# GUT CONTENT ANALYSIS OF FRESHWATER FISH *CHANNA PUNCTATUS* ( BLOCH , 1973) FROM WARDHA RIVER, AMRAVATI, MAHARASHTRA, INDIA

**K. R. Behade and V.T. Tantarpale**
*P.G. Department of Zoology, Vidya Bharti Mahavidyalaya, Amravati*
*kalyanibehade@gmail.com*

**Abstract**
*Food is a remarkable factor for fishes in various processes, including reproduction, growth, migration, and survival. The study of food and feeding is an important aspect of aquaculture and fishery biology. The Channa punctatus were collected from the Wardha River during the months of September 2022 to August 2023. The gut contents were extracted and examined for data analysis. In the present study it was found that gut content of fish consist of fish, Molluscs, insects, unidentified material, and plant materials.*

***Keywords***: *Food and feeding, Channa punctatus, Wardha river, Gut*

## Introduction

The study of the dietary habitat, of fish based on stomach content analysis is widely used in fish ecology as an important means of investigating tropic relationships in aquatic communities (Fagbenro *et al.,* 2000). The evaluation of fish gut content by qualitative and quantitative methods helps us to comprehend its ecological system (Nansimole *et al.,* 2014; Mishra, 2020 ). Fish can consume anything that is available to them, and they have flexible feeding habits. The species enormity varies with the availability of food, season, and spawning season (Krishna *et al.,* 2016). Fish have diverse eating habits, including herbivorous, carnivorous, omnivorous, plankton-feeding, and detritus-feeding. In order to study food and feeding habits, one must evaluate the gut content to gather information (Hyslop, 1980). Evaluation of patterns is helpful in the fields of ichthyology, fish ecology, and fisheries resource management (Kido, 1996). The evaluation of food and feeding resources is essential for the reinforcement of developing conservation strategies (Chipps and Garvey, 2007).

The *Channa punctatatus* (Bloch,1973) is highly regarded for its flavour, high nutritional content, and therapeutic properties (Haniffa *et al.,* 2004). The *Channa punctatus* (Bloch, 1973), also known as the spotted snakehead, it is a warm-water teleost that may be found in lakes, ponds, rivers, and limited waterbodies across Southeast Asia (Jayaram, 1999; Nguyen *et al.,* 2008). The *Channa punctatus*, an obligate air-breathing fish, is classified as low-risk or near-threatened by the IUCN. It is suggested as a convalescence diet (Chakraborty, 2006; Tantarpale and Hussain 2019; Mahesh *et al.,* 2018; Verma *et al.,*2020)

The Amravati 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 km2. Amravati district is covered by three major rivers namely Tapi, Purna and Wardha. The Wardha River, also known as the Varada River, it is a major river in Vidarbha , Maharashtra.

The present study was aimed to study the feeding behaviour of *Channa punctatus* through gut content analysis from Wardha River, Amravati , Maharashtra , India.

## Material and Method

A total of 50 fishes of *C. punctatus* were collected from the Wardha River, Near Morshi, in Amravati District, Maharashtra, India. The fresh water *Channa punctatus* was collected from the Wardha River using a cast net from September 2022 to August 2023. The fish were properly cleaned in the laboratory, and total length, and weight were recorded. The guts were removed, and it was preserved in 5% formaldehyde for further analysis.

The relative importance of all food materials were quantified by index preponderance and calculated with the percentage composition (volume and occurrence) of food contents by following the equation of (Natrajan and Jhingran ,1963; Hynes, 1950)

$$\text{Percentage by volume (\%Vi)} = \frac{Volume\ of\ individual\ \ food\ item\ (Vi)}{Total\ Volume\ of\ Gut\ Contents\ (Vt)} \times 100$$

$$\text{Percentage of occurrence (\% Oi)} = \frac{Number\ of\ stomoch\ containing\ prey\ (Ni)}{Total\ Number\ of\ stomoch\ examined\ (Nt)} \times 100$$

$$\text{Index of Preponderance (I)} = \frac{Vi \times Oi}{\sum Vi \times Oi} \times 100$$

**Results and Discussion**

The analysis of food and feeding, along with the grading of various food items, percentage composition (by volume and occurrence), and preponderance of gut contents of *Channa punctatus* are given in Table 1. The gut content evaluation of 50 fishes, revealed that the food material found in gut is zooplankton, insect, plant matter, fish, molluscs, crustaceans, annelids, and unidentified matter.

