



SEASONAL FLUCTUATIONS IN THE GUT CONTENTS OF *SCHIZOTHORAX ESOCINUS* AND *SCHIZOTHORAX CURVIFRONS*

Nasreen Kausar, G., Mustafa Shah & Ulfat Jan

P. G. Department of Zoology, University of Kashmir Srinagar India190006

ABSTRACT

The present study deals with the seasonal fluctuations of different broad food items in the gut contents of *Schizothorax esocinus* and *Schizothorax curvifrons*. Considerable variations were observed in the percentage of different food items in the gut contents of *Schizothorax curvifrons* and *Schizothorax esocinus* during different months of the year. Algae and unidentified vegetable matter formed the major food items of *Schizothorax curvifrons*, whereas identified and unidentified animal matter was observed throughout the year in the gut of *Schizothorax esocinus*. There was gradual increase in the percentage of vegetable matter from April to November in *Schizothorax curvifrons* whereas lowest percentage of animal matter was observed during the summer months. In *Schizothorax esocinus* the percentage of animal matter was highest in winter months. Significant variation was observed in the feeding intensity of both the species. The feeding intensity was quite low from April up to June in case of *Schizothorax curvifrons* whereas in *Schizothorax esocinus* it was significantly lower during March, April and May. The fluctuations in gut contents can be attributed to spawning cycle.

KEYWORDS: Algae; Animal matter; Season; Vegetable matter

INTRODUCTION

Kashmir has been gifted by nature with a number of fresh water bodies, which are inhabited by a number of fish species both endemic and exotic. This ichthyofauna has attracted the attention of a large number of Zoologists. The major fish fauna of these water bodies comprises of exotic carp and indigenous *Schizothorax* species. Other rarely found species are *Labeo*, *Glyptosternum*, *Puntius*, *Nemacheilus* etc. *Schizothorax* is represented by many species viz; *Schizothorax esocinus*, *Schizothorax curvifrons*, *Schizothorax niger*, *Schizothorax plageostomus*, *Schizothorax labiatus*, *Schizothorax richardsonii* etc. *Schizothorax* which is tasty and preferred by all, is clean and cold water loving fish, but it finds difficult to cope up with the problems in their habitat and is therefore disappearing. The good way of protection of this fish is their inclusion in culture. But to select the fish for culture, three things are very important to be worked out. These are: (i) way of feeding (ii) feeding schedule and

(iii) type of feed or gut content analysis. Therefore the present investigation was undertaken to find out feeding habit of *Schizothorax curvifrons* and *Schizothorax esocinus* on the basis of gut content so that attempts can be made to culture the fish in captivity.

MATERIALS AND METHODS

The present investigation was carried out from April 2007 to April 2009. Fishes analyzed were collected from Dal Lake, Tailbal Nalla, River Jhelum, Lidder and Sindh Streams of Kashmir valley, India. Fishes were brought to the laboratory and were dissected. The gut contents of 785 specimens were screened, 383 specimens were of *Schizothorax esocinus* and 402 were of *Schizothorax curvifrons*. Frequency of occurrence method Hynes (1950) was employed to express the percentage of each item in the gut and was determined by the following formula:

$$\text{Percentage occurrence of food item} = \frac{\text{Volume of a food item}}{\text{Volume of whole gut content}} \times 100$$

RESULTS

The gut contents sorted out were categorized into five groups 1. animal matter 2. Vegetable matter 3. Unidentified animal matter 4. Unidentified vegetable matter and 5. Sand particles. Animal matter was represented by Protozoa (*Diflagia*, *Arcella*), *Rotifera* (*Keratella*, *Monostyla*), *Crustacea* (*Cyclops*, *Bosmina*, *Canthocamptus* and *Diaptomus*), insect larvae of may flies, caddis flies, *Chironomus* larvae and insect appendages. Fish eggs and scales were observed in the gut contents of *Schizothorax esocinus* only. Vegetable matter

