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Food and feeding habits of *Channa punctatus* (Bloch) from water bodies of Surguja of district Chhattisgarh

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Abstract

The present study reveals that the average RLG value for the fishes of group I (less than 10cm) was 0.74 and group II as 0.60. The average GaSI was ranged from 2.11 to 4.86 for males and that of female from 2.35 to 6.67. The highest value of GaSI was recorded 4.86 and 6.67 during the month of October for males and females respectively. Gut content analysis showed significant seasonal patterns and dominated by insects (41%) followed by plant matter (16%), fishes (15%), crustaceans (11%), zooplankton (8%), miscellaneous (6%), and annelids (3%), in the order of preference. Thus reflecting its widening of food spectrum and carnivorous in nature.

Keywords: Food and feeding habit, RLG, GaSI, Gut content analysis

1. Introduction

Food is an important factor in the biology of fishes to the extent of governing their growth, fecundity and migratory movements. Variations in the seasonal and diurnal abundance of governing their growth, fecundity and migratory movements. Variations in the seasonal and diurnal abundance of the favourite food organisms of different species of fish, in any region, may influence respectively the horizontal and vertical movements of the fish stocks. Hence, a correct knowledge of the relationship between the fishes and food organisms is essential for the prediction and exploitation of the fish stocks^[1]. Studies of food and feeding habit of fishes have manifold importance in fishery biology^[2]. The knowledge about the food and feeding habit of fishes is necessary for piscicultural practices. Several workers investigated food and feeding habits of *Channa* species in India. The relationship between the food and feeding habits, structure of the alimentary canal^[2, 7], investigation of food spectrum and intensity, food preferences and seasonal variation of *C. punctatus* were reported^[1, 7]. The knowledge of food and feeding habits of a species helps to find out distribution of the species which helps successful management of the fishery. The nature of food composition of a fish will also throw light on the possible habitats it frequents. There is no authentic information on the food and feeding habits of *Channa* species in the research area. So, the present investigation was carried out to fulfill the paucity of information on food and feeding habits of *Channa punctatus* especially from water bodies of Surguja district Chhattisgarh.

2. Materials and Methods

2.1 Study area

Surguja district is located in the northern part of Chhattisgarh, State of India. The district headquarter is Ambikapur, it lies between 23°37'25" to 24°6'17" north latitude and 81°34'40" to 84°4'40" east longitude. The area receives an annual rainfall of about 1360mm. The minimum and maximum temperature varies between 20 to 40 degree celcius. The present study was carried out during October 2018 to May 2019 from different water bodies like ponds, paddy fields, and dams etc.

2.2 Sample collection and estimation

The specimens of *Channa punctatus* were collected from water bodies of the Surguja district. The collection work was done with the help of fishermen, immediately after the collection, specimens were brought to the laboratory for further analysis. The total length, and weight of fishes were measured with the help of Vernier Calliper and electronic weighing balance

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respectively. Fishes was categorized into two groups viz. group I (less than 10cm) and group II (more than 10cm) for convenience of discussion. After taking the length and weight the entire guts removed and preserved in 5% formaldehyde for further analysis of the different food items. Total 40 digestive tracts were examined for analysis of food and feeding habit of *C. punctatus*. The preserved guts were later uncoiled, cleaned off and the attached tissues were removed. The following methods were used to analyse the food and feeding habit of fish.

2.2.1 Relative length of the gut (RLG): The RLG value was calculated by using the following standard formula^[8]. RLG = length of the gut/total length of the fish

2.2.2 Gastro-somatic index (GaSI): The feeding intensity or gastro-somatic index (GaSI) was calculated by using the following formula^[9].

$$\text{GaSI} = \frac{\text{Weight of the gut}}{\text{Total weight of the fish}} \times 100$$

2.2.3 Gut content analysis: Gut contents were (gut which were preserved in 5% formaldehyde) analyzed by quantitative and qualitative method. For analysis of food items in the gut of fish, the point method was used^[10].

