

## Feeding biology of *Mastacembelus armatus* of Delhi and NCR in place of biology of *Mastacembelus armatus* of Delhi and NCR

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### Abstract

Spiny eel (*Mastacembelus armatus*) is a commercially important freshwater teleostean fish. It is a popular table fish due to its delicious taste and high nutritive value. Monthly samples of fish were collected from NCR region from January to December 2016. Male shows a slight numerical superiority over female. Well-developed dentition, absence of gill rakers, strongly built stomach and short intestine together with the dominance of animal matter in the gut contents, suggested the carnivorous and active predatory habits of *M. armatus*. Body width in all life stages of *M. armatus* was about 5.56% of total body length, resulting in a slender body. This also pointed towards an active mobile lifestyle suited to its predatory nature. 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.

**Keywords:** spiny eel, feeding biology, fish, aquatic insects, crustaceans, molluscs

### Introduction

*Mastacembelus armatus* (Spiny eel) is among the most prevalent teleosts of India. It is an economically important large size (max 65cm) inland water fish, also known as zig zag eel (locally baam or bami). *Mastacembelus armatus* is a night loving fish usually occurs in streams and rivers with sand. The fish usually remains stick to bottom, occasionally remains slightly buried in sand or substrate. According to temperature and water quality variation the food and feeding habits of fish changes throughout the year. *Mastacembelus armatus* very much appreciated as food fish when sold alive but all the supply comes from its natural population which leads to endangering the species. Hardly any systematic efforts has been made to culture the fish. Very few printed information is accessible on feeding biology of *Mastacembelus armatus*, as Dutta (1989 & 1990) [5] on food and feeding ecology of *Mastacembelus armatus*. Serajuddin and Mustafa (1994) [17] and Serajuddin *et al.* (1998) [18] on the figures and ding specialization and food and feeding habits of the species respectively. Uthay kumar *et al.* (2013) studied impact of seasonal variation on feeding and reproductive behavior of *M. armatus*. Gupta and Banerjee (2016) [6] studied food and feeding habit and reproductive biology of *M. armatus*. Acknowledging this present study focusing on food and feeding habits of *Mastacembelus armatus* was undertaken, which would be useful for artificial propagation of this fish.

### Methodology

Samples (20-30 each month) were caught from water bodies of Delhi & NCR during year 2017. All sample were collected at particular time of the day (early hours). It helps in reducing the possible effects of differential digestion of food items. All samples were transported frozen. Total length of each sample was taken from tip of snout to caudal fin rays (longest) to the nearest 0.1mm. We weight the

samples on an electric balance (sensitive up to 0.001g) and sexed. We segregated the samples in five length groups on the basis of size. Except for group one, where it was 5cm, length range was 10cm. On the basis of Gonadal condition the stages of maturation was determined (scheme of classification used by Qayyum and Qasim 1964a for *Ophiocephalus punctatus*). The gonadosomatic index was calculated for each male and female using the formula.

$$\text{GSI} = \frac{\text{weight of gonad}}{\text{weight of fish}} * 100$$

Gut contents were analyzed on the basis of frequency of occurrence, numerical count and gravimetric methods (Lagler 1956) [9]. Qualitative analysis (identification of prey items in the gut contents) formed an important part of the gut content analysis; and it was on the basis of qualitative analysis that the above mentioned all relative quantitative assessments were made.

### Results & Discussion

#### Food and feeding

Well-developed dentition, absence of gill rakers, strongly built stomach and short intestine, together with the dominance of animal matter in the gut contents, suggested the carnivorous and active predatory habits of *M. armatus*. Body width in all life stages of *M. armatus* was about 5.56% of total body length, resulting in a slender body. This also pointed towards an active mobile lifestyle suited to its predatory nature.

#### Food Composition

Freshwater shrimps (*Macrobrachium* species) were the preferred prey organisms (Table-1) other organisms consumed were dipteran larvae, brine shrimps (branchipus species), earthworms and minor carps (cyprinids), depending on the frequencies of their occurrence. Food

categories of lesser importance include aquatic vegetation fish eggs and barbells which may have been accidentally swallowed by the fish while it was voraciously feeding on other organisms. Following the criteria proposed by Nikolosky (1963) [11], food eaten by *M.armatus* could be divided into three categories;

Crustaceans and forage fish are as basic food for the adults and annelids and aquatic insects as basic food for the juveniles. Aquatic annelids and insect larvae could be considered as the secondary food for adults, while forage fish and crustacean together represented the secondary food of juveniles. Molluscs and aquatic vegetation could be regarded as incidental item for both juvenile and adults. Khan (1934) [7] reported *M.armatus* as carnivorous and emphasized that it is detrimental to eggs and fry of other fishes. Das and Moitra (1953) [2] pointed out that this fish mainly feeds on crustacean. Jhingran (1982) described it as piscivorous. Dutta (1989-90) [5] carried out stomach content analysis of *M.armatus* collected from Gadigarh stream (Jammu) and reported it as selective insectivorous fish (Serajuddin *et. al.*1998) [18] reported it as a carnivorous. However, Mookerjee *et. al.* (1947) [10] reported this species to be herbivorous.