Table 1 : Gut content and Grading of *Channa punctatus* of Wardha River

| Food items in gut of *Channa Punctatus* | Percentage of Occurrence(Oi) | Percentage of Volume (Vi) | Vi Oi | $\frac{Vi \times Oi}{\sum Vi \times Oi}$ 100 | Grading |
|---|---|---|---|---|---|
| Zooplankton | 13.83 | 9.63 | 133.18 | 9.62 | V |
| Insects | 10.8 | 11.33 | 122.36 | 8.84 | VII |
| Crustaceans | 14.8 | 15.17 | 224.51 | 16.18 | III |
| Annelids | 3.95 | 3.47 | 13.70 | 0.99 | VIII |
| Molluscs | 15.41 | 17.9 | 275.83 | 19.87 | II |
| Fishes | 17.7 | 19.1 | 338.07 | 24.42 | I |
| Plant Matter | 12.25 | 10.3 | 126.17 | 9.11 | VI |
| Unidentified Material | 11.46 | 13.1 | 150.12 | 10.84 | IV |
| Total ∑ | 100 | 100 | 1383.97 | 100 | |

Fig 1: Percentage of Frequency occurrence of different food items in Channa Punctatus

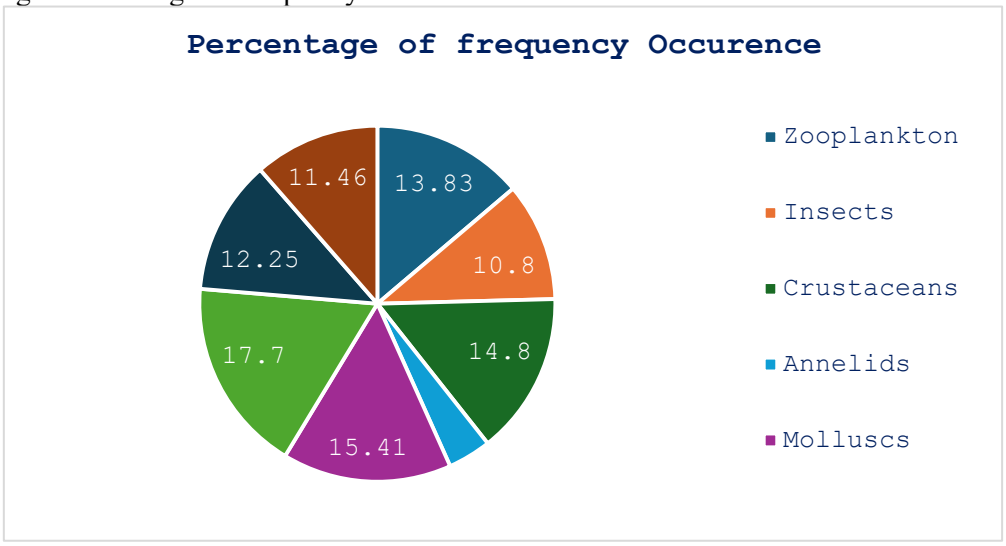



Fig 2: Percentage of volume of different food items in *Channa Punctatus*

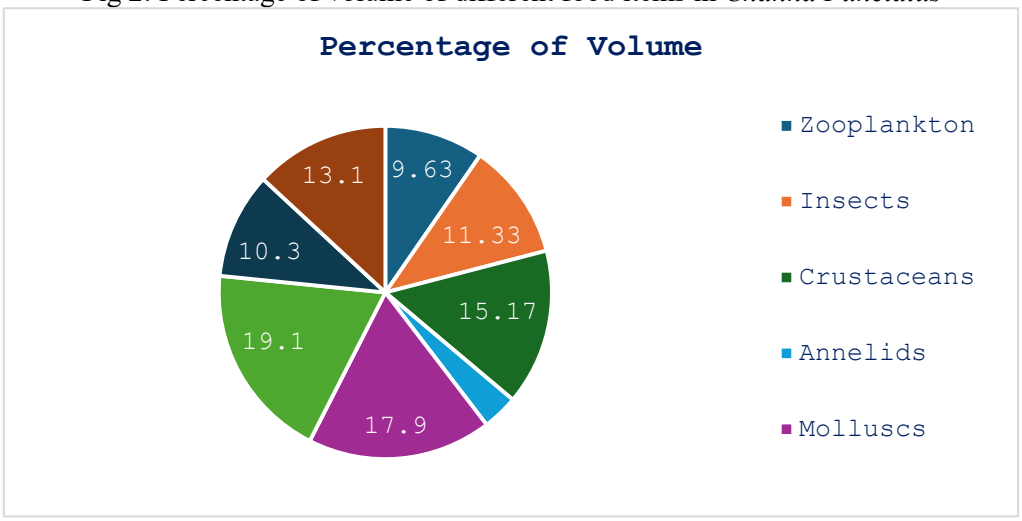
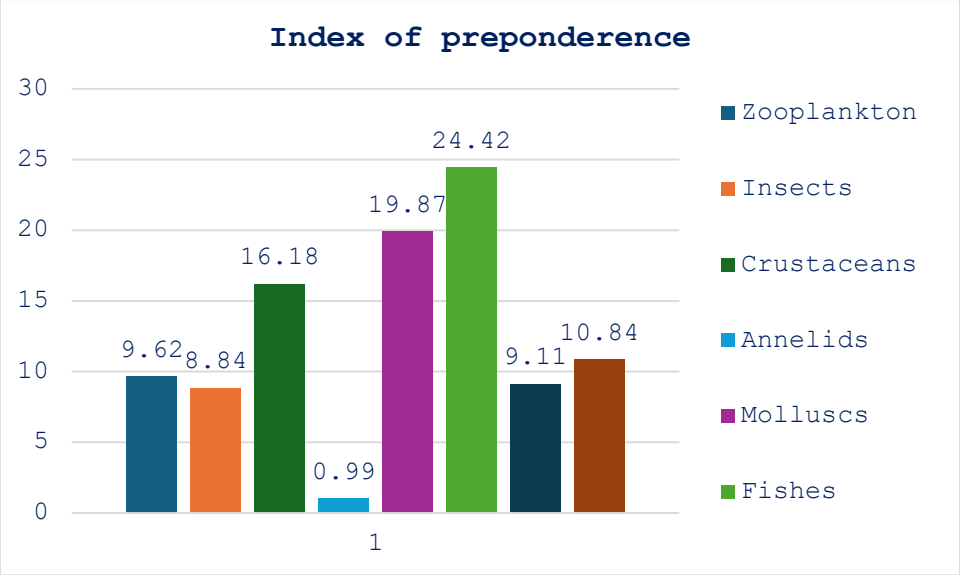


Fig 3 : Index of preponderance of different food items in *Channa Punctatus*




On the basis of gut content analysis it was observed that fish *C. punctatus* were feeding mainly on animal materials and also on plant materials. The gut content analysis of *C. punctatus* revealed that fish formed the main item of gut content, forming 19.1% by volume and 17.7% by occurrence in the gut content of *Channa punctatus.* Molluscs form the next important food item, forming 17.9% by volume and 15.41% by occurrence. The crustaceans were found to be another important food item 15.17% by volume and 14.8% by occurrence. The unidentified materials formed a part of the gut, constituting 13.1% by volume and 11.46% by occurrence. Plant matter were another important food item in the gut, forming 10.3% by volume and 12.25% by occurrence. Zooplankton formed 9.63% by volume and 13.83% by occurrence; insects formed a part of the gut by 11.33% by volume and 10.8% by occurrence. Annelids constituted only 3.47% by volume and 3.95% by occurrence ( Fig1 and Fig2).

From the present study, gut content analysis of *C. punctatus* showed that the basic food of this fishes from the Wardha River is , fish (24.42%), molluscs (19.87%), crustaceans (16.18%), unidentified plant material (10.84%), plant matter (9.11%), followed by zooplankton (9.62%), insects (8.84%) and annelids (0.99%) (Fig3).

