



# FOOD AND FEEDING HABITS OF THE HILL STREAM FISH *Garra gotyla gotyla* (GRAY) OF SONG RIVER, DOON VALLEY (DEHRADUN), UTTARAKHAND

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## ABSTRACT

Knowledge of food and feeding habits of a particular fish species is highly essential for its successful culture management. The present paper deals with the studies on the food and feeding habits of *Garra gotyla gotyla*. The gut contents were examined from juvenile to the adult stages. Their fry and fingerlings feed mostly on plankton of which the Zooplankton forms a higher percentage of food. This is a herbivorous and detritivore fish. The food recorded includes algae, belonging to chlorophyceae (*Volvox* sp., *Oedogonium* sp., *Spirogyra* sp., *Ulothrix* sp. and *Chlorella* sp.) and Myxophyceae.

**Keywords :** Food, feeding habits, *Garra gotyla gotyla*, Song river.

## INTRODUCTION

Food is an essential component of an organism as its growth, reproduction, development and physiological activities are dependent on the energy generated by consumed food material. Feeding is an important physiological activity of fishes like other organisms. The study of food and feeding habit of fishes is an area of continuous research as it forms the basis for the development of a successful management programme as capture and culture fisheries (Sodhi *et al.*, 2022). Thingran (1983) stated that the natural foods of fishes are classified under three groups (i) main food, (ii) occasional food, (iii) emergency food. According to Parihar (2016) the importance of studying food and feeding habit of fish can help in devising a suitable programme for the development of fisheries. According to Adewumi and Amoo (2014) study on food and feeding habits of fish can provide valuable data for formulation of artificial feed for the species during culture and for proper management of the fish. Unrevealing food and feeding habits of fishes is the centre of research in aquatic biology, ecology, conservation biology and fisheries (Sodhi *et al.*, 2022). Considerable attention has been paid by many workers to study food and feeding habits of fishes inhabiting in different ecosystem.

Food and feeding habits of fish is an important aspect for culture in ponds which is taken into consideration during composite farming to avoid competition for food among fishes (Rauthan and Chalotra, 2013). It is virtually impossible to gather sufficient information of food and feeding habits of fish in their natural habitat without studies its gut contents. Food plays an important role in the growth, migration and spawning behaviour of the fish.

As the nature of food depends to a great extent upon the nature of environment, the problem is interesting from specific as well as ecological point of view (Kanswal and Pathani, 2012). The study of the food and feeding habits of freshwater fish species is a subject of continuous research because it constitutes a base from the development of a successful fisheries management program on fish. The food and feeding habits of freshwater fishes have been studied by number of workers including Agarwal and Singh (1963), Das and Moitra (1965), Dewan and Saha (1979), Badola and Singh (1980), Bhuiyan and Haque (1984), Horsani et al. (1991), Badola and Khanna (1991), Buiyan *et al.*, (1998), Jodder and Horsani (2008), Manon and Hossan (2011), Kanswal and Pathani (2012), Gupta and Banerjee (2013), Dobriyal (2013), Rauthan and Chalotra (2013), Gaur *et al.*, (2013), Sabba *et al.*, (2017), Deshmukh and Shillewar (2018), Majumdar *et al.*, (2018), Sodhi *et al.*, (2022). The present paper deals with food and feeding habits of *Garra gotyla gotyla* found in Doon valley.

## MATERIALS AND METHODS

Monthly samples of *Garra gotyla gotyla* have been collected from January 2020 to December 2020 from Song river near Maldevta. The total 102 specimens have been collected from January 2020 to December 2020 from Song river in Dehradun. The total 100 specimens have been collected during entire study period. After collection from the fish were transferred to ice box and morphometric study was performed immediately after reaching laboratory. Total Length (TL) in cm has been measured for each of the individual fish from tip of the mouth to tip of the caudal fin using a measuring scale to the nearest of 0.1 cm and total body weight was measured in grams after that fish and total weight of gut total length of gut measure to the nearest of 0.01 gram respectively. Gastro somatic analysis have been made to study the food and feeding habit of *Garra gotyla gotyla*. Gastro Somatic Index (GSI) have been measured using the following equation:

$$GSI = \frac{\text{Total weight of gut (gm)} \times 100}{\text{Total body weight (gm)}}$$

Relative length of gut value has been measured following the formula:

$$RLG = \frac{\text{Total weight of gut (gm)} \times 100}{\text{Total body weight (gm)}}$$

After that, gut fullness has been assessed accordingly to the subjective scale described by Lebedev (1946) as empty ¼ full; ½ full; ¾ full and 100% full.

