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FOOD AND FEEDING BEHAVIOUR OF *HETEROPNEUSTES FOSSILIS* BY GUT CONTENT ANALYSIS FROM PURNA RIVER AMRAVATI (M.S.).

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ABSTRACT

*The aim of this study was to establish the food and feeding behaviour of **Heteropneustes fossilis** from Purna river Amravati The Snakeheaded fresh water fish , **Heteropneustes fossilis** were collected from river Purna, district Amravati during the month of January 2017 . The total length of fish ranged from 15.3 cm to 20.3 cm and weighed from 70-400 grams. The gut content of these fishes were extracted and examined for data analysis. Different food items were recovered from the gut and were identified as fish, molluscs, zooplanktons, insects, plant materials and unidentified materials.*

KEY WORDS: - *Food and feeding, Heteropneustes fossilis, Purna.*

INTRODUCTION:

Amravati district is a district of Maharashtra state in central India. Amravati is the administrative headquarters of the district. The district is situated between 20°32' and 21°46' north latitudes and 76°37' and 78°27' east longitudes. The district occupies an area of 12,235 km^2. Amravati district is covered by three major rivers namely Tapi, Purna and Wardha. The Purna River flows through the southern slope of the Gavilgarh hills and marks the district boundary between Amravati and Akola.

Fish is a valuable source of protein and occupies a significant position in the socio-economic fabric of the South-Asian countries. Most of the countries in the world depend on fisheries as a source of food supply and protein foods. In many tropical countries fish consumption now exceeds that of all other animal protein (Khabade, 2015). Feeding is one of the main concerns of daily living in fishes and the fish devotes large portion of its energy searching for food (Shamsan and Ansari, 2010). Feeding and searching for food are factors, which regulate and at least influence the distribution, migration and growth of fish (Papaconstantinou *et al.,* 1992).

It is not possible to gather sufficient information of food and feeding habit of fish in their natural habitat without studying its gut contents (Manon and Hossain, 2011). The study of dietary habits of fish, based on stomach content analysis, is widely used in fish ecology. The identification of stomach or gut contents allows us to know about food consumption, feeding and assimilation rates, cannibalism and even habitat segregation (Manoharan *et al.,* 2012).

One of the important biological factors for selecting a group of fish for culture in ponds to avoid competition for food among themselves and live in association and to utilize all the

available food is the food and feeding habit of fishes (Dewan and Saha, 1979). Studies of the feeding habits of the fish fauna are useful to examine both fisheries management and conservation fishery biology in an aquatic environment (Alp *et al*., 2008). According Offem *et al*., (2009), studies on the feeding habit of fish are also essential for aquaculture development and aquaculture has gained a growing interest over the years, due to the increasing of human population and the important of fish as a low cost source of animal protein.

The present study was aimed to study the feeding behavior of *Heteropneustes fossilis* through gut content analysis from Purna River in Amravati (Maharashtra).

MATERIALS AND METHODS

Sampling site, Fish collection, Processing and data analysis:-

Specimens (*Heteropneustes fossilis*) for the present study were collected from Purna river using cast net during January 2017 with the help of the local fisherman. The specimens were properly cleaned in the laboratory and the total length, total weight were recorded. Food and feeding habits of *Heteropneustes fossilis* were studied by examining a total of 50 digestive tracts. The guts were removed from the specimen after measuring and weighing each specimen to the nearest cm and gm respectively and were preserved in 5% formalin for subsequent analysis. The stomach of each fish was dissected out and the food was preserved in 5% formaldehyde. The content of stomach and intestine of each fish were taken and studied with the help of magnifying glass and under microscope.

Data from stomach contents were analyzed by volumetric method (indirect estimation) and Frequency of occurrence method. The frequency of various components in the food of the species was estimated by the occurrence method and the same was expressed in percentages (Hynes, 1950; Hyslop, 1980). The volume of food in each gut of fish was measured and various food items are identified (Pillay, 1952; Hynes, 1950; Hyslop, 1980). The relative importance of the items was judged by the 'Index of Preponderance' as given by Natarajan and Jhingran (1961).