3. Results and Discussion

The RLG value was calculated from October 2018 to May 2018. Results are depicted in Table 1 and Figure 1 the RLG value was varied from 0.61 to 0.87 with average value 0.74 in group I fishes while its observed in group II fishes from 0.51 to 0.68 with an average value of 0.60. The RLG value was observed maximum in group I fishes. This indicates a gradual decline in RLG values as the fish grows. The RLG value in *Channa punctatus* was observed to decrease with the increasing length of the fish indicating the change of feeding habit from fry stage to adult stage. Similar observation made by^[11] in *C. punctatus*, in^[12] *Ompok pabda*; and^[13] in *Notopterus notopterus* from different habitats and considered these fish species as carnivorous. The value of RLG is generally low in carnivorous fish, higher in omnivorous fish and highest in herbivorous fish^[14]. The findings of the present study indicates the feeding habit of *C. punctatus* is carnivorous and corroborated with the earlier workers.

Table 1: RLG value of *C. punctatus* in different size groups

| Size group | RLG value | Average |
|----------------------------|-----------|---------|
| Group I (less than 10 cm) | 0.61-0.87 | 0.74 |
| Group II (more than 10 cm) | 0.51-0.68 | 0.60 |

The gastrosomatic index was used to find out the feeding intensity of fish. In the present study (Table 2) maximum value was 4.86 for male and 6.67 for females, recorded during October. The minimum value 2.35 for male and 2.72 for females recorded during December and January respectively. Monthwise fluctuations in the feeding intensity was noticed in various months. The GaSI showed a steady increase from

February to May onwards and declined in winter seasons it's may be due to the species hibernate underneath aquatic weeds and in mud. GaSI value was also found minimum in the month of December during the study period. Seasonal fluctuation of the feeding intensity and dietary composition in fishes are influenced not only by the maturation of gonads but also due to non-availability of food in the habitat. In the present study less value of GaSI during the month of December may be due to non-availability of food in the habitat. Most fishes found in October are spent stages. Spent fishes showed highest GaSI value as GaSI value was found highest in the month of October. Similar result was also found in the present study. The result of the present study is in agreement with that of earlier workers^[5, 11, 15].

