

DIET COMPOSITION AND FEEDING INTENSITY OF WILD ZIGZAG EEL, *MASTACEMBELUS ARMATUS*

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ABSTRACT

Mastacembelus armatus is a commercially important, large sized, popular freshwater fish. The dietary composition and feeding intensity of the fish was observed for a period of 12 months. The fish fed on varieties of food items viz. fish, aquatic insects, crustaceans, molluscs, annelids, debris and mud that respectively obtained as 16.60, 14.75, 10.78, 8.50, 8.28, and 13.52 percent in average. During the study period 80.94% fish showed active feeding. In case of categorized feeding intensity 48.54% stomachs were found full, 16.14% were moderately full, 16.25% were semi-full, 12.40% were semi-empty and 6.67 % were empty. The fish also showed monthly variation in feeding intensity.

KEY WORDS: *Mastacembelus*, diet, food, feeding.

INTRODUCTION

The zigzag eel, *Mastacembelus armatus* is a large size freshwater fish, locally known as “Baim” in Bangladesh. The species is restricted to Asian continental area and is distributed in Pakistan, India, Ceylon, Myanmar, through Thailand and Malaysia to southern China including Bangladesh (Bhuiyan, 1964). *M. armatus* are nocturnal fish usually found in streams and rivers with sand, pebble, or boulder substrate. They seldom leave the bottom except when disturbed. Also occur in still waters, both in coastal marshes and dry zone tanks (Roberts, 1993). Sometimes stays partially buried in fine substrate. Economic important species, both food and aquarium trades (Rainboth, 1996). The fish is very popular as food and occupies an important commercial status. The food and feeding habits of fishes is variable throughout the year due to seasonal changes in temperature and water quality, which are responsible for food production in aquatic habitat. Age and sex may also show variation in food choice. In Bangladesh published research works regarding the species is scanty. The present work deals with the food and seasonal pattern of feeding of *M. armatus* which will provide some important information for the management and conservation of the species.

MATERIALS AND METHODS

A total of 80 wild *M. armatus* were collected directly from the fishermen of different fishing areas of Rajshahi, Bangladesh. A twelve months random survey was done for the collection of the specimens. Just after collection, the live fishes were killed and 10% formalin solution was injected into the guts of the fishes in order to inhibit further digestion and rotting of the food items. To investigate the feeding intensity, the stomachs were dissected out and fullness of stomach was studied based on the following empirical scale presented in the Table 1. 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. The percentage composition of stomach contents were analyzed by gravimetric method (Lagler, 1966) and percentage of occurrence method (Hynes, 1950).

Table 1: Description of five empirical scale of the stomach fullness used in this study

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

RESULTS AND DISCUSSION

The diet composition of fish shows a vast diversity from species to species or even in a species in different stages of life. The stomach contents of *M. armatus* consists of fish, aquatic insects, crustaceans, molluscs, annelids, debris and mud, and unidentified food groups. The average percentage of food contents were fish (16.60%), aquatic insects (14.75%), crustaceans (10.78%), molluscs (8.50%), annelids (8.28%) debris and mud (13.52) and unidentified food materials (27.57%) (Fig.1). The highest percentage (21.23%) of fish was recorded in October followed by 20.56% in March and lowest (10.75%) in December and then (11.35%) in January. The highest percentage of aquatic insects was recorded as 17.65% in July and lowest as 12.74% in May. Crustaceans were found in highest (14.50%) in February and lowest (8.60%) in August. The highest percentage of mollusks was recorded as 10.54% in June and lowest as 6.50% in

February and followed by January (6.58%). The annelids were found highest (10.75%) in September followed by June (10.25%) and lowest (5.50%) in February and then 5.87% in November. The maximum (15.92%) debris and mud contents were recorded in April and lowest (10.45%) in September and then 10.50% in August (Fig.1). The monthly percentage distribution of all these food items showed clear variation in the stomach content of *M. armatus*. The feeding intensity was determined based on the stomachs contents of 80 specimens ranging from 21 to 78.5cm in total length. In case of overall feeding intensity 48.54% stomachs were found full, 16.14% were moderately full, 16.25% were semi-full, 12.40% were semi-empty and 6.67% were empty during the study period. Fishes with full, moderately full and semi-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 80.94% fish showed active feeding during the study period (Fig. 2). The monthly feeding intensity analysis showed comparatively higher values of full and moderately full stomachs from August to March. Whereas higher percentage of semi-full and semi empty stomach were found from April to July. The percentage of moderately full stomach showed no specific variation. There were no empty stomachs recorded from August to April that only observed from May to July. The result revealed that the fish showed monthly variation in feeding intensity (Figure 3).

