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Nature of food and feeding habits of banded gourami, *Colisa fasciata* (Bloch & Schneider-1801) of a wetland of Chapra, Bihar, India.

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Abstract- The banded gourami, *Colisa fasciata* (Bloch & schneider-1801) is one of the most common fresh water species of fishes belonging to the family Belontiidae of order Perciformes and comes under the category of small Indigenous species (SIS). It is a omnivorous / planktivorous fish species feeding on almost equal quantity of plants (49.4%) and animals (44.6%) matter. It indicates the omnivorous feeding habits. It has gained popularity for its good taste and nutritional value. The alimentary canal of *C.fasciata* is of moderate length or display more or less an intermediate form in relative length just in between herbivores and carnivores since *C.fasciata* is omnivores. This further indicates that the omnivorous fishes have taken plant and animal food material nearly at 1:1 natural ratio. The Gastro-intestinal Tract (GIT) starts with mouth for ingestion and ends with anus for defecation.

Key words: *Colisa fasciata*, omnivorous, planktivorous

INTRODUCTION

The study of food and feeding habits of fishes have manifold importance in fishery biology.¹ The concept of food and feeding habits of species helps to find out the distribution of the species which helps in successful management of the fisheries and aquaculture since food is a basic prerequisite for growth, development, reproduction and survival. The banded gourami is omnivorous / planktivorous fish. The fish has planktivorous and herbivorous nature.^{2,3} It seemed that the species may be choosing its food depending on the prevalence of materials in the habitat & can subsist on a wide range of food items. The relationship between the food and feeding habits and structure of alimentary canal was studied.⁴⁻⁷

The genus *Colisa* represented by three species including *C.fasciata* are habitually column feeder but considered *C.fasciata* in particular as a surface feeder.^{7,8} It is also a good predator of mosquito larvae for its small and feeble teeth in the mouth and buccal cavity acts as larvicidal fish showing similarity with giant gourami, *Trichogaster fasciata* which is also a predator of mosquito larvae. It was reported the feeding of fish needs to be done at regular intervals for bio-management of fisheries or aquaculture.⁸

MATERIALS & METHOD

1. Gastro-intestinal Tract or Alimentary Canal of *C.fasciata*:

The alimentary canal of *C.fasciata* is of moderate length or display more or less an intermediate form in relative length just in between herbivores and carnivores since *C.fasciata* is omnivores.⁹ This further indicates that

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the omnivorous fishes have taken plant and animal food material nearly at 1:1 natural ratio. The Gastro-intestinal Tract (GIT) starts with mouth for ingestion and ends with anus for defecation. The mouth is terminal and upturned, bucco-pharyngeal cavity consisting of small tongue lined with mucosa made up of stratified epithelium without taste buds, sub mucosa and skeletal support, short tubular oesophagus, sac like stomach, much longer intestine for digestion and absorption of digested food and terminal portion of intestine is rectum which opens outside through anus for the removal of undigested food. The intestine is differentiated into anterior duodenum, small intestine, undifferentiated large intestine and rectum. A pair of caecum is found situated at the junction of pyloric stomach and intestine. The anatomical details of GIT of three species of genus *Colisa* shows similar pattern of constitution. The bilobed liver and diffused pancreas associated with alimentary canal meant for secretory function. The average relative length of the alimentary canal of *Colisa fasciata* is found to be approximately five times of the total body length (AL : BL=5 : 1) which is species specific. The herbivorous fishes have got longest alimentary canal while carnivorous fishes have comparatively short alimentary canal.

2. Gastro somatic Index and feeding intensity:-

The Gastro Somatic Index (GSI) acts as indicator and determines the intensity of feeding. It is directly proportional to the intensity of feeding i.e. higher the Gastro somatic Index, higher the intensity of feeding. Low Gastro somatic Index during May-August (Rainy season) indicated low feeding intensity while in the month of September-December the Gastro somatic Index is high indicating most intense feeding which corresponds with the post spawning period. Thus, it is clear that feeding intensity of a fish can be determined by their Gastro somatic Index i.e. higher the Gastro somatic Index most intense feeding and vice versa.

