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Feeding biology of *Glossogobius giuris* (Hamilton-Buchanan) from upper Assam

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Abstract

The present investigation has been carried out from the fish landing sites of Brahmaputra River at Guijan Ghat and Hilika Ghat (downstream of Maguri beel), Tinsukia district of Assam. For which, a total of 270 fish specimens were collected during March, 2015 to February 2016. The lowest value (0.34 ± 0.52) of relative length of gut (RLG) of *Glossogobius giuris* was found in 5-7 cm length group whereas the highest values (0.47 ± 0.14) in 11-13cm. It reveals that the fish falls in the category of carnivorous fishes. Gastro somatic index (GSI) was ranged from 1.88 ± 0.9 (January) to 3.72 ± 1.3 (February) for males whereas, it was from 2.5 ± 1.04 (April) to 3.4 ± 1.5 (July) for female fish. It was noticed that the male feeding intensity was being peak during winter seasons (December to February) while, female feeding intensity was in monsoon season (June-August). Degree of fullness of gut reveals that 44 species were found full with 16.18%, 35 species were $\frac{3}{4}$ full with 13.1%, 48 species were $\frac{1}{2}$ full with 17.9%, 24 species were $\frac{1}{4}$ full with 8.9%, 51 species were nearly empty with 18.88% and 68 species were absolutely empty with 25.0%.

Keywords: *Glossogobius giuris*, RLG, GSI, Fullness of gut, Assam

1. Introduction

Glossogobius giuris, the tank goby, is a widely distributed species and it generally inhabits clear to turbid freshwater to estuarine habitats in rivers and streams with sand, gravel or rock substrate (Allen, 1991) ^[1]. Study on the food and feeding habits is important in the management and life cycle analysis of fishes. Detailed data on the diet, feeding ecology and trophic inter-relationship of fishes is fundamental for better understanding of fish life history including growth, breeding, migration (Bal and Rao, 1984) ^[2]. There is very limited literature on the feeding biology of *G. giuris* from the Indian sub-continent. However, Bhuiyan and Haque (1984) ^[3] reported on the cannibalistic food habit of *G. giuris* in relation to its size and sex from Bangladesh and recently, Hossain *et al.* (2016) ^[4] investigated the food and feeding habits of *G. giuris* from Mithamoin Haor, Kishorganj, Bangladesh. The species is widely considered as ornamental fish in the region and can also be found in the aquarium trade. Therefore, the aim of this study was to obtain information on different aspects of food and feeding habits of *G. giuris* from Upper Assam, India.

2. Materials and Methods

A total of 270 specimens of *G. giuris* (Figure 1) were collected from the fish landing sites of Brahmaputra River at Guijan Ghat and Hilika Ghat in Tinsukia district of Assam during March, 2015 to February 2016. The collected specimens were immediately preserved in 5% formalin for further investigation.



Fig 1: Mature male of *G. giuris*

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Relative length of the gut (RLG): It was investigated through the ratio between the gut length and total length. By adopting the following formula (Al-Hussainy, 1949) ^[5]:- $RLG = GL/TL$ where, GL = total length of the gut and TL = total length of the fish.

Feeding intensity (GSI & Fullness of Gut): The feeding intensity of the species in different life stages and seasons were estimated by gastro-somatic index (GSI) following the formula (Khan *et al.*, 1988) ^[6] as well as by examining the fullness of the gut:-

$$G.S.I = \frac{\text{Weight of the gut (g)}}{\text{Total weight of the fish (g)}} \times 100$$

The gut of specimens was properly cleaned in the laboratory and its degree of fullness was recorded. Degree of fullness of stomachs were visually classified as full, ¾ full, ½ full, ¼ full, nearly empty and empty depending upon the degree of fullness and the amount of food contained in them

(Abdelghany, 1993^[7]; Bhuiyan *et al.*, 2006) ^[8]. Fishes with full and ¾ full stomachs were considered as active feeders; ½ full as moderate feeders; ¼ full and nearly empty stomachs as poor feeders (Rao and Rao, 2002^[9]; Raje, 2006^[10]).

