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LABEO ROHITA (ROHU) FEEDING STRATEGY IN ITS ONTOGENY

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ABSTRACT

Labeo rohita is a common Indian main carp species in the carp polyculture exercise. It is recognized as the water column feeder which feeds on the plankton. Rohu is basically an herbivorous column feeder in the childish and adult stages, choosing algae and the submerged vegetation. Under normal condition, in the fingerling stage, it desires zooplankton, with phytoplankton as the secondary food. At this phase it revealed a strong optimistic selection for all that zooplanktonic organisms and lesser phytoplankton. Adults display a strong adverse selection for all that zooplanktonic organisms and the optimistic choice for most phytoplanktonic creatures. Conversely, in the periphytic atmosphere, it consumes sub-periphytic organisms existing in the vicinity to substrate. In the conclusion, it is approved that L. rohita shows dissimilar feeding strategy throughout its growth from the fingerling to adult and as well from the planktonic to periphytic situation. Espousal of a fish culture plan rendering to its disparity feeding strategy would exploit in converting the naturally accessible resources to the fish biomass particularly in the polyculture methods.

KEYWORDS: *Indian Main Carp, Feed Choosiness, Polyculture, Periphyton and Phytoplankton*.

1. INTRODUCTION

Comprehending the use pattern of aquatic resources is a vital area of the study in the fish culture. Keeping in interpretation the resource utilization as important criteria, food and the feeding habits of fish deliver key data in selection of the species to promote in the poly-species fish culture. Labeo rohita (Rohu) is one of the best imperative Indian major carps (IMC) in the carp polyculture practice. This species is spread through the South Asia, Sri Lanka, South-East Asia, the former USSR, Philippines, Japan, China, Nepal, Malaysia and some nations of Africa. Statistics on its culture is accessible only from the primary part of the 20th century. In India, it was presented into virtually all riverine systems and now live in a central position in the polyculture of fish in the ponds. Its compatibility for source operation with the other freshwater carps, mostly mrigal (Cirrhinus mrigala) and catla (Catla catla) made it an idyllic candidate for the carp polyculture practice. High progress possible and compatibility united with high customer fondness, have well-known rohu as one of the most common and pleasant freshwater fish cultured in the India, Bangladesh, and further adjacent countries in the region. It assists as a vital nutritious source of protein and the n-3 PUFA fatty acids. Amongst all IMCs rohu provides the uppermost percentage of protein and also acts as the source of Vitamin-A and Calcium.

2. FOOD AND FEEDING ROUTINE OF ROHU

Though, no assenting study is existing on food and feeding routine of rohu on usual resources. From the older information so far obtainable, defines its basic food as the plankton, zooplankton or both the zoo and phytoplankton. Few lessons on development and behavior analysis decided it as periphyton feeder. Muhammad (2006) found difference size dependent diet configuration and divergent dietary fondness flanked by L. rohita and C. carpio in the semi intensive ponds. Study on the food selection and the feeding bond of L. rohita polycultured with the C. catla and also C. mrigala recommended it as zooplankton feeder in the fingerling and the phytoplankton feeder in the adult stage. Majumder (2016) inveterate it as phytoplankton feeder with improved feeding in the periphytic environment. Furthermost of these lessons solidly agree that under usual conditions, in its initial life stages, rohu partially favours zooplankton, composed mostly of rotifers and the cladocera, with phytoplankton creating the vital food.

In the fingerling period, it has strong optimistic assortment for the zooplanktonic organisms in addition to some smaller phytoplankton similar desmids, phytoflagellates and the algal spores. It exhibits its zoo planktivorous phase up to the 150 mm in full length. Nevertheless, this stage may be lengthy up to a whole length of 20.6 cm. Instead, adults display strong confident selection for phytoplankton. At this step, rohu is the herbivorous column feeder, usually choosing algae and the submerged micro-vegetation. In the adult rohu, Alam (2011) accounted 84.76% of its food from the plant origin with Chlorophyceae subsidizing the major part (45.8%) of the total food section. Additional, though the fish is supposed to be a column feeder, the existence of decomposed organic matter, sand and the mud in its gut recommend its part liking to bottom feeding habit. The chewing type of mouth thru lenient fringed lips, shrill cutting edges and nonappearance of teeth in this bucco-pharyngeal region benefit the fish to feed soft aquatic plants which do not need seizure and the crushing. The altered thin and the hair-like gill rakers also

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recommend that the fish feeds minute planktonic creatures sieving from the water. In dew pond, the fry and fingerlings display schooling behavior mostly for the feeding, though, this habit was not detected in adults.

