

Convenient Pattern of Food and Feeding Habit of *Liza parsia* (Hamilton) (Mugiliformes: Mugilidae)

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Abstract: The pattern of food and feeding habit of brakishwater gold spot mullet, *Liza parsia* (Hamilton) was studied during the period from March 1998 to February 2000. The fish is a herbivorous, feeding mainly on algae (36.55%), higher plant parts (17.19%), protozoans (12.88%), crustaceans (16.46%), debris, sand and mud (12.83%) and unidentified food materials (3.69%) by weight. Electivity analysis showed that the fish avoided zooplankton and strongly selected some genera of phytoplankton (*Volvox*, *Diatoma*, *Nostoc*, *Anabina* and *Ulothrix*).

Key words: *Liza parsia*, food, feeding habit, fish, algae, protozoans, crustaceans

INTRODUCTION

Liza parsia is a brakish water mullets and locally known as Parse, Phaisa, Phasa etc. It is found in coastal region of the Bay of Bengal in Bangladesh, especially in the Sibsa river, Kapotakkha river, estuaries and polder areas. This fish is also distributed in many countries, like Southeast Asia, India, Taiwan, the Mediterranean and Eastern European countries and in many parts of central and South America and it products also contribute to valuable fishery economics in Japan and Australia (Nash and Shehadash, 1980). Its body length is 121-180 mm. The fish is considered to be one is the most important fish for its taste and highly nutritive value. The present study is aimed to obtain some knowledge about food and feeding habit of *L. parsia* helps to select such species for culture and produce an optimum yield by utilizing all the potential food of the water bodies without any competition. This fish is a good source of protein, calcium, essential amino acid, phosphate and vitamin-A.

Feeding is the dominant activity of the entire life cycle of fish (Roye, 1972). The success of good scientific planning and management of various fish species largely depends on the knowledge of their biological aspects in which food and feeding habits include a valuable portion. Nutrition of fish is directly related with the amount of fish production. Survey of available literature reveals that works on the food and feeding habits of fishes have been done by many workers in home and abroad like Mookerjee *et al.* (1946), Hynes (1950), Das and Moita (1955), Darnell

and Meiroto (1962), Ahmed and Akhtar (1967), Dewan and Saha (1979), Nargis and Hossain (1987), Bhuiyan (1987), Bhuiyan and Islam (1988) etc. A comparative study on the food and feeding habits of *Puntius stigma*; *M. vittatus* and *N. nandus* had been reported by Ahmed *et al.* (1993), seasonal patterns of feeding of the freshwater fish, *C. fasciata* (Bloch) had been reported by Mustafa *et al.* (1982); food of the fry of *C. mrigala* (Hamilton) reported by Bhuiyan and Islam (1990). No published information is available on the food and feeding habit of *L. parsia*. This study deals with the feeding intensity and food habit of *L. parsia*.

MATERIALS AND METHODS

A total number of 445 specimens of *L. parsia* was collected from local markets, rivers and polders areas in Khulna during the period from March 1998 to February 2000. The samples were collected once in every month. Just after collection, 10% formalin solution was injected into the guts of all the fishes in order to stop digestion of food items. The stomach contents of all the specimens were noted and the stomachs were classified into full, 3/4 full, 1/2 full, 1/4 full, 1/8 full and empty. The stomach of each specimen was dissected with a fine scissors and stomach contents were taken. Total Alimentary Canal Length (ACL) was measured and weight of food of each fish was weighted in an electronic balance (Model-400 EX, MFD by A and D Co. Ltd., Korea) and from the observed results the percentages of different food items were

calculated month-wise throughout the year by using gravimetric method (Hynes, 1950). Afterwards the undigested gut contents were estimated under a simple and binocular microscope (Magnification 10x) and categorized them under different taxonomic hierarchy by following Ward and Whipple (1959), Mellanby (1963), Needham and Needham (1972).

RESULTS AND DISCUSSION

The data on the stomach contents of 445 specimens of *L. parsia* were examined. To determine the seasonal feeding intensity the percentage of fullness was observed and to know the seasonal pattern of feeding percentage occurrence of food items were observed; they are shown in Table 1 and 2. Out of 445 stomachs, 441 (92.41%) were with food and 34 (7.59%) were without food. Among these 71 (16.04%) were full, 89 (20.05%) were 3/4 full, 83 (18.72%) were 1/2 full, 106 (23.83%) were 1/4 full, 62 (13.77%) were 1/8 full. It was observed that the highest percentage of fullness of the stomachs were in August (75.00% and 72.22%). After these months the percentage of fullness gradually decreased and it was least in November (26.32% and 27.78%) (Table 1). The highest percentage of emptiness of the stomachs were in November (73.68 and 72.22%). After March the percentage of emptiness gradually decreased and the lowest percentage of emptiness in August (25 and 27.78%) (Table 1).

