



RESEARCH ARTICLE

FOOD AND FEEDING HABITS OF FRINGE LIPPED CARP, *LABEO FIMBRIATUS* (BLOCH) OF THE VANIVILAS SAGAR RESERVOIR OF KARNATAKA

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ABSTRACT

In this study Food and Feeding Habits of Fringe Lipped Carp, *Labeo fimbriatus* (Bloch) of the Vanivilas Sagar Reservoir of Karnataka have been discussed in detail. The qualitative and quantitative composition of food components from 537 male and 589 female fishes were analysed and was found that the gut content consisted approximately 46.54% of mud and sand, 20.54% of diatoms, 17.13% of decayed organic matter, 11.48% of algae, 3.32% of semi digested matter and 0.98% of miscellaneous matter. The percentage occurrence of food items in different size groups revealed that the maximum sized fishes had diatoms and semi digested matter followed by other food items. The greater percentage of fishes had stomachs with considerable food indicating active feeding during January to February. Moderate feeding was noticed during November and December and poor feeding was observed during July to August and the percentage of empty stomach increased from June to August and decreased gradually after September.

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INTRODUCTION

Labeo fimbriatus (Bloch, 1797), 'fringe-lipped' peninsular carp belonging to the order *Cypriniformes* and family *Cyprinidae* is a potential candidate widely distributed almost through central and peninsular region and extended through Orissa and Bombay up to Punjab. It is also reported in Nepal, burma and Pakistan. In peninsular India, *fimbriatus* is available in the river Cauvery, Krishna, Mahanadi and Tungabhadra. The fish is locally called as "Khemmeenu" in Karnataka.

Labeo fimbriatus is a normally slow growing fish in its wild state with a maximum length of 91 cm, weighing approximately 3.5 kg (David *et al.*, 1974). It is predominantly an herbivore, feeding on diatoms, blue-green and green algae, higher aquatic vegetation, insects and decayed organic matter. It spawns during rainy months, June to September with a peak in August. The species does not naturally spawn in confined waters (Basavaraju *et al.*, 1993).

Day (1889) has, however, recorded its distribution as 'Sind, Punjab, the Deccan and probably N.E. Bengal; also Southern India at least up to Orissa, not recorded from Malabar or Canara'. (Misra 1959), as 'India: freshwaters of E. Punjab, U.P., Orissa, M.P, Madras, Deccan, Deolali, Poona, Ahmadabad; Pakistan: freshwaters of W. Punjab'.

Labeo fimbriatus has been assessed as Least Concern solely based on the fact that it has a very large expected distribution.

However, due to the overharvesting and pollution the wild population of the species are declining (Dahanukar, N. 2013). There is a need to understand the species present distribution, population status and harvest trends. Therefore the present investigation was taken up to study the food and feeding habits of this species.

MATERIALS AND METHODS

Fish samples were collected from the Vanivilasa Sagar Reservoir fish landing centre and fish market from March, 2013 to February, 2014. The present study was based on the observation of a total of 1,126 individuals of *Labeo fimbriatus* (Bloch) ranging in size from 10 to 60 cm total length (TL) comprising 537 male and 589 female.

Qualitative analysis consisted of identification of all organisms encountered in the stomach. The identification was done using compound microscope and were made groupwise, since samples were collected from gillnets where stomach contents were in advanced stage of digestion which rendered specific identification impossible. Food items in the advanced stage of digestion were treated as semi-digested matter.

The stomach contents were washed into a petridish and analyzed by Points Volumetric methods (Hynes, 1950; Pillay, 1952) taking into consideration the extent of fullness of the stomach. Points were allotted for each food item based on its

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relative volume. From the values obtained for individual fish, monthly averages and percentages were worked out. The volume index, which is the percentage of each food item, was calculated from the total points of all the items over the study period.

Feeding intensities in various months were studied by the degree of fullness of the stomach in relation to the size of the fish. The fullness of the stomach was classified as, (i) full; (ii) $\frac{3}{4}$ full; (iii) $\frac{1}{2}$ full; (iv) $\frac{1}{4}$ full; (v) little (containing traces of food) and (vi) empty (when practically the stomach did not contain any food). Fishes with full stomach, $\frac{3}{4}$ full and $\frac{1}{2}$ full were considered to have been feeding actively.

