

Studies on feeding behaviour of *Labeo bata* (Hamilton, 1822) from the lower stretch of the Yamuna river, Uttar pradesh

Sarita Tripathi¹, A. Gopesh¹, K. D. Joshi² A. C. Dwivedi² and Priyanka Mayank²

¹Department of Zoology, University of Allahabad, Allahabad, 211002 (U.P.)

²Regional Centre, Central Inland Fisheries Research Institute, 24 Panna Lal Road, Allahabad, 211002

Corresponding Mail Id- saritatripathi08@gmail.com

Abstract

The present study was carried out to determine feeding behavior of *L. bata* with respect of changes in thermal regimes from the lower stretch of the Yamuna river at Allahabad, Uttar Pradesh. Samples were collected from Sadiapur landing centre in Allahabad during November 2012 to April 2013. The body size of the samples varied from 13.9 to 31.2 cm. The gut content analysis revealed that *L. bata* is a herbivorous fish. Green algae was dominated in study period. Green algae constitute maximum proportion (51.87%) of the gut contents, followed by diatoms (36.75 %), blue-green algae (5.00%) and protozoans (2.19%) in samples. Sand particles were also recorded in minute proportion (2.62%). Diatom group was recorded maximum diversity, while green algae shared highest percentage in the gut of fishes.

Keywords: *Labeo bata*, feeding behavior, Yamuna river, green algae and diatoms

Introduction

Feeding behavior of fishes varied from season to season. Among the various species present in the river Yamuna a minor carp; *Labeo bata* (Bata) is also forms sizeable fishery. Besides rivers, the fish also forms lucrative pond fishery in West Bengal, Assam, Orissa states in India and also in Bangladesh due to its high market demand and consumer preference. Although some preliminary investigation have been undertaken on the biology of this economically important fish species, but there is dearth of knowledge on its food and feeding habits.

Fish has been an important part of human food since time immemorial. Art and science of fish harvesting have been evolved by the fishermen communities and passed on from generation to generation (Tynsong & Tiwari 2008). The river Ganga and its numerous tributaries are home for diverse fishery, in which *L. bata* also contributes to the food basket. *L. bata* (Hamilton) is a freshwater medium sized Indian minor carp, normally attains a length of 20-25 cm in pond and 30-50 cm in large tanks, reservoirs and rivers. It forms an attractive pond

fishery in west Bengal, Assam, Orissa in India and also in Bangladesh for high market demand (Chondar 1999). It is widely cultured in West Bengal due to its high market demand and consumer preference (Anjana & Das 2011). Bata is considered an esteemed food fish and cultured along with other major carps in India. They are also available in the Ganga, Yamuna and Brahmaputra rivers (Dwivedi *et al.* 2011). This species was abundantly available in Bangladesh in the past (Miah *et al.* 2009). It has herbivorous feeding habit Sehgal & Kaur (1969). It is predominantly a bottom feeder (Das & Moitra 1963). The natural distribution of *L. bata* is mainly in the India, Bangladesh and Nepal (Talwar & Jhingran 1991). It is breed during July and August (Siddiqui *et al.* 1976).

Food plays one of the most vital roles in the life history of fishes by way of controlling their growth, fecundity and migration. Variations in the seasonal and diurnal availability of the preferred food organisms of various species of fish in any region may govern the horizontal and vertical movements of the fish stocks. Nikolosky (1963) realized the importance of food study and stated that deterioration in food resource might

lead to reduced food consumption resulting in deceleration of growth rate, emaciation, delayed sexual maturity, changes in food spectrum, and reduction in fish stocks and an increase in the range of morphological variability of the fish species. The present study was aimed to highlight food and feeding habits, abundance of organisms in the gut of *L. bata* with special reference to the feeding structure through organisms from the lower stretch of the Yamuna river at Allahabad, India. This study will help in formulating the fishery management protocol for *L. bata*.

Material and methods

The fish samples of *Labeo bata* (Hamilton, 1822) collected from the fish market Sadiapur, Allahabad, Uttar Pradesh during November 2012 to April 2013. The length of fishes varied from 13.9 to 32.6 cm. Sadiapur is main fish market for the Yamuna river at Allahabad. Different food items were identified by microscopic examination. Food items of the gut were analyzed by following Lagler (1956) method. Qualitative and quantitative analysis of various food items was done up to generic level. Food particles observed in the gut were identified as per Needham & Needham (1962). The identified organisms were arranged species wise, group wise and categories-wise (animal and plant).

Results and Discussion

All food organisms were divided into seven groups. Overall thirty two genus was recorded in the intestine of *L. bata*. *Protococcus* was dominated (25.9%) in the gut compared to *Pediastrum* (11.43%) and *Synedra* (8.12%) in the pooled samples (Table 1). Green algae and Diatoms groups were recorded 51.87% and 36.75%, respectively (Fig. 1). Both groups constituted more than 85% of the total gut items of *L. bata*. Sand was recorded minute proportion (2.62%).