varied from unicellular algae to multicellular macrovegetation. *Chlorophyceae* (*Spirogyra*, *Ulothrix*, *Oedogonium*), *Bacillariophyceae* (*Fragilaria*), *Myxophyceae* (*Oscillatoria* and *Spirulina*). Unidentified animal matter was represented by semidigested animal matter and invertebrate eggs. Unidentified vegetable matter was represented by mucilaginous mass of muddy colour. In addition to these food items mucous was found invariably in the gut contents of both species, which is actually the secretion of alimentary canal for the smooth movements of food. Food items recovered from

alimentary canals revealed considerable variations in the percentage of different items in both species. Animal matter was observed in high percentage throughout the year in the gut of *Schizothorax esocinus* whereas algae and other vegetable matter formed the major food item of *Schizothorax curvifrons*. There was a gradual increase in the percentage of vegetable matter from April to September in *Schizothorax curvifrons* food and lowest percentage was observed during winter months (fig.1). However; the percentage of animal matter was lowest

during the summer months. The trend was quite similar in *Schizothorax esocinus* (fig. 2) but the percentage of animal matter observed was higher than *Schizothorax curvifrons*. Significant variation was also observed in the feeding intensity of both the species. The feeding intensity was quite low from ending April upto ending June in case of *Schizothorax curvifrons* whereas in *Schizothorax esocinus* it was significantly lower during March to May which coincided the spawning seasons.

FIGURE1. Seasonal fluctuations in the gut contents of *Schizothorax curvifrons*

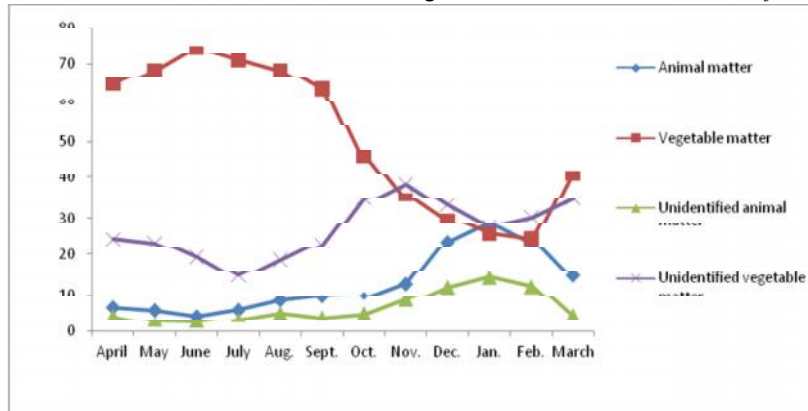
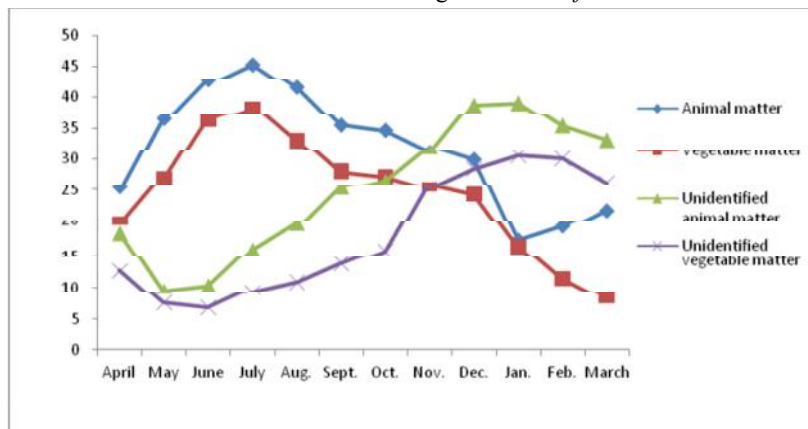