Similarly, stomachs with $\frac{1}{4}$ full and little were considered to denote poor feeding. The percentage occurrence of stomachs in different conditions of feeding over the whole period was also calculated. Food in relation to size of the fish was studied by tabulating percentage occurrence of each food item against the size of the fish.

RESULTS AND DISCUSSION

The quantitative and qualitative composition of food components are presented in table 1. The analysis of gut content showed that mud and sand, diatoms, decayed organic matter and algae formed the main food. The gut content consisted approximately 46.54% of mud and sand, 20.54% of diatoms, 17.13% of decayed organic matter, 11.48% of algae, 3.32% of semi digested matter and 0.98% of miscellaneous matter.

Mud and sand was found in greater abundance during October (67.11%) and November (63.01%) months. The lowest quantity of this item was found during April (31.22%). Diatoms formed a major constituent (20.54%) of the stomach content throughout the year.

Higher quantities of diatoms appeared in the months of May (32.87%) and June (27.44%) whereas, lower quantities were noticed in the months of August (4.34%) and September (6.06%).

The group was represented by *Amphora*, *Asterionella*, *Chaetoceros*, *Cocconeis*, *Cymbella*, *Diatoma*, *Diploneis*, *Gomphonema*, *Navicula*, *Nitzschia*, *Pinnularia*, *Pleurosigma*, *Surirella* and *Synedra*. Decayed Organic Matter (17.13%) formed an important food item next to diatoms.

Higher percentage of decayed organic matter was recorded in August (35.02%) and September (31.23%), lower percentage in the months of November (2.11%) and December (4.57%). After decayed organic matter, algae (11.48%) formed the next abundant food item.

Considerable quantities were found in the months of June (23.09%) and May (16.78%), the lowest quantities were observed during October (2.34%) and November (4.77%). *Agmanellum* sp. was found to be abundant throughout the investigation period followed by *Cosmarium* sp. and *Pediastrum* sp. forming second abundant species.

Food in relation to size

The percentage occurrence of food items in different size groups are presented in Table 2. At all the size groups starting from 10 to 15 cm to 55 to 60 cm, food items such as decayed organic matter, mud and sand, diatoms, algae, miscellaneous matter and semi digested matter were found in different proportions. The percentage occurrence of decayed organic matter showed an increasing trend with the increase in the size of the fish except in between 30-35, 40-45 and 45-50cm sizes. The lowest percentage was observed in the size range of 10-15 cm (12.31%) and highest percentage at 55-60cm (18.22%). Mud and sand occurred more in the gut of young fishes (i.e. 10-15cm, 15-20cm and 20-25cm) while it decreased as the size of fish increased. The lowest percentage was found in the size range of 55-60cm (15.27%) and the highest at 20-25cm (32.57%).

Diatoms constituted an important food item, the percentage composition of diatoms in the entire size range varied from 18.22 to 24.99% and no significant difference was noticed between size groups. The highest percentage was noticed in the size range of 55-60 cm (24.99%) while the lowest was found in the size range of 40-45 cm (18.22%). Occurrence of algae ranged from 7.34 to 12.99% in the size range of 40-45cm and 15-20 cm respectively. Miscellaneous matter was found in all the size groups, the highest percentage was observed in the size range of 10-15 cm (5.19%) and the lowest percentage was in the size range of 55-60cm (0.98%). Semi digested matter was present in all size groups in varied proportions. The highest percentage was found in the size group of 40-45cm (31.99%) while, the lowest was in 20-25cm (14.15%).

Feeding intensity

The percentage occurrence of stomach in various degree of fullness is presented in Table 3.

It is evident from the figure 3 that the greater percentage of fishes had stomachs with considerable food indicating active feeding during January to February. Moderate feeding was noticed during November and December. February month was found to be the active month of feeding. Poor feeding was observed during July to August and the percentage of empty stomach increased from June to August and decreased gradually after September.