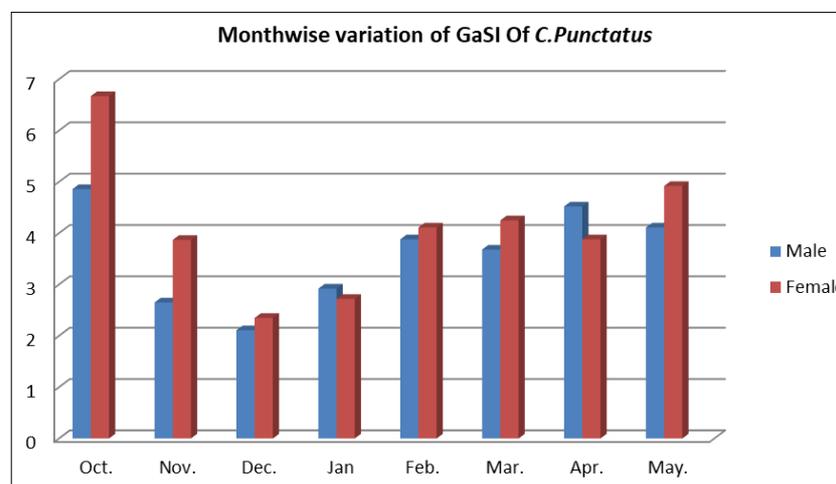
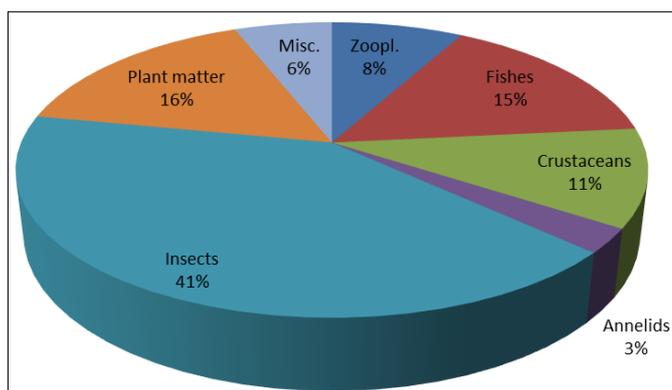
The percentage composition of food items in the gut of *C. punctatus* (depicted in Table 3) reveals that the composition of diet of *C. Punctatus* have been group into following broad categories. (1) zooplankton 8% (2) Insects 41% (3) crustaceans 17% (4) fishes 15% (5) plant matter 16% (6) miscellaneous group including unidentified food and spores together forming 6% annually as shown in Figure 1. Gut contents were analyzed from the different items of the diets in different seasons (Table 3 and Figure 1). In the present study seasonal variation showed a significant variation in feeding habit which might be due to fluctuation in the availability of different food items in different season. Zooplankton was the highest percentage (11.77) occurrence in the month of March and that of lowest (5.34) in May. Insect percentage varies from October (36.46) to May. The highest percentage (12.77) of crustaceans was observed in November and lowest (8.62) in January. The percentage of annelids varied from highest 6.25 and lowest April and December respectively. The percentage of plant matter fluctuates from 11.92 to 18.54 in the month of May to October respectively. The miscellaneous or unidentified components was observed highest in November (9.55) and lowest in February (1.18) after analysis it was found that in any season insect matter forms the major diet. The earlier works indicates that *C. punctatus* is carnivorous in feeding habit, mainly fed on the animal food viz. crustaceans, insects, and fishes^[16, 19]. Food and feeding frequency is directly related to the food availability in the surroundings which is affected by the seasonal variations and other factors^[18, 20]. From the present study it was analysed that *C. punctatus* changes its food habit with the changes in seasons, its may be due to the variety of food items available in the water bodies. These findings agree with those of^[21] who reported that *Tilapia nilotica* changed its food habit with the change in season.

Table 2: Average GaSI in different months

| Months | Male | Female |
|----------|------|--------|
| October | 4.86 | 6.67 |
| November | 2.65 | 3.87 |
| December | 2.11 | 2.35 |
| January | 2.92 | 2.72 |
| February | 3.88 | 4.11 |
| March | 3.68 | 4.25 |
| April | 4.52 | 3.88 |
| May | 4.11 | 4.92 |

Table 3: Percentage composition of food items in *Channa punctatus*

| Month | Zooplankton | Fishes | Crustaceans | Annelids | Insects | Plant matter | Misc. |
|-------|-------------|--------|-------------|----------|---------|--------------|-------|
| Oct. | 10.39 | 16.12 | 9.12 | 2.11 | 36.46 | 18.54 | 7.26 |
| Nov. | 4.00 | 15.18 | 12.77 | ---- | 39.23 | 18.27 | 9.55 |
| Dec. | 9.35 | 14.45 | 12.93 | 1.18 | 37.53 | 18.23 | 6.33 |
| Jan. | 7.38 | 13.56 | 8.62 | 1.21 | 42.23 | 17.83 | 9.17 |
| Feb. | 9.92 | 15.09 | 11.26 | 3.22 | 42.56 | 16.70 | 1.18 |
| Mar. | 11.77 | 16.14 | 11.39 | 2.11 | 43.16 | 13.80 | 1.63 |
| Apr. | 6.17 | 15.60 | 10.22 | 6.25 | 43.86 | 12.42 | 6.31 |
| May | 5.34 | 16.56 | 9.48 | 5.27 | 44.31 | 12.92 | 6.29 |

**Fig 1:** Monthwise variations of gastro-somatic index (GaSI) of *Channa punctatus***Fig 2:** Qualitative percentage Analysis of various food items in different months of *C. punctatus* from October 2018 to May 2019

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