RESULTS AND DISCUSSION

Gut content analysis: The percentage composition of food items in the gut of *Heteropneustes fossilis* as observed in has been summarized in the Table 1. The gut content of *Heteropneustes fossilis* have been group into 8 broad categories i.e. zooplankton, insects, crustaceans, annelids, molluscs, fishes, plant matter, and unidentified components

Food items in the gut of *Heteropneustus fossilis*	**Total no of fishes observed**	**No of Fishes with the particular food item in Gut**	**Percentage of frequency occurrence (Oi)**	**Percentage Volume of (Vi)**
Zooplanktons	50	43	17.2	11.45
Insects	50	24	9.63	10.22
Crustaceans	50	42	16.86	18.33
Annelids	50	15	6.02	8.22
Molluscs	50	38	15.26	16.55
Fishes	50	32	12.58	14.03
Plant matter	50	26	10.44	11.33
Unidentified materials	50	29	11.64	12.01
Total		249	100	100

Table 1:-Percentage of frequency Occurrence and Percentage of Volume.

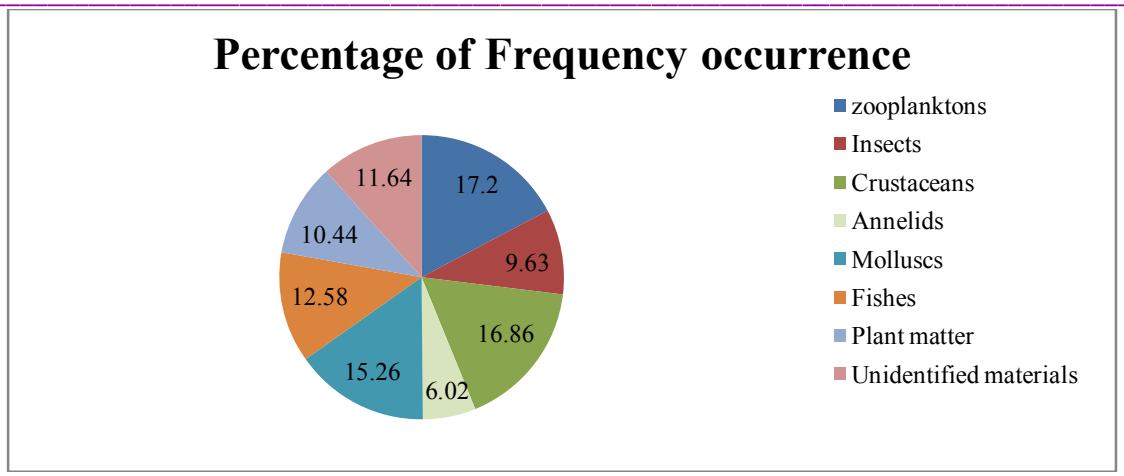

Fig 1:-Percentage of Frequency occurrence of different food items in *Heteropneustes fossilis*

