Biospectra : ISSN: 0973-7057, Vol. 18(1), March, 2023, pp. 39-42

An International Biannual Refereed Journal of Life Sciences

Animal Science

ISSN : 0973-7057

Catla modifies its feeding behaviour as it develops: an approach from feeding ecology

Suruchi Chandra, Arun Kumar* & Kumar Ramashanker

University Department of Zoology, B. N. Mandal University, Madhepura, Bihar, India

Received : 20th November, 2022 ; Revised : 22nd December, 2022

Abstract- A common major carp species in carp polyculture is *Labeo catla*, which is native to India. It is recognised as a plankton-eating water surface and midwater feeder. Adult feeds on zooplankton using large gill rakers, but its juvenile feeds on both zooplankton and phytoplankton. It prefers zooplankton in its natural environment at the fingerling stage, with phytoplankton serving as a supplemental diet. At this stage, all zooplanktonic species and smaller phytoplankton showed a strong positive selection. All zooplanktonic organisms exhibit severe negative selection in adults, but most phytoplanktonic organisms exhibit positive selection. Yet, in periphytic environments, it consumes nearby sub-periphytic species that are present. It is well acknowledged that *L. catla* demonstrates a variety of eating strategies as it matures from a fingerling to an adult and transitions from a planktonic to periphytic environment. The conversion of naturally occurring resources to fish biomass would be maximised by adopting a fish culture strategy in accordance with its differential feeding strategy, particularly in polyculture practices.

Key words: *L. catla,* Socioeconomic status, demography, fishermen community, strategies, upliftment.

INTRODUCTION

An important part of fish culture research is figuring out how aquatic resources are used. The eating and feeding behaviours of fish provide crucial information in choosing which species to produce in poly-species fish culture, which considers resource use as a key criterion. One of the most significant Indian Mazor Carps (IMC) in carp polyculture is *Labeo catla* (catla). Across South Asia, South-East Asia, Sri Lanka, Japan, China, the Philippines, Malaysia, Nepal, and some African nations, this IndoGangetic riverine species is found. Little data from the early 20th century is available regarding its culture. It was introduced into practically all riverine systems in India and currently plays a key role in pond fish polyculture.

*Corresponding author :
Phone : 9006991000
E-mail : prf.arunkumar@gmail.com

It was a prime option for carp polyculture due to its resource tolerance with other freshwater carps, particularly rohu (*Labeo rohita*) and mrigal (*Cirrhinus mrigala*).[1] Catla is one of the most well-known and delectable freshwater fish rose in India, Bangladesh, and other nearby nations in the region because to its great growth potential, compatibility, and consumer choice. It provides as a significant dietary source of n-3 PUFAs and protein. The species that supplies the most protein overall is catla. It serves as a source of calcium and vitamin A in small amounts.[2,3]

Unfortunately, there is no conclusive research on the diet and eating habits of catla in relation to natural resources. According to the earlier accounts that are now available, its primary food is plankton i.e. both zooplankton and phytoplankton. A few studies that looked at its growth and behaviour identified it as a periphyton feeder. According to research on the diet and feeding habits of *L.catla* in polycultures with *L.rohita* and *C. mrigala*, it feeds on zooplankton as an adult and phytoplankton as a fingerling.

From the point of feed selectivity by catla, the ontogenic shift is fairly noticeable. For zooplankton such crustaceans (*Cyclops, Daphnia*), rotifers (*Keratella*), and other smaller phytoplankton like phytoflagellates (*Euglena, Volvox*), desmids (*Cosmarium, Closterium*), and fingerlings of catla exhibit substantial positive selection. Reversibly, adults were found to have significant phytoplanktonic negative selection and most zooplanktonic positive selection. Most of the Chlorophyceae, such as *Pediastrum, Selenastrum, Ankistrodesmus, Scenedesmus, Zygnema, Ulothrix,* and *Tetraspora,* were preferred over giant filamentous algae like *Oedogonium. Selenastrum, Pediastrum,* and *Scenedesmus* were the only tiny unicellular or colonial Chlorophyceae that were chosen above other species. Chlorophyceae was favoured to Bacillariophyceae. The favoured phytoflagellates during the fingerling stage were completely avoided. Compared to their abundances in the environment, zooplankton species such as protozoa, rotifers, and crustaceans only appeared in trace amounts in the gut contents.[4-6]