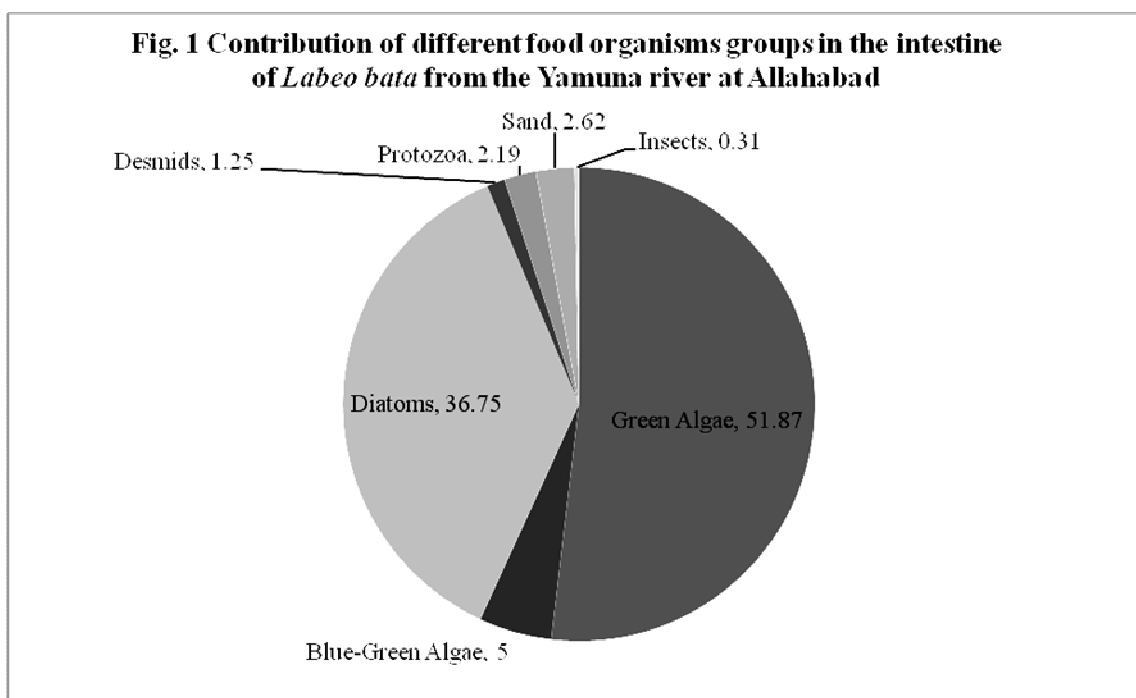
Table 1 Frequency of different organisms in the intestine of *Labeo bata* from the Yamuna river at Allahabad

Groups/Organisms	Frequency	Percentage
Green Algae		
<i>Scenedesmus</i>	128	8.00
<i>Protococcus</i>	415	25.90
<i>Pediastrum</i>	183	11.43
<i>Selenastrum</i>	31	1.93
<i>Botryococcus</i>	28	1.75
<i>Spirogyra</i>	21	1.31
<i>Coelastrum</i>	14	0.87
<i>Microspora</i>	10	0.62
Blue-Green Algae		
<i>Polysystis</i>	13	0.81
<i>Merismopedia</i>	16	1.00
<i>Tetrapedia</i>	19	1.18
<i>Anabaena</i>	8	0.50
<i>Oscillatoria</i>	9	0.56
<i>Phormidium</i>	13	0.81
<i>Nostoc</i>	2	0.12
Diatoma		
<i>Meridian</i>	54	3.37
<i>Diatoma</i>	106	6.62
<i>Synedra</i>	130	8.12
<i>Nitzschia</i>	129	8.06
<i>Navicula</i>	58	3.62
<i>Amphora</i>	17	1.06
<i>Gyrosigma</i>	19	1.19
<i>Cyclotella</i>	56	3.50
<i>Melosira</i>	10	0.06
<i>Cymbella</i>	5	0.31
<i>Tabellaria</i>	4	0.25
Desmids		
<i>Cosmarium</i>	14	0.87
<i>Gonatozygon</i>	6	0.37
Protozoan		
<i>Uroglena</i>	11	0.69
<i>Synura</i>	17	1.06
<i>Pandorina</i>	4	0.25
<i>Euglena</i>	3	0.19
Sand	42	2.62
Insects parts	5	0.31

Pahwa and Mehrotra (1966) and Chakrabarty *et al.* (1959) have stated that among phytoplankton, diatoms were dominated during winters. This has been clearly reflected in present studies as the contribution of diatom in food items. The food and feeding habits of the fishes vary with the time of the day, size of the fishes and season of the year (Mamun *et al.* 2004). It is not always possible to relate fish's diet to the

length of the alimentary canal (Al-Hussaini 1949). Dasgupta (2001) stated that the *L. bata* feeds vegetable matter 63.00%, green algae 15.00%, filamentous algae 10.00%, detritus 2.00% and sand particles 5.00%. The result of the present study and the available literature indicate that feeding is strongly influenced by the environment of the habitat, particularly the depth of water and abundance of food organism (Mondal & Kaviraj 2010).