The food consumption rate is high in summer and winter than monsoon period. In monsoon period (Rainy season) the adult male and female fishes remain busy for their mating and courtship for most of time, therefore, they neglect in their feeding. There is a correlation of feeding intensity with breeding periodicity has been reported; low feeding activity has been documented during the spawning months while intense feeding has been observed in post spawning season.

3. Gut Fullness

The gut fullness is correlated with the amount of food in stomach /intestine and it was examined/ assessed according to subjective scale as empty, 1/2 full and complete full. The following formula was used to calculate monthly fullness index for the determination of percentage of feeding intensity:

$$F1 = \frac{\text{No. of gut with same degree of fullness} \times 100}{\text{Total No. of gut examined}}$$

RESULT & DISCUSSION

1. Food and Feeding habits.

The mouth and whole Gastro-Intestinal Tract (GIT) of *Colisa fasciata* is well adapted according to the nature and type of food. The banded gourami is omnivorous fish feeds on almost equal quantity of plants (49.4%) and animals (44.6%) matter.

The mouth of *C.fasciata* is bordered by thick lips, the upper lips are protrudable and more pronounced in male .Small and feeble teeth are present in the mouth and buccal cavity. The intestine is of moderate size and coiled indicating omnivorous nature of *C.fasciata*. The length of intestine varied from 14.5 to 55 cm in the fish of 3.5 to 9.7 cm length. The omnivorous fishes usually have to possess an intermediate form of alimentary canal just in between herbivorous and carnivorous in its size and form. This further indicates that the omnivorous fishes have got intermediate preference of plant and animal food materials nearly at 1:1 natural ratio.

2. Gut Status:

The amount of food in the stomach or intestine is connected with the fullness of the gut, which was measured and rated on a subjective scale as empty, half full, or completely full. The monthly fullness index was computed using the following formula to determine the percentage of feeding intensity:

$$F1 = \frac{\text{No. of gut with same degree of fullness} \times 100}{\text{Total No. of gut examined}}$$

The status of gut fullness of the collected specimen was 48% empty, 23% 1/2 full and 29% full. The feeding intensity was low during April to July every year which increased afterwards in January as shown in fig.1.

3. Food items and their abundance:

Four to five adult fishes were collected and were placed them in the preservative (10% formalin) after anesthisising by chloroform and brought to the laboratory

Das & Singh- Nature of food and feeding habits of banded gourami, *Colisa fasciata* (Bloch & Schneider-1801) of a wetland of Chapra, Bihar, India.

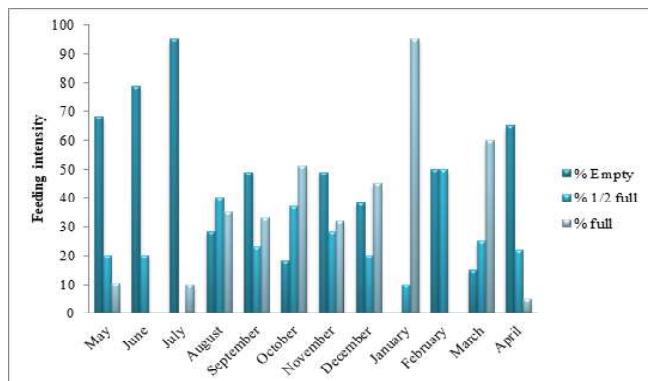


Fig 1: Month-wise gut index of *C. Fasciata* collected from Hardiya Chour/ wet land Chapra, Bihar, India during May 2020 - April 2021.

for analysis of food contents. Standard length and weight of the individual fish was also recorded. Now the gut/stomach of the specimens were dissected out longitudinally inside a clean Petridis and the whole content of gut was poured to it and weighed. The seasonal variations in stomach content were analysed by numerical method. The food items were identified up to major taxonomic groups. The period of intense feeding of the fish was arrived at by following the monthly gastro- somatic index (GSI) expressed as weight of gut divided by weight of fish X 100. The gastro-somatic index of both the sexes was low during May to July (Breeding season). It gradually increased from August onwards and reached its peak in October and then again declined gradually. The lowest values of GSI were during October -February. The feeding intensity was reduced during May-July/August, the breeding period as shown in Fig: -2.