3. OUTLINE OF FEED CHOOSINESS

Planktonic environment

Onto genic shift is actual protuberant from the point of feed choosiness by rohu. Fingerlings of rohu expression strong confident selection for zooplankton alike rotifers (Keratella), crustaceans (Cyclops), etc. in addition to some lesser phytoplankton alike phytoflagellates (Euglena, Volvox), desmids (Cosmarium) etc. Phytoplanktonic macro algae as of the Chlorophyceae, Bacillariophyceae and Cyanophyceae are entirely evaded at this stage. Reversibly, grownups were stated with strong undesirable selection for the zooplanktonic and confident selection for maximum phytoplanktonic organisms. On assessment of Ivlev's (1961) electivity index, Siddique and Khan (1973) found high and optimistic electivity index for the Chlorophyceae and also Bacillariophyceae. Excluding great filamentous algae Oedogonium, maximum of the Chlorophyceae comparable Pediastrum, Ankistrodesmus, Selenastrum, Zygnema, Scenedesmus, Tetraspora and Ulothrix were highly chosen. Though, small sized unicellular or the colonial Chlorophyceae alike Selenastrum, Scenedesmus and Pediastrum were solely favored over others. Bacillariophyceae were chosen next to the Chlorophyceae. Amongst Bacillariophyceae *Cyclotella, Nitzchia, Naviculla,* and *Synedra* were carefully chosen justly well in appraisal to the others. The electivity index was adverse for all the blue green algae. Phytoflagellates number one in fingerling stage were completely avoided. Zooplankton, similar Protozoa, crustaceans and rotifers seemed in small numbers in the gut innards as matched to their abundances in this environment (Figure 1). Rahman (2006) also deliberate growth, production and the food penchant of rohu in 2 culture environments that is the monoculture and the polyculture with communal carp (C. carpio L.) by means of artificial and the natural feeds in the ponds. They experiential three different types of feeding forms of rohu based on accessibility of resources in their environment. First, rohu consumed more phytoplankton and the zooplankton in the culture environment with the artificial feed. Such liking was above the preference of provided artificial feed. The amount of the phytoplankton and zooplankton consumed in ponds with the artificial feed are, correspondingly, 1.3 and 3.2 times greater than treatments with the normal feed. The shifting of rohu in the direction of naturally existing food resources was exciting as it evades direct feeding on the artificial feeds and availed the usual feed bring about through the inseminating assistances by artificial feed in this environment. Second, it consumed twice as much as the phytoplankton than zooplankton in surroundings with usual feed. Third, in the existence of artificial feed, rohu consumed 1.3 times additional zooplankton than phytoplankton. Fascinatingly last two cases signified totally differing feeding behaviours of rohu. Former, Miah (1984) stated zooplankton as a better food of rohu fry over the phytoplankton. Additional studies on ingestion rate of the food organisms by the rohu define vagaries in onto genic behavior in the usual ponds. Rahman (2008) absorbed that ingestion rate of the phytoplankton by rohu upsurges with the fish size. Above 20.6 cm whole length, its ingestion rate on the zooplankton slowly reductions and the phytoplankton increases. They resolved with a noteworthy positive connection between rohu's intuitive phytoplankton bio volume and entire length. Rotifers were originating the most vital food substances for rohu under the 20.6 cm whole length (32-45% of the whole diet) tracked by Cladocera (25-28% of the whole diet), and Copepoda (14-16% of the whole diet). Up to the total length of 20.6 cm, these 3 groups composed added 74-88% of the entire diet of rohu. Above these length, Chlorophyceae were noted as the most significant food items for the rohu (28-41% of the total diet) tracked by the Bacillariophyceae (15-27% of the whole diet). From place to place 43-68% of the whole diet of rohu was donated by these 2 groups only.