**Intensity of feeding in relation to seasons**

The values of gastrosomatic index (GSI) for different months are given in Table 2. It was found that the individuals in the size range 21-50 cm consumed more food during summer (March-June) than during the rainy season and winter (July-February). The younger specimens (5-20 cm) were found feeding voraciously during post monsoon and autumn periods (September-November). Like adults they too consumed a lesser quantity of food during winter. Pronounced feeding activity in the younger individuals of both sexes was observed in the month of October, and it was extremely low in December. In adult female specimens, a higher GSI was recorded for all sizes in April. In these

cases, low GSI varied with size. The lowest values for the size groups 31-40 cm and 41-50 cm were observed in August and October respectively. Maximum numbers of empty guts were found during spawning and during the winter season.

In conclusion this fish is carnivorous in nature. Younger specimens were found feeding voraciously during post monsoon and autumn period. All sizes of fish consumed lesser quantity of food during winter while adult specimen consumed more food during summer, but spawning season (June–September) maximum number of empty guts were found. This information about food and feeding biology of *M. armatus* might help in future studies.

**Table 1:** Gut contents of the spiny eel. *M. armatus*

Food Items	Numerical content (%)	Frequency of occurrence (%)	Gravimetric index (%)
Crustacea			
Macrobrachium	82	55.7	97.52
Eubranchipus	25	28.8	0.97
Daphnia	18	11.5	
Teleostomi			
Puntius	14	23.0	27.52
Esomus	08	07.6	09.57
Osteochilus	04	05.7	12.32
Unidentified	25	48.0	62.20
Scale	40	38.4	0.98
Aquatic insects (larval stage)			
Ephemeroptera	Numerous	19.2	06.80
Diptera	Numerous	30.7	08.52
Hemiptera	02	05.7	0.43
Unidentified	30	11.5	02.32
Annelids			
Aquatic earthworm	Numerous	26.9	15.00
Mollusca			
Gastropods	05	03.8	0.21
Digested matter		36.5	35.00
Aquatic vegetation		03.8	04.32
Fish eggs	Numerous	07.6	02.35
Barbels	40	17.3	0.53

**Table 2:** Gastro Somatic index of *M.armatus* in different seasons and size range according to sex

Month	5-10cm			11-20 cm			21-30cm			31-40 cm			41-50 cm		
	M	F	Combined	M	F	Combined	M	F	Combined	M	F	Combined	M	F	Combined
Jan.	1.8	1.2	1.3	2.2	1.8	2.1	3.2	3.2	3.4	3.6	2.9	2.6	1.6	1.7	1.6
Feb.	1.8	1	1.4	2.2	1.6	2.2	3.1	3.2	3.5	3.2	2.9	3.4	2.8	2.5	2.6
March	1.5	1.5	1.6	2.5	2.0	2.2	3.5	3.4	3.4	3.6	3.7	3.4	2.9	2.8	2.8
April	1.3	1.6	1.8	2.3	2.5	2.4	3.6	3.5	3.5	3.3	3.8	3.4	3.5	3.5	2.1
May	1.6	1.8	1.7	2.6	1.9	2.5	3.7	3.5	3.6	3.8	3.1	3.5	3.6	3.4	3.4
June	--	1.8	1.8	2.5	2.5	2.4	3.8	3.2	3.5	3.6	2.7	3.4	3.8	2.6	3.7
July	--	--	--	2.3	2.6	2.4	2.9	2.8	2.9	1.4	1.8	1.9	3.6	2.6	3.2
Aug	--	--	--	2.6	2.3	2.5	2.1	2.6	2.5	1.9	1.6	1.8	2.1	1.8	2.1
Sept.	--	--	--	2.5	2.6	2.6	3.5	2.9	3.2	1.8	1.8	1.7	1.9	1.7	1.8
Oct.	3.1	1	2.6	2.7	1.9	2.6	3.6	3.2	3.1	1.9	2.3	2.0	2.0	1.6	2.0
Nov.	2.1	0.9	2.1	1.9	1.7	2	3.7	2.8	2.9	2.6	3.0	2.9	1.7	3.0	1.8
Dec.	--	0.8	0.8	1.7	1.7	1.8	3.6	2.5	2.9	2.4	2.7	2.6	1.5	1.7	1.6
Mean#SE	1.7#0.20	1.6#0.11	1.6#0.14	2.3#0.08	2.1#0.08	2.3#0.07	3.4#0.14	3.1#0.12	3.2#0.10	2.7#0.23	2.7#0.20	2.7#0.20	2.6#0.24	2.3#0.19	3.2#0.20

Male=M; Female=F; Combined=C

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