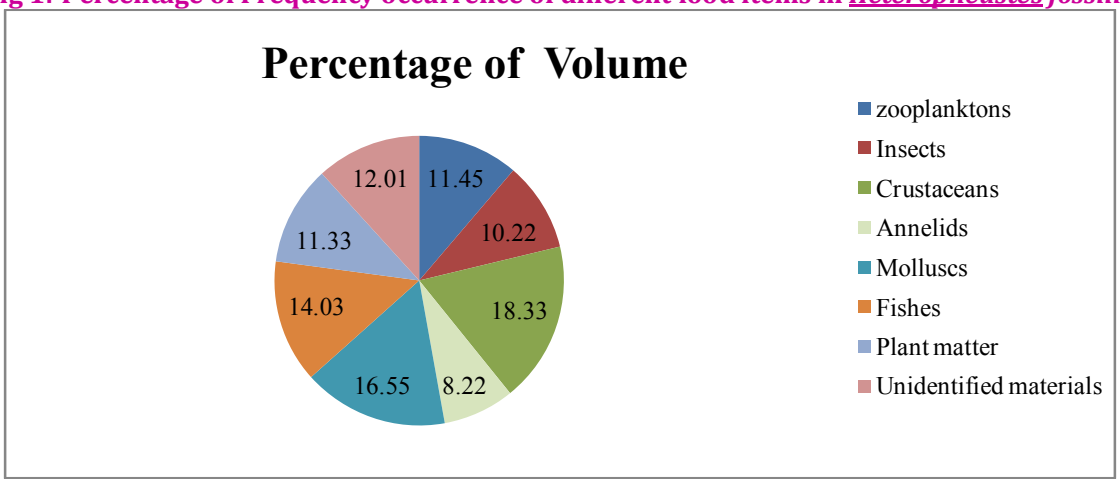

Fig 2:-Percentage of volume of different food items in *Heteropneustes fossilis*

Index of pre-ponderance: The preferred food item of the species as revealed from the index of pre-ponderance has been given in Table 3 and in fig 3. Crustaceans were the most preferred food items of *Heteropneustes fossilis* which constituted 23.04% followed by molluscs (18.83%), zooplanktons (14.68%), fishes (13.16%), unidentified materials (10.84%), plant matter (8.82%), insects (7.33%) and annelids (3.68%) respectively.

Food items in the gut of *Heteropneustes fossilis*	**Percentage of frequency occurrence (Oi)**	**Percentage of Volume (Vi)**	**ViOi**	$I = \frac{\text{Vi Oi}}{\Sigma \text{ Vi Oi}} \times 100$	**Grading**
Zooplanktons	17.2	11.45	196.94	14.68	**III**
Insects	9.63	10.22	98.41	7.33	**VII**
Crustaceans	16.86	18.33	309.04	23.04	**I**
Annelids	6.02	8.22	49.48	3.68	**VIII**
Molluscs	15.26	16.55	252.55	18.83	**II**
Fishes	12.58	14.03	176.49	13.16	**IV**

Plant matter	10.44	11.33	118.28	8.82	**VI**
Unidentified materials	11.64	12.01	139.79	10.42	**V**
Total	100	100	1341.01	100	

Table: - 2 Index of pre-ponderance

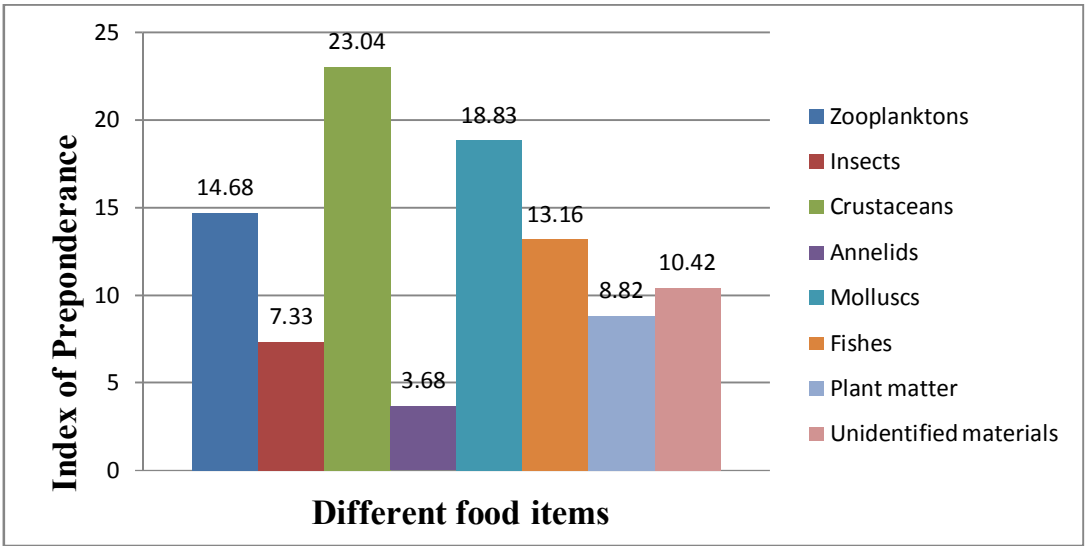

Fig3:-Index of pre-ponderance of different food items in *Heteropneustes fossilis.*

DISCUSSION

On the basis of gut content analysis it was observed that this fish (*Heteropneustes fossilis*) was feeding mainly on animal material and to a lesser extent on plant material. The results indicated that the species prefer animal as their first choice as compare to plant in their food. There is also variation in the percentage composition of different items of food in the gut.