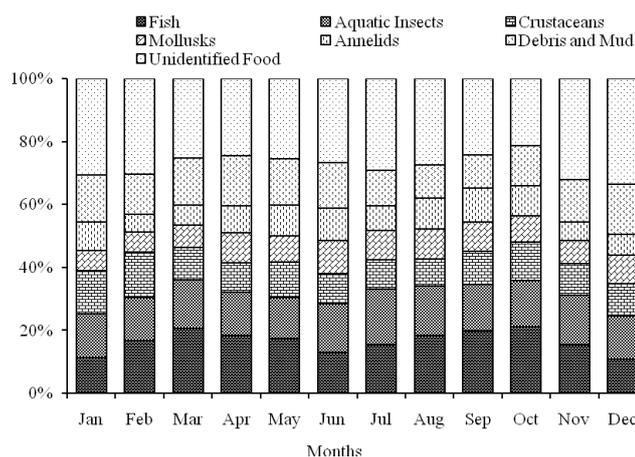


Figure 1. Monthly variation in diet composition of *M. armatus*.

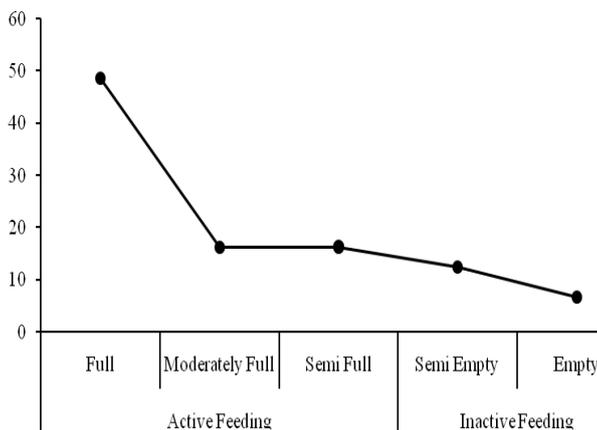


Figure 2. Overall feeding intensity of *M. armatus*.

The smaller sized fishes were found with full stomachs throughout the year, but in case of the larger specimens it was variable. It is observed that in case of mature fish the stomach was full in the months of March to August and it was poor in the months of January and February. The present findings reveal that *M. armatus* is a carnivore fish, mainly feeding on other smaller fishes and crustaceans. Azadi *et al.* (1991) commented that *Eutropiichthyes vacha* of the Kaptai reservoir feeding on the trash fishes, converting the less priced fishes into valuable protein, the same can be said for *M. armatus*. Bhuiyan (1964) reported that *M. armatus* is carnivorous and destructive to eggs and fry of other fishes. The plant materials and debris found in the gut of *M. armatus* in the present study may be entered into the gut during food search and not due to preferential feeding. Normally, the feeding intensity of fish decreases during the peak-breeding season Lagler *et al.* (1962), Azadi *et al.* (1991) and Hossain *et al.* (1992).

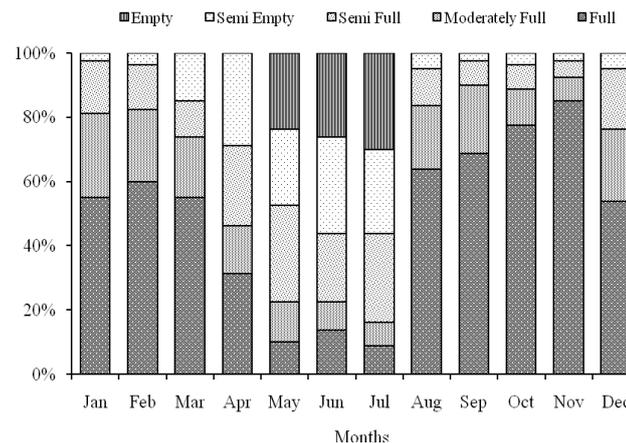


Figure 3. Monthly variation in feeding intensity of *M. armatus*.