The data have been used to calculate the monthly Fullness Index (FI) to determine the percentage of feeding intensity.

$$= \frac{\text{Number of gut with same degree fullness} \times 100}{\text{Total number of gut examined}}$$

## RESULTS AND DISCUSSION

The food types observed during the gut content analysis of *Garra gotyla gotyla* have been divided into six classes namely, Cyanophyceae, Chlorophyceae, Planktonic crustacea, Rotifers, plant parts and unidentified species. Results of monthly analysis of gut content present in Table 1. Cyanophyceae has been recorded with average of 11.17%. Anabaena and microcystis have been noticed as the dominant genus. The high percentage of cyanophyceae (16.68%) has been recorded during the month of December and the lowest percentage (8.20%) in July. Euglenophyceae has been recorded with an average value of 9.20 according to the percentage of occurrence method. The highest percentage of Euglenophyceae has been found during (12.21%) in November and lowest percentage (4.42%) in August. Bacillariophyceae has been noted with an average 22.84%. The highest percentage (33.66%) has been recorded during February and lowest percentage in July (17.02%). Chlorophyceae has been observed with an average of 36.08% according to the percentage of occurrence method. Chlorophyceae has been found as the most abundant group and has been recorded on regular bases in the gut contents throughout the study period. *Spirogyra*, *Coelastrum*, *Pediastrum*, *Tetredron* have been noticed as the dominant genus among them. The highest percentage of Chlorophyceae has been recorded with an average 36.8%. The highest percentage has been noticed in July (54.59%) and lowest percentage in November (19.12%). Planktonic crustacean has been noticed

with an average of 2.87%. *Daphnia*, *Mesocyclops* and *Diaphanosoma* have been recorded as the most dominant genus away them. The highest percentage of planktonic crustacean has been observed during in July (5.41%) and lowest percentage in March (2.11%) in March. Rotifer has been noted with an average of 8.45% according to the percentage of occurrence method. The highest percentage of Rotifer has recorded in June (8.82%) and lowest percentage in December (6.00%). Plant parts have observed with an average of 0.81%. The highest percentage of this group has been observed during in July (1.82%) and lowest percentage in January (0.33%). Unidentified species has been recorded with an average of 1.33%. The highest percentage of this group has been noticed in May (2.00%) and lowest in January (0.62%).

The study of food and feeding habits of fishes has a special significance in ecological studies. Nikolsky (1963) has divided food of fishes into four categories according to the relationship between the fishes and their food. These categories are (i) basic food which comprises the main part of the gut contents, (ii) secondary food which is also frequently found in the gut contents, but in small amounts, (iii) incidental food which is really found in the gut contents, and (iv) obligatory food which the first consumes when the basic food is not available. The food items of *Garra gotyla gotyla* were classified into six groups. *Garra gotyla gotyla* is mostly omnivorous in nature. Among the food items phytoplankton and zooplankton were most dominant, followed by the aquatic plant parts, phytoplankton, zooplankton and insects. In this case the nature of this fish is omnivorous because it also feeds on zooplankton. It was noticed that the feeding intensity of *Garra gotyla gotyla* in matured fish was poor and the feeding intensity was very poor in spawning period. The feeding intensity of immature fishes was found to feed actively.

The food and feeding habits of fishes vary from month to month. This variation is due to the changes in the composition of food organisms occurring at different season of the year.

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## REFERENCES

- Adewumi, A.A.** and Amoo, O. (2014). Comparative food and feeding adaptation of two teleosts in Ado-Ekiti Reservoir. *Int. J. Innov. Res. Devel.*, 2(3) ; 401-402.
- Agarwal, V.P.** and Singh, T.R. (1969). Food and feeding habits and alimentary canal of freshwater fishes of Muzaffarnagar. *Agra Univ. J. Res.*, 18(1) : 15-28.
- Badola, S.P.** and Khanna, D.R. (1991). Food and feeding habits of some hillstream fishes of Garhwal Himalaya. *Him. J. Env. Zool.*, 5 ; 141-143.
- Badola, S.P.** and Singh, H.R. (1980). Food and feeding habits of fishes of genera of *Tor puntius* and *Barilius*. *Proc. Indian Natn. Sci. Acad.* B46(1) : 58-62.
- Bhuiyan, A.S.** and Islan (1991). Observation on the food and feeding habits of *Ompok pabda* (Ham.) from river Padma (Silurid : Cypriniforms). *Pakistan J. Zool.*, 23(1) : 75-77.
- Das, S.M.** and Moitra, S. (1965). Studies on food of twenty four species of U.P. *Ichthyologia*, 4(a) : 1107-1116.
- Deshmukh, M.M.** and Shillewar, K.S. (2018). Food and feeding habits of *Puntius sarana* (Hamilton) from Godavari river, Nanded Maharashtra. *Int. J. Life. Sci. Res.*, 6(3) : 328-330.
- Dobriyal, A.K.** (2013). Conservation Biology of cobitid fish *Lepidocephalus guntea* (Hamilton - Buchanan) : Food and feeding habits. *J. Env. Bio. Sci.*, 27(2) : 223-227.
- Gupta, S.** and Banerjee, S. (2013). Food and feeding habits of *Amphypharyngodon mola* (Hamilton - Buchanan) in West Bengal, India. *Fisheries*, 2(5) : 67-70.
- Jhingran, V.G.** (1983). Fish and Fisheries of India. Hindustan Pub. Corp.

