection the live fishes were killed and 5-10% formalin solution was injected into the stomachs of all the fishes in order to stop digestion and rotting of food items. The specimens were then tagged and finally preserved in 10% formalin for laboratory investigation.

To investigate the feeding intensity, the stomachs were dissected out and fullness of stomach was studied based on the following empirical scale presented below:

Fullness Category	Description
Empty stomach	Stomach barely bloated with no or few prey
Semi-empty stomach	Stomach slightly bloated with few amount of prey
Moderately full stomach	Stomach bloated with considerable amount of prey
Semi-full stomach	Stomach sufficiently bloated with large amount of prey
Full stomach	Stomach immensely bloated with large amount of prey

Stomach contents were examined under simple and compound microscope as required and the food items were identified to the species level whenever possible depending on the stage of digestion. Monthly and length group wise percentage composition of stomach contents were analyzed by gravimetric method (Lagler, 1966) and percentage of occurrence method (Hynes, 1950).

Results and Discussion

The diet composition of fishes shows great variation from species to species or even in a species in different stages of life, season to season, month to month and even within a day (Lagler, 1966). The stomach contents of *O. niloticus* consisted of aquatic plants (*Hydrilla*, *Valisneria*, *Najas*, *Ceratophyllum*, *Wolffia*, *Lemna*, *Azolla*), phytoplankton (*Volvox*, *Ulothrix*, *Oedognum*, *Oscillatoria*, *Diatoms*, *Euglena*), zooplankton (*Diaptomus*, *Daphnia*, *Ceriodaphnia*, *Moina*, *Cyclops*, nauplii, rotifers), debris and detritus, sand and mud and semi digested food materials. The average percentage of these food contents were aquatic plants (19.95%), phytoplankton (17.36%), zooplankton (18.41%), debris and detritus (22.61%), sand and mud (6.00%) and semi digested food materials (15.67%) (Fig. 1).

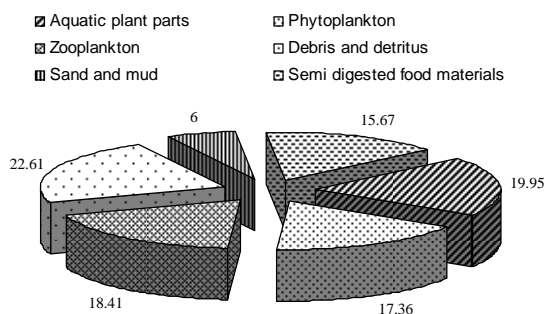


Fig. 1. Mean variation in diet composition of *O. niloticus*.

The highest percentage (33.26%) of aquatic plants was recorded in July followed by 32.26% in June and lowest (6.80%) in December. The phytoplankton were recorded highest (25.36%) in January and lowest (10.13%) in July. The highest (27.29%) zooplankton were found in April and lowest (11.17%) in October. The highest percentage of debris and detritus was recorded as 31.27% in November and lowest as 14.22% in April. The sands and mud were found highest (9.51%) in December and lowest (3.00%) in August (Fig. 2).

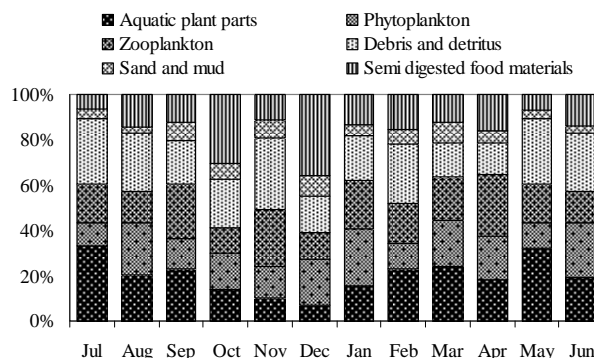


Fig. 2. Monthly variation in diet composition of *O. niloticus*.