Periphytic Environment

The periphytic organisms live involved to immersed surfaces in the aquatic environment reach high biomass in the short time and donate up to 80% of this aquatic main production. It has important role in the providing food for the fish and other fauna in normal and the meticulous environment. As a food in the aquaculture, periphyton may deliver 75% metabolic energy to the fish and this assistance in growing the fish productivity. Conventionally, periphyton is being used as the rich source of certainly existing aquatic food reserve for the fishes in countries similar Cambodia, Srilanka, West Africa, India, and Bangladesh.

Numerous tests have been accomplished in the periphyton based polyculture atmosphere with species L. rohita, Catla catla, Cirrhinus mrigala, Oreochromis niloticus, and Labeo calbasu to comprehend and assess synergizing production level. In these trials, L. rohita presented best progress and the efficiency. Azim (2001) found 77% advanced production of the L. rohita when kept with L. gonius using the bamboo as substrate than the substrate free pond. Trialling with the C. catla and the C. calbasu, Azim (2002) conveyed 2.6 times greater production of L. rohita under the substrate (bamboo) fed form. Assessment on its aptitude to entree periphytic food resources was tried over periphyton-based aquaculture experimentations in the ponds. Though, these studies did not effort feeding ecology of the rohu in the periphyton-based trials, the biomass based consequence approves that the fish logically see the sights naturally existing resources in the periphytic than the planktonic environment. NFEP (1997) similarly conveyed upper total weight gain of the rohu in the substrate treatment tests and resolved that it could be because of its periphyton browsing habit. Montchowui (2009) specified that Labeo species are particular feeders on occupied algae and rubbish from the rock layer. However, these trials were executed in periphytic environment, the feeding ecosystem of stocked fish species has been unheeded. Amongst the carp group simply Cyprinus carpio has got wider consideration as appropriate candidate for the Periphyton Based Aquaculture. Freshly Saikia (2013) detected that all sizes of the rohu feed widely on algae

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under the periphytic environment in usual pond. Their study involved of rohu in two dissimilar environments viz. planktonic and the periphytic. Their study which was centered on the gut content of this fish from these environments, inveterate that rohu displays greater feeding in the periphyton based area. Additional, they analysed reserve selectivity and definite that rohu at the later stage of growing explores both plankton and the periphyton in substrate based area. Though, they presumed that rohu may not be really feeding on the periphyton, subsequently its mouth morphology doesn't upkeep a grazing actions of the fish, but see the sights periphytic food in a very lucid method. A step additional, they proposed that the fish shrewdly utilizes a sub-periphytic zone rich in the algal communities in vicinity to substrate. Such improved feed availability in natural environment could be espoused for micronutrient enrichment of the rohu unswervingly over algal feed resources.

4. OPTIMIZATION OF FEEDING OF THE ROHU ON USUAL RESOURCES

The accessible studies on the food and feeding habit of the rohu in substrate free or substrate based atmospheres clarified a kind of niche allotment by rohu towards dissimilar food types along with it's the ontogenic progression. These food varieties are (i) selective zooplanktonic communities at the early stage of the progress, (ii) phytoplankton communities at the later stage of growing and (iii) extensive use of algal communities regardless of age class under the periphytic condition (Figure 3). The last option might be a result of the synergistic relationship of obtainability of wealth to this active planktivorous behavior of the rohu. Ivlev (1961) recommended that the tendency of a specific animal to eat assured food items selectively in contrast to others is strongminded by its essential properties. Allen (1941) pointed out that however feeding performance of fish plays a vital role in the selection mechanism, but as well it, the making of any food item by Mother Nature of the environment and their obtainability also effect it. Thus the fishes' choice their food from those food items which are available to them in the environment. From the periphytic or periphytic-planktonic interface, if rohu can retrieve the optimum food organisms, it would absolutely donate to the increase in the fish biomass in addition to micronutrients in its body. Outline of usual substrates like the bamboo poles for the settlement of the periphytic organisms in pond environment could diminish inter exact feeding race of rohu with the other stocked fishes in this polyculture environment. Former studies stated better fish yield in the substrate treatments, which could be because of niche partitioning over totalling of foods in the form of the periphyton and the bacterial biofilm. Noteworthy gains in the weight of rohu and the catla in substrate atmospheres over substrate free environs were reported. In the monoculture, its feeding ecology likewise strongly cares the increased assortment on the natural resources in substrate based environs than the substrate free atmospheres. Periphyton feeding routine of the rohu might have promoted catla through the reducing inter-specific race in the polyculture condition. In ponds deprived of substrates, rohu and the catla tend to compete with each other for the planktons.