Das & Moitra (1963) marked *L. bata* as a bottom feeder and a herbivore, the plant-food forming 78.7% of the average annual feed, the rest being mainly sand and the animal food is entirely absent in the diet of the adult fish. Sehgal & Kaur (1969) recorded that the *L. bata* is purely herbivore in dietary habits subsisting mainly in decayed organic matter, algae, diatoms and plant matter. The feeding intensity is maximum during June for peak breeding season and poor feeding activity during November to January.



References

- Al-Hussaini, A.H. 1949. Functional morphology of the alimentary tract of some fish in relation to difference in their feeding habits: anatomy and histology. *Quart. Micr. Sci.*, **90**: 2.
- Anjana, & S.K. Das 2011. Evaluation of growth and nutrient digestibility of *Labeo bata* fed with plant matter incorporated diets. *J. Inland Fish. Soc. India*, **43**(2): 33-38.
- Chakrabarty, R.D., P. Ray & S.B. Singh 1959. A quantitative study of the plankton and the physico-chemical conditions of the river Jumna at Allahabad in 1954-55. *Indian J. Fish.*, **6**(1): 186-203.
- Chondar, S.L. 1999. Biology of Finfish and Shellfish. *SCSC Publishers (India) Howrah*, pp 1-514.
- Das, S. M. & S. K. Moitra 1963. Studies on food and feeding habits of some freshwater fishes of India. IV. A review on the food and feeding habits, with general conclusions. *Ichthyologica*, **11**(1-2): 107-15.
- Dasgupta, M. 2001. Morphological adaptations of the alimentary canal of four *Labeo* species in relation food and feeding habits. *Indian J. Fish.*, **48**(3): 255-257.

Sarita Tripathi, A. Gopesh¹, K. D. Joshi A. C. Dwivedi and Priyanka Mayank

- Dwivedi, A.C., S. Tripathi, S. Khan & P. Mayank 2011. Population structure of *Labeo bata* (Hamilton) from the middle stretch of the Ganga river, India. *Asian J. Animal Sci.*, **6(2)**: 188-190.
- Lagler, K.F. 1956. Freshwater fishery biology. *Iowa. Wm.C. Brown Co. U.S.A.* Pp. 421.
- Mamun, A., K.M.A. Tareq & M.A. Azadi 2004. Food and feeding habits of *Amblypharyngodon mola* (Ham.) from Kaptai reservoir, Bangladesh. *Pakistan J. Biol. Sci.*, **7(4)**: 584-588.
- Miah, M.I., M.S. Harun, M.M. Rahman, M.R. Haue & M.A. Hossain 2009. Study on the embryonic and larval development of an endangered species of Bata (*Labeo bata*). *Int. J. Sustain. Crop Prod.*, **4(1)**: 72-82.
- Mondal, D.K. & A. Kaviraj 2010. Feeding and reproductive biology of Indian shad *Gudusia chapra* in two floodplain lakes of India. *Electronic J. Bio.*, **6(4)**: 98-102.
- Needham, J.G. & P.R. Needham 1962. A guide to the study of freshwater biology. Holden-Day, San Francisco, 5th Edition: 107 pp.
- Nikolosky, G.V. 1963. The ecology of fishes. *Academic Press, London and New York* : 352 pp.
- Pahwa, D.V. and Mehrotra, S.N. 1966. Observations on fluctuations in the abundance of plankton in relation to certain hydrological conditions of river Ganga. *Proc. Nat. Acad. Sci. India, Sec. B*, **36, Part II**: 157-189.
- Sehgal, K. L. & Kaur 1969. Food and feeding habits of *Labeo bata*. *Zool. Anz.*, **185 (5-6)**: 19-27.
- Siddiqui, A.Q., A. Chatterjee & A.A. Khan 1976. Reproductive biology of the carp, *Labeo bata* (Hamilton) from the river Kali, India. *Aquaculture*, **7(2)**: 181-191.
- Talwar, P.K. & A.G. Jhingran 1991. Inland fisheries of India and adjacent countries. *Oxford and IBH publishing Co. PVT. LTD, New Delhi*.
- Tynsong, H. & B. K. Tiwari 2008. Traditional knowledge associated with fish harvesting practices of war Khasi community of Meghalaya. *Indian J. Trad. Know.*, **7(4)**: 618-623.