The first group that is Zooplanktons comprised of Daphnia, Cyclops, Alona , cypris , Monostyla , Mytilina and Unidentified parts of Zooplankton. Second Group , Insects comprised of Nymph of Dragonfly, Mayfly and half-digested insect parts, water bug, Mosquito larvae, insects pupae, Cybister , Chironomus larvae, and small parts of wings etc. Crustaceans were third group represented by shrimps, crabs, small prawn parts, small fragment of carapace etc. Annelids were represented by Limnodrillus, Tubifex, small body parts of Pheretima. Molluscs recorded were Pila (Larvae), Unio ( Larvae), Lamellilidens and Lymnaea, It also compromises small parts of molluscan shell and mantle, Bivalve. Fish matters were recorded fish egg, fish scales , small fishes, fish fragment , fish larvae and hatchlings and small parts of fishes like scales, fins operculum etc. Plants were represented by Hydrilla, Azolla, Spirogyra, Nymphoides, Utricularia , Wolffia, dry stems, leaves etc. Unidentified food material includes as semi digested food material, sand particles, mud and food items which cannot be identified.

Thus, the present study revealed that *Channa punctatus* is a carnivore in feeding habit, and gut content analysis showed mostly body parts of small fishes, molluscs, crustaceans, unidentified matter, followed by plant matter, zooplankton, insects, and annelids. Saikia *et al*., (2012) have reported that *Channa punctatus* falls into the carnivore category.

The gut content of *C. puncatus* showed mostly small fish, insects, and larvae, and it is reported to be carnivore in nature by Sakhare and Chalak (2014) in *Clarias batrachus* Shrivastava *et al.,* (2014); Mangi and Memon (2017*).*

Similarly, the pre-ponderance value showed that fishes were the preferred food items of *C. punctatus*, followed by insects, crustaceans, plant matter, and unidentified matter. Similar worked by Desai (1970) ; Reddy and Rao (1993); Hatikakoty and Biswas(2003); Raj *et al.,* (2004); Sakhare(2010); Kumar *et al.,(*2015); Prakash (2016).

**Conclusion**

The result indicated that *C. punctatus* species fall under the carnivorous category. It mainly feeds on small fish, molluscs, crustaceans, annelids, phytoplankton, and zooplankton. Index ponderance of different dietary components in *C. punctatus* gut indicated that fish was the most dominant food item in the gut, followed by molluscs, crustaceans, unidentified food material, zooplankton, plant matter, insects, and annelids, respectively. The study of *C. punctatus* gut content material showed significant variation in dietary preferences. The Further research is required for food preference, feeding strategies for conservation, and the successful culture of species.