Different food items found in the stomach of *L. parsia* in different months are as follows:

Algae: This item included Chlorophyceae (*Volvox*, *Ulothrix*), Cyanophyceae (*Anabina*, *Nostoc*), Bacillariophyceae (*Diatoma*). In the first observation the highest percentage of algae occurred in July (52.67%) and the lowest in November (24.11%). In the second observation the highest percentage of algae occurred in July (49.69%) and the lowest in November (27.87%). The average occurrence of algae was 36.95%. The average occurrence of Chlorophyceae was 18.71%, Cyanophyceae was 4.6%, Bacillariophyceae was 13.64% (Table 2).

Higher plant parts: Leaves, stems and sometimes the roots of higher aquatic plant parts formed the food items of *L. parsia*. The highest percentage of higher plant parts occurred in December (29.50%) and the lowest in August (8.06%). In the second observation the highest percentage was observed in December (26.15%) and the lowest in September (7.00%). The average percentage higher plant parts was 17.19% (Table 2).

Protozoans: Protozoans mainly consisted of *Paramecium*, *Operculina*, *Euglena*, *Rotalia* and *Vorticella*. In the first observation the highest percentage of Protozoans was recorded in September (18.29%) and the lowest in June (8.75%). In the second observation the highest percentage was observed in February (17.15%) and the lowest in June (9.20%). The average percentage of Protozoans was 12.88% (Table 2).

Crustaceans: This item included species of *Cyclops*, *Paracyclops*, *Diaptomus*, *Cypris*, *Eucypris*, *Daphnia*,

Table 1: The monthly percentage fullness of the stomach condition of *L. parsia*

Months	Year	No. of specimens						
		examined	Full	3/4Full	1/2Full	1/4Full	1/8Full	Empty
March	1998	20	20.00	20.00	25.00	20.00	5.00	10.00
	1999	22	27.27	13.64	22.73	22.73	13.64	0.00
April	1998	19	10.53	31.58	10.53	26.32	10.53	10.53
	1999	20	15.00	25.00	15.00	25.00	15.00	5.00
May	1998	20	15.00	15.00	20.00	30.00	15.00	5.00
	1999	20	20.00	20.00	10.00	35.00	10.00	5.00
June	1998	18	22.22	27.78	11.11	22.22	11.11	5.56
	1999	17	23.53	17.56	17.65	29.41	11.76	0.00
July	1998	18	27.78	22.22	16.67	22.22	11.11	0.00
	1999	17	29.41	23.53	17.65	17.65	5.88	5.88
August	1998	20	30.00	25.00	20.00	10.00	15.00	0.00
	1999	18	22.22	22.22	27.78	16.67	11.11	0.00
September	1998	15	13.33	13.33	26.67	26.67	13.33	6.67
	1999	15	13.33	26.67	20.00	20.00	13.33	6.67
October	1998	18	0.00	16.67	16.67	27.78	22.22	16.67
	1999	20	0.00	15.00	20.00	20.00	25.00	20.00
November	1998	19	0.00	10.53	15.79	21.05	31.58	21.05
	1999	18	0.00	5.56	22.22	33.33	27.78	11.11
December	1998	20	0.00	15.00	20.00	25.00	25.00	15.00
	1999	19	0.00	21.05	15.73	26.32	21.05	15.79
January	1999	18	16.67	33.33	16.67	22.22	5.56	5.56
	2000	19	15.79	26.32	21.05	21.05	10.53	5.56
February	1999	18	27.78	22.22	16.67	27.78	0.00	5.56
	2000	17	35.29	11.76	23.53	23.53	0.00	5.88
Occurrence average of 24 months (%)			16.04	20.05	18.72	23.83	13.77	7.59

Note: Fullness includes full, 3/4 full, 1/2 full stomachs. Emptiness includes 1/4 full, 1/8 full and empty stomachs