Periphytic organisms, which are creatures that are permanently attached to submerged surfaces in aquatic environments, quickly build up large amounts of biomass and make upto 80% of the aquatic primary production. In a natural and managed setting, it plays a crucial role in producing food for fish and other wildlife. Periphyton can provide fish with up to 75% of their metabolic energy when used as food in aquaculture, which helps to boost fish productivity. Periphyton is traditionally used as a rich source of readily accessible aquatic food for fish in nations including Bangladesh, Sri Lanka, India, and Cambodia.

MATERIALS & METHODS

Several research paper were consulted

RESULT & DISCUSSION

To comprehend and assess the level of synergizing production, a number of tests have been conducted in a periphyton-based polyculture setting using the species *Labeo catla, Labeo rohita, Cirrhinus mrigala, Oreochromis niloticus,* and *Labeo calbasu. L. catla* displayed the best growth and output in these experiments. Via periphyton-based aquaculture trials in ponds, it was attempted to assess its capacity to obtain periphytic food supplies. The biomass-based results of these investigations suggest that the fish intelligently searches naturally accessible resources in periphytic than planktonic environments, despite the fact that they did not attempt to study the feeding ecology of catla in periphyton-based tests.[7]

Despite the fact that these studies were conducted in periphytic environments, the feeding ecology of the fish species that were stocked has been disregarded. Only *Cyprinus carpio* has received more attention among the carp species as a viable option for periphyton-based aquaculture. Recently, it was shown that catla of all sizes consume a lot of algae in periphytic pond environments. The investigation focused on catla in both planktonic and periphytic habitats. They found that catla demonstrates enhanced feeding (with a wider Smith's diet breadth) in periphyton-based areas in their study, which was based on the gut content of fish from these settings. They also looked at resource selection, which revealed that catla investigates both periphyton and plankton in substrate-based areas at a later stage of growth. [8,9]

Since the fish's mouth shape does not support a grazing behaviour, they hypothesised that catla may not actually be feeding on periphyton, though it does so in a highly lucid manner. They went a step further and suggested that the fish cleverly makes use of a sub-periphytic zone that is close to the substrate and is rich in algae populations. Through the use of algal feed resources, catla can be directly enriched with micronutrients thanks to such improved feed accessibility in the natural environment. [10]

The studies that are currently accessible on the diet and feeding habits of catla in substrate-free or substrate-based habitats illustrate how catla allocates a kind of niche to various food kinds along with its ontogenetic development.

These food types includes:-

(1) extensive use of algal communities regardless of age class under periphytic conditions,
(2) selective phytoplanktonic communities at an early stage of growth,
(3) zooplanktonic communities at a later stage of growth, and
(4) phytoplanktonic communities at a later stage of growth.

The final choice may result from a synergistic interaction between resource availability and catla's active planktivorous habit. According to Ross (2003)[3], an animal's propensity to choose one food over another when eating is influenced by its innate characteristics. Alam (2011)[10] emphasised that although fish feeding behaviour plays a significant role in the selection mechanism, it is also influenced by the production of any food item by the environment and its availability.

In addition, despite the fact that the fish is thought to be a surface and midwater feeder, the presence of rotting organic debris, sand, and mud in its gut points to a partial preference for bottom feeding. The fish can feed on soft aquatic invertebrates without having to seize and crush them thanks to its nibbling mouth type, which has soft lips with soft fringes, sharp cutting edges, and no teeth in the bucco-pharyngeal area. The fish's modified thin, hair-like gill rakers further imply that it feeds on tiny planktonic creatures that filter food from the water. The primary reason why fry and fingerlings school in ponds is to eat, while adults do not display this behaviour.