**References**


1. Chakraborty N. M. (2006) : Murrels and Murrel Culture. Narendra Publishing House, Delhi
2. Chipps S. and J. Garvey(2007) : Assessment of Diets and Feeding Patterns.
3. Desai, V. R. (1970) : Studies on the fishery and biology of Tor tor (Hamilton) from river Narmada. I. Food and feeding Habits. J. Inland Fish. Soc. India, 2 : 101-112.
4. Fagbenro O., Adedire, C. O., Ayotunde, E. O., and E. O. Faminu. (2000): Haematological profile, food composition and digestive enzyme assay in the gut of the African bony-tongue fish*, Heterotis (Clupisudis) niloticus* (Cuvier 1829)(*Osteoglossidae*). *Tropical Zoology*, *13*(1), 1-9.
5. Haniffa, Mohammed & Marimuthu, Kasi & Nagarajan, Muniyandi & Arokiaraj, A. and D. Kumar (2004) : Breeding behaviour and parental care of the induced bred spotted murrel Channa punctatus under captivity. Current Science. 86. 1375-1376.
6. Hatikakoty G. and S.P. Biswas (2003): Food and feeding habits of *Oreochromis mossambicus* (Peters) from a sub-tropical environment. J Inland Fish Soc India. 2003; 35(2):57-61.
7. Hynes H.B.N., (1950) : The Food of Freshwater Sticklebacks (*Gasterosteus aculeatus* and *Pygosteus pungitius*) with a Review of Methods Used in Studies of the Food of Fishes. Journal of Animal Ecology, 19, 36-58. https://doi.org/10.2307/1570
8. Hyslop E. J. (1980): Stomach contents analysis: a review of methods and their application. J. Fish. Biol, 17: 411-429.
9. IUCN (2014) : The IUCN Red List of Threatened Species. Version 2014.1. Downloaded on 21 July 2014.
10. Jayaram, K. C. (1999): The Freshwater Fishes of the Indian Region, 1st edn. Narendra Publishing House, Delhi. 446 p.
11. Kido, M. H. (1996). Morphological variation in feeding traits of native Hawaiian stream fishes. Pac. Sci., 50 (2): 184- 193.
12. Krishna P.V., Panchakshari V. and K. Prabhavathi. (2016): Feeding Habits and Stomach Contents of Asian seabass Lates calcarifer from Nizampatnam Coast, Andhra Pradesh, India. *Int. J. of Adv. Res.* 4 (Apr). 168-172] (ISSN 2320-5407). www.journalijar.com
13. Mangi, A. and Z. Memon (2017): Analysis of gut contents of Common carp *(Cyprinus carpio)* in district Larkana, Sindh Pakistan. Journal of Entomology and Zoology Studies .5(6): 2631-2634.
14. Mishra, S. P.(2020): Analysis of the Gut contents of Indian major carp Rohu*(Labeo rohita)* from Meeranpur lake of district Sultanpur, Uttar Pradesh, India. Volume 5. 217-221. 10.5281/zenodo.4015976.
15. Nansimole, A., Sruthi, S., Devi, T., Lekshmi, S., Balasubramaniam, N., and T.Radhakrishnan, (2014): Studies on morphometry, feeding biology and sex ratio of *Saurida undosquamis* (Richardson, 1848) (Fam: Synodontidae) from Neendakara area, Kollam, South West coast of India. Indian Journal of Scientific Research, 5(2), 51-58.
16. Natarajan, A.V. and. V. G. Jhingran (1963) : On the biology of *Catla catla* (Ham.) from the River Yamuna. Indian J. Fish. 8(1):54-59.
17. Nguyen, V.C., Nguyen, P.T. and B. Mark, (2008) : Effects of sublethal concentrations of diazinon on surfacing and hanging behaviors of snakehead *Channa striata.* F isheries Science 74, 1330– 1332.
18. Raj A.J. A, Seetharaman, Haniffa M.A ., and S. P. Singh (2004) : Food and feeding habits of a threatened featherback Notopterus notopterus. Journal of Aquatic Biology 19(1): 115-118.
19. Reddy Y. S. and M. B. Rao 1993) : Food and Feeding Habits of *Channa punctatus* (Bloch) from Hussainsagar Lake Hyderabad. Proc. Second Indian Fish. Forum, Mangalore. 1993; 27:109-111.
20. Saikia A.K., Abujam, S.K.S. and S.P. Biswas(2012): Food and feeding habit of Channa punctatus (Bloch) from the Paddy field of Sivasagar District, Assam. Bulletin of Environment, Pharmacology and Life Sciences, 1(5): 10-15.
21. Sakhare V.B. (2010): Food and Feeding habit of common carp, Cyprinus carpio (Linn). Fishing Chimes 30(1): 180-182.

22. Sakhare V. B., and A.D.Chalak.(2014): "Food and feeding habits of Clarias batrachus (Linnaeus, 1758) from Ambajogai, Maharashtra, India." *Journal of Fisheries* 2, 148-150.
23. Srivastava, S. C., Verma, P., Yadav. K.C. and M. Tripathi (2014) :Feeding ecology of carp fishes and cat fishes captured from Gomati River stretch at Lucknow, Uttar Pradesh, India. International Journal of Fauna and Biological Studies.1 (5): 65-68.
24. Tantarpale V. T. and A. M. Hussain (2019) : Food and feeding behaviour of Heteropneustes fossilis by gut content analysis from Purna River, Amravati (M.S.) , Review of Research, 2249-894X, Vol 8
25. V . Mahesh & Nair R. and G. Ambarish. (2019): Stomach Content Analysis Techniques in Fishes.
26. Verma D.R. , Tarbez A., Haider A. and V. Kumar ( 2020): Studies on the stomach content analysis and Feeding Ecology of Fishes of Rapti River at Balrampur District U.P.India , JETIR November 2020, Volume 7, Issue 11