3. Results and Discussion

Relative length of gut (RLG): The value of RLG was ranged from 0.34 (± 0.52) to 0.47 (± 0.14). The lowest was recorded in 5-7 cm and highest was in 11-13 cm group (Table 1). The RLG of a fish is highly correlated with feeding behaviour. Further, *G. giuris* showed its preferences for molluscs, small crabs, aquatic insects, fishes which were encountered throughout the year in the habitat. The present finding of RLG values are in agreement with the findings of Hossain *et al.* (2016) ^[4]. Position of the mouth is terminal and gape of mouth is wide, gill racker and teeth are also prominent. The gut is very short and straight. Based on the RLG value and other related structure associated with mouth, the species falls in carnivore. Bhuiyan and Haque (1984) ^[3] have also reported cannibalistic food habit of *G. giuris*.

Table 1: RLG value in various size groups of *G. giuris*

Length range (cm)	Gut length (cm)	No. of fishes examined	RLG \pm	Mean RLG
5-7	2.04	12	0.34 \pm 0.52	0.4
7-9	3.07	10	0.37 \pm 0.52	
9-11	4.3	9	0.43 \pm 0.72	
11-13	5.3	11	0.47 \pm 0.14	

Gastrosomatic index (GSI): The GSI value for male was ranged from 1.88 \pm 0.9 (April) to 3.72 \pm 1.3 (February) and for female was from 2.5 \pm 1.04 (April) to 3.4 \pm 1.5 (July). Interestingly, the male feeding intensity was being peak during winter season (Table 2) while, female feeding intensity

was in monsoon months (June-August). Hossain *et al.* (2016) ^[4] reported the peak feeding intensity of *G. giuris* was observed during winter season and a low GSI was observed during the breeding season from February to June.

Table 2: Monthly variation in GSI of *Glossogobius giuris*

Month	Male	Female
January	3.26 \pm 1.5	2.7 \pm 0.71
February	3.72 \pm 1.3	2.8 \pm 1.3
March	2.82 \pm 1.8	2.75 \pm 1.4
April	1.88 \pm 0.9	2.5 \pm 1.04
May	3.09 \pm 0.6	2.7 \pm 0.67
June	2.6 \pm 1.0	3.1 \pm 0.09
July	2.1 \pm 1.4	3.4 \pm 1.5
August	2.4 \pm 1.3	2.5 \pm 1.08
September	2.29 \pm 0.18	2.4 \pm 0.85
October	2.01 \pm 0.54	4.5 \pm 1.08
November	2.3 \pm 0.5	2.8 \pm 0.7
December	2.5 \pm 0.06	2.9 \pm 0.05

Fullness of gut: Percentage of fullness of guts for *G. giuris* in different months is given in Table 3. Out of 270 gut examined, 44 specimens (16.18) were found full, 35 were ¾ full (13.1%), 48 were ½ full (17.9%), 24 were ¼ full (8.9%), 51 were nearly empty (18.88%) and 68 individuals (25.0%)

were absolutely empty. The monthly feeding intensity indicated active feeding was from November to February. Incidentally, most of the ripe individuals (about 80%) were found having nearly empty stomach. Similar observation was also made by Hossain *et al.* (2016) ^[4].

Table 3: Percentage of fullness of gut of *G. giuris*

Months	No. of specimen	Active feeding		Moderate feeding	Poor feeding		Empty
		Full	¾ Full	½ full	¼ full	Nearly empty	
January	20	24.4	10.28	19.49	6.52	28.0	11.31
February	25	20.0	17.44	20.22	9.55	28.76	4.03
March	21	13.22	13.11	17.55	6.22	18.22	31.68
April	26	9.33	10	22.21	12.2	18.45	27.81
May	29	23.22	10.22	21.11	10	29.0	7.45
June	24	9.14	11	10.14	8.6	22.11	39.01
July	26	20.21	12.2	13.33	10	10.55	33.71

August	22	10.17	15	14.32	7.66	15.25	37.6
September	21	10.42	17.2	18.22	8.5	9.22	36.44
October	23	10.11	10	16.23	6.8	9.73	47.13
November	18	20.6	14.34	22.35	10.32	18.13	14.26
December	15	23.29	13.5	23.55	10.4	19.14	10.12
Overall	270	16.18	13.1	17.9	8.9	18.88	25.0

4. Conclusion

It can be concluded that *G. giuris* is carnivore and predatory fish based on the presence of crustaceans, molluscs, decomposed aquatic vegetation and mud in the gut. The feeding intensity varied in different months as the highest GSI was observed in February (male) and July (female) while lowest for both sexes in April. The degree of fullness of guts exhibited more or less similar throughout the year. It revealed that the peak active feeding was found in February, moderate in December and poor feeding in May. It was also observed that the maximum numbers of empty stomachs were recorded in October.

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