**Kanswal, B.P.S.** and Pathani, S.S. (2012). Food and feeding habits of a hillstream fish *Garra lamta* (Hamilton - Buchanan) in some tributaries of Suyal river, Kumaun, Himalaya, Uttarakhand (India). *Int. J. Food. Nutri Sci.*, 1(2) : 16-22.

**Majumder, S.** Majumdar, N., Ghosh Pinkey, Saikia, S.K. and Saha, S.K. (2018). Rohu, *Labeo rohita* (Hamilton 1822) changes feeding strategy throughout its ontogeny : An explanation feeding ecology. *Int. J. Sci. Res. Biol. Sci.*, 5(4) : 92-96.

**Menon, M.R.** and Hossain, M.D. (2011). Food and feeding habit of *Cyprinus carpio* var. *specularis*. *J. Sci. Foundation*, 9(1,2) : 163-181.

**Parihar, D.**, Chaturvedi, J., Saksena, D.N. and Rao, R.J. (2016). Food and feeding habits of freshwater teleost ; *Ompok bimaculatus*, *Xenentodon cancila*, *Puntius sarana* and *Labeo boggut* from Tighra reservoir, Gwalior (M.P.). *Int. J. Sci. Res. Growth*, 1(1) : 1-8.

**Rauthan, J.V.S.** and Chalotra Shepali (2013). Food and feeding habits of the fresh water fish *Labeo rohita* (Ham.). *J. Mount. Res.*, 8 : 23-28.

**Sabha, K.K.**, Nagar, A.M., Bhat, F.A., Shah, T.H. and Balkhi, M.H. (2017). Food and feeding habits of snow trout, *Schizothorax niger* inhabiting Nigeen lake, Kashmir. *J. Exp. Zool. India*, 1(20) : 635-637.

**Sodhi, A.S.**, Mir, A.H., Ahmad, S. and Gull Romisa (2022). Food and feeding habits of fishes inhabiting different water bodies of Kashmir - A review. *The Pharma Innov. Jour.* 11(2) ; 328-332.

**Table 1 : Monthly variation of composition of different items following percentage of occurrence methods in the gut contents of *Garra gotyla gotyla*.**

Months (' 2020)	Cyano-phyceae	Eugleno-phyceae	Bacillariophyceae	Chlorophyceae	Planktonic crustecea	Rotifera	Plant parts	Unidentified species
Jan.	10.40	10.11	25.60	33.10	2.26	0.20	0.31	0.52
Feb.	11.20	9.26	31.10	36.25	2.00	4.13	0.40	0.77
Mar.	12.20	8.62	20.16	40.20	2.09	5.40	0.60	1.10
Apr.	10.62	11.80	24.16	44.16	2.60	4.36	0.71	1.10
May	10.21	9.42	25.34	44.0	2.34	4.32	0.88	2.12
June	9.94	8.20	19.61	45.16	2.61	7.62	1.20	1.62
July	9.00	7.25	18.00	51.20	4.42	7.00	1.72	1.34
Aug.	11.22	6.16	24.20	43.40	4.36	6.26	1.31	1.62
Sep.	13.25	5.25	20.19	31.26	3.21	5.31	0.41	1.51
Oct.	11.20	6.00	22.10	26.00	3.00	6.00	0.72	0.64
Nov.	10.23	8.88	21.62	18.29	2.65	6.20	0.54	0.91
Dec.	14.66	12.88	22.00	20.10	3.00	6.00	0.47	1.22
Yearly average (%) occurrence	11.17	9.20	22.84	36.08	2.87	8.45	0.81	1.33