The gut content analysis showed that the encountered food items were Bacillariophyceae and chlorophyceae (phytoplankton), Balantidae, insect, mud and some

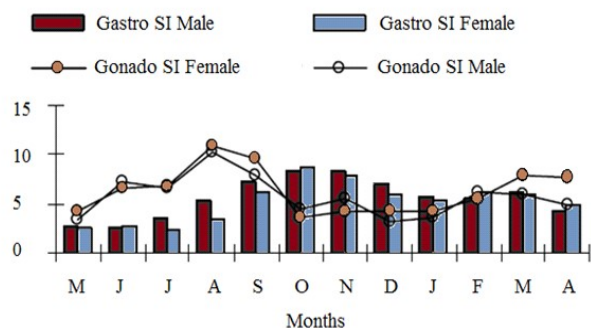


Fig. 2- Gastro somatic index and Gonado somatic index of male and female *C.fasciata*

unidentified food materials. The phytoplankton was observed as the most dominant (48%) food group of the fish. The composition of food group of the fish illustrated in Fig.-3.

The feeding pattern in both sexes was almost same as illustrated in Fig.-4.

With respect to the season, insect (29.6%) was most dominant food item in the gut during summer season as illustrated in Fig.-5.

The number of macroinvertebrates, macrophytes, insects and the broken pieces of organisms were counted with the help of hand lens whereas the zooplankton and phytoplankton were counted under the microscope after

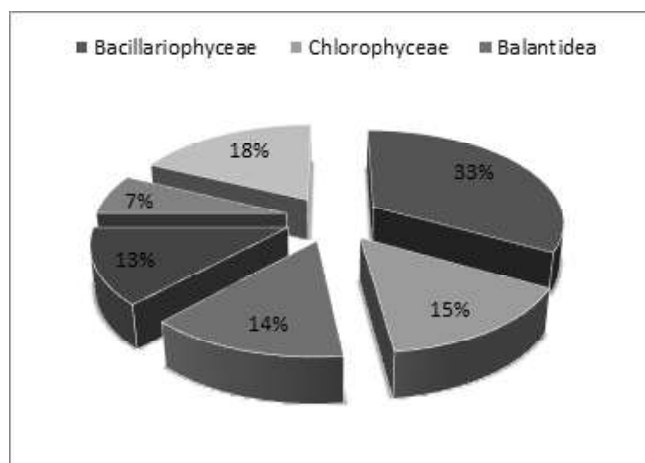


Fig 3: Composition of food items and their availability in *C. fasciata* collected from Hardiya Chour/ wet land Chapra, Bihar, India during May 2020 to April 2021.

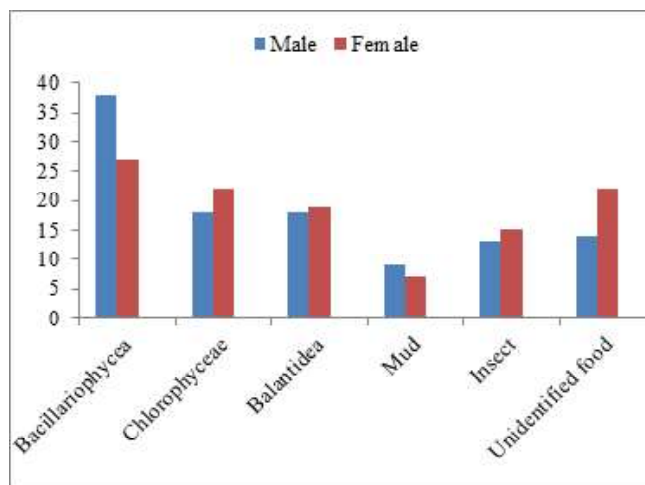


Fig 4: Food items with respect to Male and Female *C. fasciata* collected from Hardiya Chour/ wetland Chapra, Bihar, India during May 2020 to April 2021.

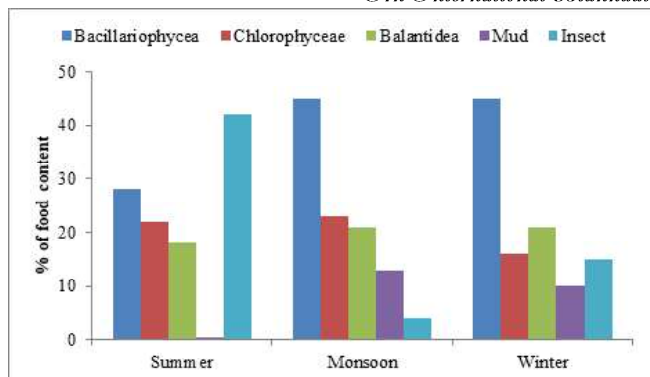


Fig 5: Season-wise food items and their availability for *C. fasciata* in Hardiya Wetland, Chapra, Bihar, India.