Table 2: The monthly percentage composition of the food items of *L. parsia*

Month	Year	No. of specimens	Total algaee	Food items							
				Algae			Higher plant parts	Protozoans	Crustaceans	Debris, sand and muds	Unidentified food materials
				Chlorophyceae	Canophyceae	Bacillariophyceae					
March	1998	16	44.31	20.96	2.83	20.52	13.82	11.87	20.18	6.98	2.84
	1999	13	38.68	21.00	2.60	15.08	18.25	12.32	19.20	7.61	3.94
April	1998	20	39.05	14.33	3.80	20.92	17.68	10.03	18.77	10.53	3.94
	1999	18	35.47	13.25	4.22	18.00	15.60	11.67	15.30	16.35	5.61
May	1998	23	48.24	17.84	6.52	23.88	11.68	8.25	10.64	19.32	1.87
	1999	21	43.66	18.53	5.35	19.78	13.08	9.32	13.20	17.26	3.48
June	1998	20	46.89	16.38	8.06	22.45	10.12	9.20	6.27	20.58	6.94
	1999	17	47.28	15.68	7.55	24.05	14.00	8.75	8.87	18.00	3.10
July	1998	21	52.67	20.99	9.76	21.92	11.53	9.34	7.27	14.17	5.02
	1999	22	49.69	19.35	6.82	23.52	10.25	8.92	8.00	19.30	3.84
August	1998	15	46.21	20.24	3.18	22.79	8.06	15.89	15.31	11.08	3.45
	1999	18	45.25	22.00	5.00	18.25	7.35	10.86	17.42	13.90	5.22
Septemer	1998	18	31.77	19.90	3.52	8.35	10.68	18.39	24.51	10.00	4.65
	1999	18	38.45	20.12	4.25	14.08	7.00	12.15	16.00	20.40	6.00
October	1998	19	25.47	18.38	3.89	3.20	28.00	11.48	25.50	5.29	4.26
	1999	16	33.60	16.92	5.30	11.38	15.00	14.52	18.25	15.80	2.83
November	1998	13	24.11	16.88	4.40	2.83	27.62	16.77	20.00	8.55	2.95
	1999	17	27.87	17.55	5.00	5.32	19.32	16.00	15.75	17.35	3.71
December	1998	20	28.10	18.85	3.25	6.00	29.50	15.38	19.65	5.35	2.02
	1999	19	28.50	20.00	3.00	5.50	26.15	16.38	18.00	8.04	2.93
January	1999	21	24.65	18.50	2.98	3.17	25.00	16.10	28.25	4.97	1.03
	2000	22	27.89	20.15	3.18	4.56	25.48	14.25	15.00	14.25	3.13
February	1999	18	30.66	21.58	2.50	6.58	28.33	14.22	16.12	7.89	2.78
	2000	20	28.28	19.60	3.43	5.25	19.00	17.15	17.64	15.00	2.93
Occurrence average of 24 months (%)			36.95	18.71	4.60	13.64	17.19	12.88	16.46	12.83	3.69

Note: 1st observation March 1998 to February 1999, 2nd observation March 1999 to February 2000

Moina and prawn larvae. The occurrence of crustaceans in the stomach of *L. parsia* was the highest percentage in January (24.25%) and the lowest in June (6.27%) in the first observation while in the second observation the highest percentage in March (19.20%) and lowest in July (8.00%) and the average was 16.46% (Table 2).

Debris, sand and muds: The maximum quantity of these materials in the first observation was recorded in June (20.58%) and the lowest in January (4.97%) while in the second observation the highest percentage was noticed in September (20.40%) and the lowest in March (7.61%) and the average was 12.83% (Table 2).

Unidentified food materials: The highest percentage of unidentified food materials was recorded in June (6.94%) and the lowest in January (1.03%) in the first observation and the second observation the highest percentage was observed in September (6.00%) and the lowest in August (2.83%) and average percentage was 3.69% (Table 2).

Feeding in relation to sexual cycle: The intensity of feeding in case of mature fishes was found to be very poor during the months of October, November and December which is the peak spawning season of this fish. It was also observed that the maximum number of empty stomachs was recorded during the spawning season

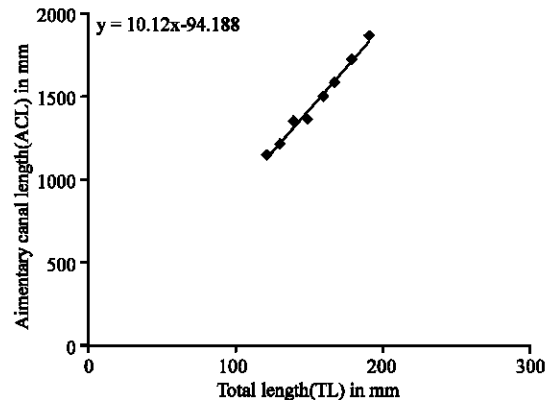


Fig. 1: *L. parsia*: Relationship between Total Length (TL) and Alimentary Canal Length (ACL)

(October to December). The mature fishes showed active feeding intensities in other months. But the immature fishes were found to feed actively during these months. Thomas (1969) stated that this low feeding activity may not be due to shortage of food items but due to the spawning season of the fish.

Relationship between Total Length (TL) and Alimentary Canal Length (ACL): The relationship between the total length and alimentary canal length was obtained (Fig. 1).

The mean total length (TL) of this fish was 99.59±9.48 mm and the mean Alimentary Canal Length (ACL) was 932.84±102.06. The total length and alimentary canal length ratio was 1: 9.51.

The regression equation is $ACL = -94.19 + 10.12 TL$ ($r = 0.990$).

The relation between the total length and alimentary canal length indicates that *L. parsia* is a herbivorous fish. Like other fishes, this fish changed its food and feeding habit with the change of season. These findings agree with the works of Dewan and Saha (1979) in *Tilapia nilotica*, Nargis and Hossain (1987) in *Anabas testudineus*, Bhuiyan *et al.* (1999) on *Mugil cephalus*.

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