The monthly percentage distribution of all these food items showed clear variation in the stomach content of *O. niloticus*. Omnivorous fishes food groups are algae, plant parts, protozoans, crustaceans, debris and detritus, sand and mud (Das & Moitra, 1956). The stomach contents of *O. niloticus* shows that the fish mainly fed on aquatic plants, phytoplankton, zooplankton, debris and detritus, sand and mud. The analysis of stomach contents revealed that the fish is an omnivore species and the food items varied in different months of the year. Many fish species have wide, variable food habits (Hartley, 1948) and they may appear to show preference, these often seem to be conditioned by the predominant food items among the availability of food items in nature to have a role in feeding behavior of the fish. Hynes (1950) reported that the food of freshwater stickle back varied throughout the year. The result also agreed with the findings of Banu *et al.* (1993) in *Hypophthalmichthys molitrix*, Bhuiyan *et al.* (1998) in *Puntius gonionotus*, Karmaker & Das (2001) in *Lates calcarifer*, Alam *et al.* (2002) in *Tor putitora* and Islam *et al.* (1999) in *Colisa fasciata*.

The feeding intensity was determined on the basis stomach contents of 185 specimens. In case of overall feeding intensity 19.91% stomachs were found full, 29.06% were semi-full, 27.69% were moderately full, 15.13% were semi-empty and 8.21% were empty during the study period. Fishes with full, semi-full and moderately full stomachs were considered to feed actively and fishes with semi empty and empty stomachs were considered to feed inactively. The overall percentage occurrence revealed that 76.66% fishes showed active feeding during the study period (Fig. 3).

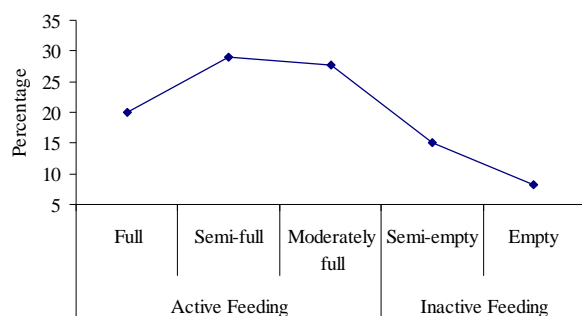


Fig. 3. Mean variation in feeding intensity of *O. niloticus*.

The monthly feeding intensity analysis showed a little variation throughout the year. During the study period the obtained fullness indices of the stomachs ranged from 17.65 to 23.12% for full, 23.22 to 32.88% for semi-full, 22.63 to 31.27% for moderately full, 12.48 to 18.99% for semi empty and 6.30 to 9.79% for empty stomach (Fig. 4).

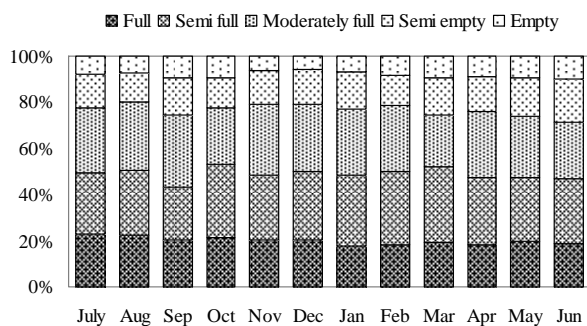


Fig. 4. Monthly variation in feeding intensity of *O. niloticus*.

The result revealed that the species is more or less active feeder and dwells in a good condition. However, the year round presence of empty stomach is observed due to the body cavity is laden with fully mature ovary. *O. niloticus* was found to feed actively in all months of the year. Mustafa *et al.* (1982) reported that some fishes like *Notopterus notopterus* and *Puntius sarana* feed throughout the year and the maximum number of empty stomachs was recorded in the months of June and July. The condition of feed was also related to maturity of fish. Immature fishes were found to feed with almost equal intensity through out the year. Keast (1968) reported that many fishes change their feeding habit as they grow up. These findings clearly indicated that the feeding intensity in juvenile fishes was very high. The present research shows a usual feeding activity all over the study period.

Similar result was also observed by Bhuiyan *et al.* (1992) in *Aspidoparia morar*, Hossain *et al.* (1992) in *Nandus nandus*, Bhuiyan *et al.* (1994) in *Rhinomugil corsula* and Alp *et al.* (2008) in *Esox lucius*.

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