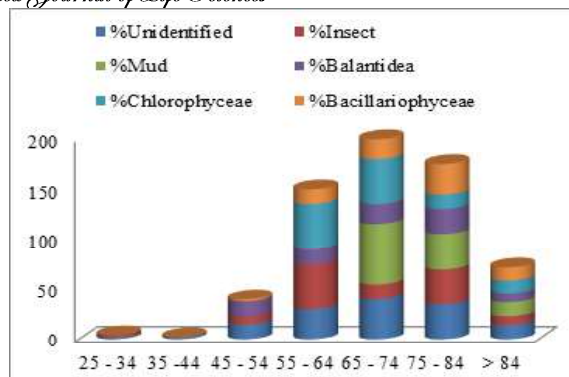


Fig 7: Food items of *C. fasciata* in different size groups collected from Hardia Chour, Saran District, Bihar, India from March 2020 - April 2021.

adding 25-30 cc of distilled water to stomach content in a petridish. Among the plant materials, Bacillariophyceae and Chlorophyceae were the major food components. The food items were *Anabaena* sp., *Closterium* sp., *Diatoma* sp., *Microsystis* sp., *Navicula* sp., etc among plant matter and *Branchionus* sp., *Chironomus* larvae, *Cyclops* sp., *Tubifex*, Odonatd nymphs, Coeloptera larvae, *Cypris* sp., and *Notholca* sp. among the animal matter. The food items with respect to the different size groups as well as juvenile and adult forms of *C.fasciata* collected from different sites of Hardia Chour illustrated in Fig;-6 and Fig;- 7.

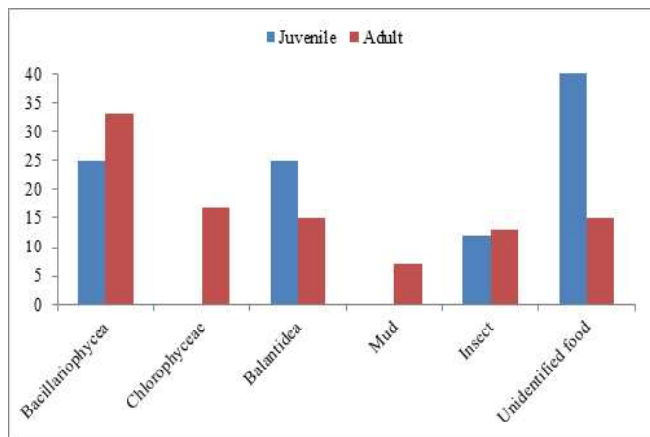


Fig 6: Food items of juvenile and adult forms of *C. fasciata* collected from Hardia Chour, Saran District, Bihar, India.

4. Gastro-intestinal Tract or Alimentary Canal of *C.fasciata*.

The alimentary canal of *C.fasciata* is of moderate length or display more or less an intermediate form in relative length just in between herbivores and carnivores since *C.fasciata* is omnivores. This further indicates that the omnivorous fishes have taken plant and animal food material nearly at 1:1 natural ratio. The Gastro- intestinal

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Table 1- The ratio of relative length of alimentary canal and body length in three species of genus-*Colisa*

Sl.No.	Name of species	Relative alimentary canal & body length ratio (AL : BL)
1	<i>C.fasciata</i>	5 : 1
2	<i>C.lalia</i>	3 : 1
3	<i>C.sota</i>	2:1

CONCLUSION

Given that food is a necessary condition for growth, development, reproduction, and survival, understanding the notion of food and eating habits of species aids in determining the distribution of the species and aids in the successful management of fisheries and aquaculture. As an omnivore fish, the banded gourami consumes nearly equal amounts of plant (49.4%) and animal (44.6%) materials. The species appears to be able to select its food based on what is abundant in its environment and can survive on a variety of foods.

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