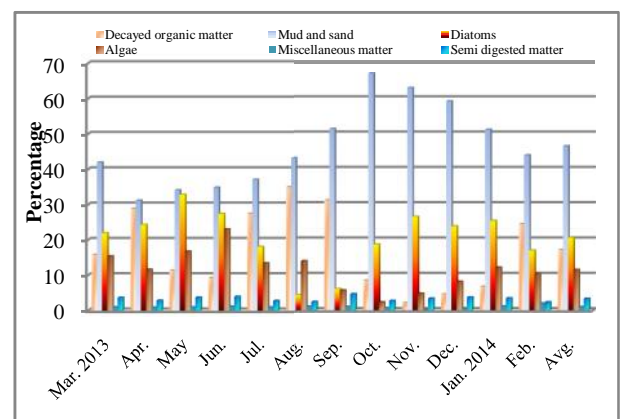


Figure 1 Quantitative composition of the gut content of *Labeo fimbriatus* during March 2013 to February 2014.

Table 1 Qualitative and Quantitative composition of the gut content of *Labeo fimbriatus* during March 2013 to February 2014.

Months Gut contents	Months												Avg.
	Mar. 2013	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan. 2014	Feb.	
I. Decayed organic matter	15.85	28.93	11.42	9.36	27.51	35.02	31.23	8.49	2.11	4.57	6.72	24.43	17.13
II. Mud and sand	42.01	31.22	34.15	34.89	37.13	43.18	51.41	67.11	63.01	59.24	51.21	43.96	46.54
III. Diatoms	21.98	24.35	32.87	27.44	18.10	4.34	6.06	18.66	26.52	23.83	25.37	16.96	20.54
Amphora	+	-	+	+	+	-	-	-	-	-	+	+	+
Asterionella	+	+	-	+	+	-	-	-	-	-	+	+	+
Chaetoceros	+	+	+	+	+	+	+	+	-	+	+	+	+
Cocconeis	+	+	-	+	-	-	+	-	-	-	+	+	+
Cymbella	+	+	+	+	+	-	-	+	+	-	-	-	-
Diatoma	+	-	+	+	+	+	-	+	+	+	+	+	-
Diploneis	+	+	+	+	-	-	-	-	+	+	+	+	+
Gomphonema	-	+	+	-	+	+	+	-	+	-	+	+	+
Navicula	+	+	+	+	+	+	+	+	+	+	+	+	+
Nitzschia	+	+	+	+	+	+	+	+	+	+	+	+	+
Pinnularia	-	+	+	+	-	-	-	+	-	+	+	+	+
Pleurosigma	+	-	-	+	+	+	-	-	+	+	+	+	+
Suirella	+	+	+	-	+	-	-	-	+	-	+	-	-
Synedra	+	+	+	+	+	+	+	+	+	+	+	+	+
IV. Algae	15.45	11.67	16.78	23.09	13.46	13.97	5.68	2.34	4.77	8.13	12.13	10.33	11.48
Agmanellum	+	+	+	+	+	+	+	+	+	+	+	+	+
Cosmarium	+	+	+	+	+	+	-	-	+	-	+	+	+
Oscillatoria	-	-	+	+	-	+	-	-	+	+	+	+	+
Pediastrum	+	+	+	+	+	+	-	+	-	-	-	-	-
Scenedismus	-	-	-	+	+	-	+	-	-	-	-	-	-
Spirogyra	+	+	+	+	-	+	-	+	+	+	+	+	+
V. Miscellaneous matter	1.01	0.92	1.02	1.22	0.98	1.07	1.00	0.68	0.21	0.54	1.12	1.98	0.98
Shell pieces	+	+	+	+	+	+	+	+	+	-	+	+	+
Wooden and leaf pieces	+	-	+	+	+	+	+	+	+	+	+	+	+
VI. Semi digested matter	3.70	2.91	3.76	4.00	2.82	2.42	4.62	2.72	3.38	3.69	3.45	2.34	3.32