In the present study females of *M. armatus* were found with empty stomach during May to July laden with fully mature ovary. The result also agreed with the findings of Mustafa and Ahmed (1979) in *N. notopterus*, Hossain and Nargis (1987) in *Anabas testudineus*, Bhuiyan and Islam (1988) in *Xenentodon cancila*, Bhuiyan *et al.* (1992) in *Aspidoparia morar*, Hossain *et al.* (1992) in *Nandus nandus*, Bhuiyan *et al.* (1994) in *Rhinomugil corsula*, Šantić *et al.* (2005) in *Trachurus trachurus*, Xue *et al.* (2005) in *Pseudosciaena polyactis*; Alp *et al.* (2008) in *Esox lucius*.

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REFERENCES

- Alp A., Yeggen V., Yagci M. A., Uysal R., Biçen E. and Yagci A. (2008). Diet composition and prey selection of the pike, *Esox lucius*, in C, ivril Lake, Turkey. *J. Appl. Ichthyol.* 24: 670-677.
- Azadi M. A., Islam M. A. and Solaiman S. (1991). Food and feeding habits of *Eutropiichthyes vacha* (Ham.) from the Kaptai reservoir. *J. Asiat. Soc. Bangladesh. Sci.* 17(1): 53-60.
- Bhuiyan A. L. (1964). *Fishes of Dacca*. Asiatic Soc. of Pakistan, Dacca. Pp 116-117.
- Bhuiyan A. S. and Islam M. N. (1988). Seasonal variation in the percentage composition of the food of *Xenentodon cancila*. *Univ. j. zool., Rajshahi Univ.* 7: 33-36.
- Bhuiyan A. S., Islam M. N. and Islam M. S. (1994). Seasonal pattern of food and feeding habit of *Rhinomugil corsula* (Ham.) from river Padma. *Univ. J. Zool. Rajshahi Univ.* 13: 25-29.
- Bhuiyan A. S., Islam M. N. and Sultana N. (1992). Food and feeding habit of *Aspidoparia morar* (Hamilton) from the river Padma. *Univ. J. Zool. Rajshahi Univ.* 10 and 11: 71-76.
- Hossain M. A. and Nargis A. (1987). Food and feeding habit of Koi fish (*Anabas testudineus*). *Bangladesh J. Agric.* 12: 121-127.
- Hossain M. A., Parween S., Afroze S. and Rahman M. A. (1992). Food and feeding habit of *Nandus nandus* (Hamilton-Buchanan) (Nandidae: Perciformes). *The Rajshahi University Studies (Part B)*. 20: 279-286.
- Hynes H. B. N. (1950). The food of freshwater Sticklebacks (*Gasterosteus aculeatus* and *Pygosteus pungitius*) with a review of methods used in studies of the food of fishes. *J. Anim. Ecol.* 19: 36-58.
- Lagler K. F., Bardach J. E. and Miller R. R. (1962). *Ichthyology*. John Willey and Sons. Inc New York, Pp 115-171.
- Lagler K. F. (1966). *Freshwater Fishery Biology* (second edn). W.M. C. Brown Company. Dubuque. Iowa. Pp 421.
- Mustafa G. and Ahmed A. T. A. (1979). Food of *Notopterus notopterus* (Pallas) (Notopteridae:Clupeiformes). *Bangladesh J. Zool.* 7(1):7-14.
- Rainboth W. J. (1996). *Fishes of the Cambodian Mekong*. FAO Species Identification Field Guide for Fishery Purposes. FAO, Rome, Pp 265.
- Roberts T. R. (1993). Artisanal fisheries and fish ecology below the great waterfalls of the Mekong River in southern Laos. *Nat. Hist. Bull. Siam Soc.* 41:31-62.
- Šantić M., Jardas I. and Pallaoro A. (2005). Feeding habits of horse mackerel, *Trachurus trachurus* (Linnaeus, 1758), from the central Adriatic Sea. *J. Appl. Ichthyol.* 21: 125-130.
- Xue Y., Jin X., Zhang B. and Liang Z. (2005). Seasonal, diel and ontogenetic variation in feeding patterns of small yellow croaker in the central Yellow Sea. *Journal of Fish Biology.* 67: 33-50.