Index of Pre-ponderance of various food compositions in the gut of *Heteropneustes fossilis* indicated that crustaceans were the most dominant food item in the gut, followed by the molluscs, zooplanktons, fishes, unidentified materials, plant matter, insects and annelids respectively.

The first group that is the Zooplanktons comprised of *Daphnia*, *Cyclops*, *Nauplius* larvae and unidentified parts of zooplankton. Second group (Insects) comprised of nymphs of Dragonfly, Damselfly, Mayfly and also half digested parts of insects. Crustaceans were the third group represented by Shrimps, Mysids and Small prawn. Annelids were represented by *Limnodrillus, Nais communis; Lumbricus* and *Glossiphonia sp.* Molluscans recorded were *Pila, Lamellilidenes, and Lymanaea.* Fish matters recorded were fish egg, fish scales and small fishes (*Rasbora)*. Plants were represented by segments of *Hydrilla, Azolla, Spirogyra, Zygnema, Volvox and Diatom.* Unidentified materials include semi-digested food material, sand particles, mud, and food items which cannot be identified.

On the basis of character of food consumed, Das and Moitra (1956, 1963) applied an improved scheme for the classification of fishes from Uttar Pradesh. Accordingly, the categories are: (a) Herbivorous – 75% of food comprise of plants (b) Omnivorous – plant and animal foods are approximately 50% - 50%, neither is less than 10% - 15% (c) Carnivorous - animal foods constitute of about 75%. Later two more categories were added: (a) Herbi-omnivorous – greater amount of plant foods (b) Carni - omnivorous – greater amount of animal foods. Based on the above categorization, it appears that *Heteropneustes fossilis* belong to the carnivorous group.

The analysis of stomach content of *Heteropneustes fossilis* revealed that the fish belongs to carnivorous group and the main food items found in the gut of the fish were phytoplankton, molluscs, chironomid larvae and pupae and higher plants (Al-Haitham, 2008). The feeding intensity of a fish is

related to its stage of maturity, reproductive state and the availability of food items in its environment (Maddock and Burton, 1999; Sivakami, 1996; Kiran and Puttaiah, 2004).

Ranjan et al., (2009) reported both herbivorous and carnivorous foods in the gut of *Heteropneustes fossilis* in 2005 and 2006 and the results were almost similar. The percentage of herbivorous, carnivorous and miscellaneous food was 9.7%, 88.2%, and 2.1% respectively in 2005. The percentage of herbivorous, carnivorous and miscellaneous food included 9.4%, 89.8% and 1.0% respectively in 2006

Feeding habit of *Heteropneustes fossilis* were found to be carnivorous with main preference of crustacean (60%) followed by animal matter (30%) and lowest preference worms (10%) (Narejo *et al.,* 2016).

CONCLUSION

This study revealed the importance of crustaceans, molluscs, zooplanktons, fishes, insects, annelids and plant materials as food for *Heteropneustes fossilis* in river Purna. It further showed that crustaceans and molluscs form important items in the diet of *Heteropneustes fossilis.* From this study it is concluded that the fish *Heteropneustes fossilis* mainly feeds on animal material, that is, it belongs to carnivorous group and also a wide variety of food item is also found in the stomach, which was in semi-digested form and cannot be identified by quantitative method.

Index of Pre-ponderance of various food compositions in the gut of *Heteropneustes fossilis* that Crustaceans were the most dominant food item in the gut, followed by molluscs, zooplanktons, fishes, unidentified materials, plant matter, insects and annelids respectively. The gut content analysis of *Heteropneustes fossilis* revealed a distinct variation in food intake of the species. The results indicated that the species fall in the carnivorous category. Further research is required on commercial food preference and feeding strategies for conservation and successful culture of this species.

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