‘+’ = Present ; ‘-’ = Absent

Table 2 Percentage occurrence of food items in different size groups of *Labeo fimbriatus* during March 2013 to February 2014

Size Group (cm)	Food item					
	Decayed organic matter	Mud and sand	Diatoms	Algae	Miscellaneous matter	Semi digested matter
10-15	12.31	30.11	21.32	12.13	5.19	18.94
15-20	13.17	31.47	22.34	12.99	3.37	16.66
20-25	14.41	32.57	23.76	12.87	2.24	14.15
25-30	16.69	29.86	21.49	10.82	1.78	19.36
30-35	14.52	28.91	19.13	9.51	2.24	25.69
35-40	17.12	26.77	18.45	8.16	1.68	27.82
40-45	15.98	24.89	18.22	7.34	1.58	31.99
45-50	15.23	23.97	21.55	8.89	1.43	28.93
50-55	16.41	19.39	23.21	8.21	1.22	31.56
55-60	18.22	15.27	24.99	9.13	0.98	31.41
Average	15.41	26.32	21.45	10.01	2.17	24.65

Table 3 Percentage occurrence of *Labeo fimbriatus* in various degrees of fullness of stomach during March 2013 to February 2014.

Months	No. of fish examined	Feeding intensity					
		Full	¾ Full	½ Full	¼ Full	Little	Empty
Mar. 2013	77	28.77	18.28	14.9	21.53	13.26	3.26
Apr.	78	24.84	16.79	22.54	19.81	10.24	5.78
May	84	16.75	13.48	18.5	23.76	19.63	7.88
Jun.	91	9.74	8.32	6.83	33.19	26.47	15.45
Jul.	110	8.56	7.72	12.98	25.09	31.13	14.52
Aug.	98	6.23	7.14	13.42	28.98	33.77	10.46
Sep.	105	7.81	9.48	15.65	26.71	31.2	9.15
Oct.	118	15.69	20.33	18.49	22.04	16.74	6.71
Nov.	95	25.27	23.14	16.62	15.11	13.98	5.88
Dec.	101	32.12	18.22	19.99	13.86	10.6	5.21
Jan. 2014	84	35.64	17.37	17.82	12.19	12.04	4.94
Feb.	85	33.25	21.21	16.43	15.23	9.43	4.45

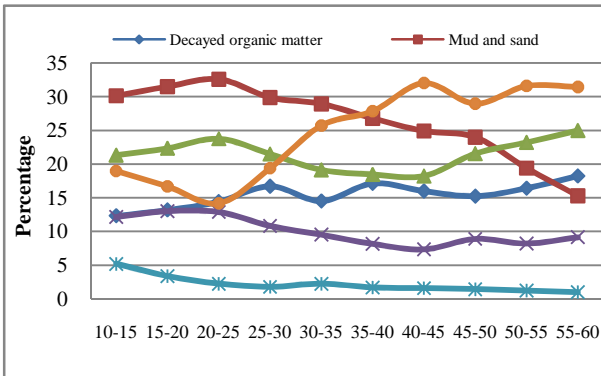


Figure 2 Percentage occurrence of food items in different size groups.

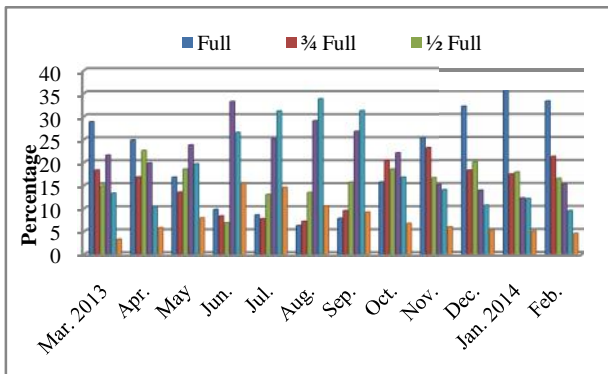


Figure 3 Percentage occurrence of *Labeo fimbriatus* in various degrees of fullness of stomach

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