FIGURE 2. Seasonal fluctuations in the gut contents of *Schizothorax esocinus*



DISCUSSION

The results of the present study revealed that *Schizothorax curvifrons* is a phytophagous fish, with its mouth adapted for scraping attached plants from the surface of stones. Sunder (1984) and Sunder and Subla (1985) studied the diet of *Schizothorax curvifrons* and recorded on an average, dissolved organic matter (40.33%), sand and mud (17.51%), phytoplankton (38.78%), zooplankton (2.00%) and miscellaneous matter (1.38%). The results of the present study revealed an average animal matter (12.43%), vegetable matter (51.25%), unidentified animal matter (6.25%), unidentified vegetable matter (27.67%) and sand particles (2.595). Variation in food intake correlated with size groups showed that there was no appreciable change in nature of diet, though the broad food elements did vary in proportion at various stages of fish growth. Significant relationship was observed between nature of diet and the season. High percentage of animal matter was recorded

during winter months whereas high percentage of vegetable matter was observed in summer months. The variation observed in the nature of diet is attributed to unavailability of plant materials during the winter months. Feeding intensity of *Schizothorax curvifrons* was quite high throughout the year except May-June. The difference observed in the feeding intensity is attributed to the breeding season of the fish as it was observed in May-June. The present study reveals that *Schizothorax esocinus* is an omnivorous fish as 57.09% of animal matter was recorded from the gut contents of the fish. Our findings are in contrast to the findings of Jhingran (1991) who reported 63.5% of plant matter and 30.5% of animal matter from the gut contents of *Schizothorax esocinus*. Feeding (gastrosomatic index) of *Schizothorax esocinus* and *Schizothorax curvifrons* was found out to be related to their maturity stages (gonadosomatic index) to a great extent. The two indices bore an inverse relationship to

each other, with the result that the gonadosomatic index was high during spawning season, the gastrosomatic index was low. Similar conclusions have been recorded by Jhingran (1961), Bhatnagar (1972) in *Labeo fimbriatus*, Desai (1973) in *Tor tor* and Thakur (1978) in *Clarius batrachus*. Malhotra (1967) also recorded identical observations for *Schizothorax niger* from the valley.

REFERENCES

- Bhatnagar, G. K. (1972) Maturity, fecundity, spawning season and certain related aspects of *Labeo fimbriatus*. *Journal of Inland Fisheries Society of India* 4, 26-37.
- Desai, V. R. (1973) Studies on the fishery and biology of *Tor tor* (Ham) Maturity, Fecundity and Larval development. *Proceedings of Indian National Science Academy* 19, 228-248.
- Hynes, H.B.N. (1950) The food of fresh water sticklebacks (*Gasterosteus aculeatus* and *Pygosteus pungitus*) with a review of methods used in studies of the food of fishes. *Journal of Animal Ecology* 19,35-58.
- Jhingran, A.G. (1961) Studies on the maturity and fecundity of the Gangetic ancovy, *Setipinna phase* (Hamilton). *Indian Journal of Fisheries* 8,291-311.
- Jhingran V.G. (1991) *Fish and Fisheries of India*, Hindustan Publishing Corporation, Delhi 72p.
- Malhotra, Y. R. (1967) On the relationship between feeding and ovarian cycle in *Schizothorax niger* Heckel and *Botia berdi*. *Indian Journal of Fisheries* 14, 313-317.
- Sunder, S. (1984) Biology of an indigenous carp *Schizothorax curvifrons* (Heckel) from a stretch of river Jehlum with certain hydrobiological parameters . Approved Ph. D. Thesis. Department of Zoology. K. U. Srinagar. India.
- Sunder, S. and Subla, B. A. (1985) Fish and Fisheries of River Jehlum, Kashmir. *Zoologica Orientalis* 1,34-39.
- Thakur, N.K. (1978) On the food of air breathing cat fish, *Clarius batricus* (Linn.) occurring in the wild waters. *Internationale Revue der Gesamten Hydrobiologie* 63,421-431.