CONCLUSION

It is evident that little research has been done on *L. catla's* diet and feeding ecology with regard to planktonic organisms in general and periphyton in particular, despite the species' immense potential in polyculture. A conclusive finding on the portion of its food and feeding ecology is required to ascertain the trophic position of catla and to support it as a possible candidate in converting the maximum amount of natural food resources to micronutrient rich nutritious fish biomass. Periphyton is unquestionably a solution in that situation, particularly for herbivorous fish species to adopt a "as and when need" type of feeding approach in polyculture ponds. In the Indian subcontinent, catla is one of the most widely cultivated freshwater fishes. In periphytic polyculture, it exhibits enhanced feeding and significant growth. When stocked with other column feeders, catla-based polyculture in periphytic environments must be standardised with appropriate data on its feed sharing, resource partitioning, and diet selection. Even though it grows satisfactorily when stocked in a polyculture pond with a periphytic environment, such growth results do not confirm its resource utilisation in the specified environment; as a result, more research is necessary before developing any efficient strategies for maximising periphytic resource utilisation. A report on this feeding behaviour in a periphytic polyculture environment would be more suitable for its polyculture. The feeding ecology that demonstrated its "increased feeding in periphytic environment" was examined in monoculture practise. Its ontogenic shift must be demonstrated under the presence of periphytic resources, regardless of whether it depends on size, monoculture, or polyculture combinations.

REFERENCES

1. **V. G. Jhingran. 1991.** Fish and Fisheries of India, 3rd edn, Hindustan Publishing Corporation, Delhi, India.
2. **S. Ahmed, A. F. M. A. Rahman, M. G. Mustafa, M.B. Hossain, N. Nahar. 2012.** Nutrient composition of indigenous and exotic fishes of rainfed waterlogged paddy fields in Lakshmipur, Bangladesh. *World Journal of Zoology*. **7(2):** 135-140.
3. **N. Roos, M. M. Islam, S. H. Thilsted. 2003.** Small Indigenous Fish Species in Aquaculture in Bangladesh: Contribution to Vitamin A, Calcium, and Iron Intakes. *Journal of Nutrition.* **133:** 4021S– 4026S.
4. **S. M. Das, S. K. Moitra. 1955.** Studies on the food of some common fishes of Uttar Pradesh, India. 1. Surface-feeders, mid-feeders and bottom feeders. *Proceedings of the National Academy of Sciences* (B), **25:** 1-6.
5. **S. Dewan, M. M. Ali, M. A. Islam. 1977.** Studies on the size and patterns of feeding of fries and fingerlings of three major carps viz. *Labeo rohita* (Ham.), *Catla catla* (Ham.) and *Cirrhinus mrigala* (Ham.)", *Bangladesh Journal of Agriculture.* **2:** 223-228.
6. **V. G. Jhingran & R. S. V. Pullin. 1985.** A hatchery manual for the common, Chinese and Indian major carp. 191p *Asian Development Bank, ICLARM Studies and Reviews*.
7. **S. Majumder, P. Ghosh, S.K. Saha, S.K. Saikia. 2016.** Study on food selection of *Labeo rohita* (Hamilton, 1822) by determining electivity index in periphyton based and periphyton free monoculture pond. *International Journal of Applied Research*. **2(3):** 4-7.

8. **M. M. Rahman, Y. M. Hossain, Q. Jo, S. K. Kim, J. Ohtomi, C. Meyer. 2008.** Ontogenetic shift in dietary preference and low dietary overlap in rohu (*Labeo rohita*) and common carp (*Cyprinus carpio*) in semi-intensive polyculture ponds, *Ichthyology Research.* **56:** 28-36.

9. **H. A. Khan & V. G. Jhingran 1975.** Synopsis of Biological Data on Rohu, *Cirrhinus mrigala* (Hamilton, 1822). *FAO Fisheries Synopsis* No. 111, pp. 100, FAO, Rome.

10. **M. Alam, S. Sharma, J. K. Pathak. 2011.** Food preferences of *Labeo rohita* (Hamilton) in river Ramganga, Uttar Pradesh, India, *International Journal of Fisheries and Aquaculture Sciences,* **1(2):** 99-105.

***