5. CONCLUSION

Clearly, in spite of vast potentiality in the polyculture, the food and the feeding ecology of Labeo rohita on these planktonic organisms as an entire and periphyton as specific has not been studied widely. To govern trophic position of the rohu and to validate it as potential candidate in altering maximum usual food resources to micronutrient rich healthy fish biomass, a conclusive outcome on the part of its food and the feeding ecology is essential. In that situation, periphyton is absolutely a solution, particularly for herbivorous fish species to accept "as and when essential" type of the feeding policy in the polyculture pond. Information of Saikia (2013) may be united for designing improved feeding module in heartening micronutrients along with the protein in rohu. This will aid, to more or less extent, to minimize the size-dependent intra-specific and the inter-specific competition amongst stocked species. As now reviewed, rohu is one of the utmost cultured freshwater fishes in the Indian subcontinent and it displays greater feeding and the important development under the periphytic polyculture atmosphere. But rohu-based polyculture in the periphytic surroundings must be consistent with adequate info on its feed sharing, resource dividing and diet selectivity when stocked with the other column feeders. However, it displays acceptable growth when stocked in the polyculture pond under the periphytic environment, such development outcomes do not approve its resource use in the stated environment and hence wants additional research before outlining any actual strategy for the maximum utilization of the periphytic resources. The feeding ecosystem which exhibited its "improved feeding in the periphytic environment" was premeditated in the monoculture practice, but a statement on such feeding performance in the periphytic polyculture environment would be more valid for its polyculture. Its ontogenic change whether depends on the size, monoculture or the polyculture mixtures are to be established under the obtainability of periphytic resources. Results of Rahman (2008) approves that rohu have a preference diatom and the green algae with growing in size. Fascinatingly, in all the experiments of periphyton based aquaculture, the entrenched substrate in pond typically favours the colonization of the Bacillariophyceae and the Chlorophyceae. Thus there be present every single opportunity for the rohu to choice these 2 resources as its food under the periphytic surroundings. Additional research on its feeding ecology in the periphytic environment under the polyculture condition with adjustable amalgamation of the cultivable fish will positively add original dimensions to rohu based polyculture in the periphytic environment.

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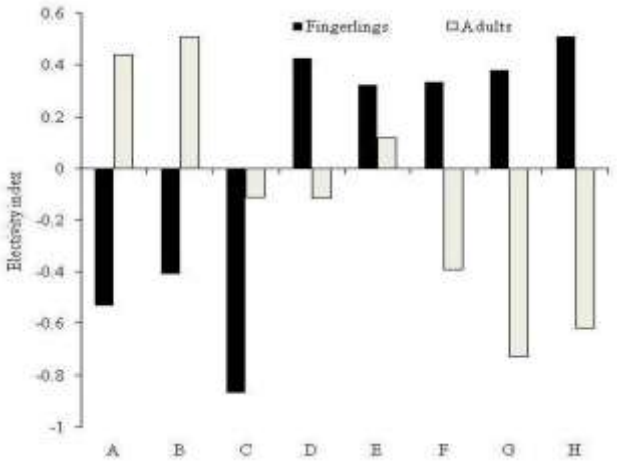

Fig. 1: Electivity index (E) of Labeo rohita from the pond. Data amassed from Khan and Siddique (1973) (Where A for Chlorophyceae, B for Bacillariophyceae, C for Cyanophyceae, D for Phytoflagellates, E for Desmids, F for Protozoa, G for Rotifers, H for Crustaceans).

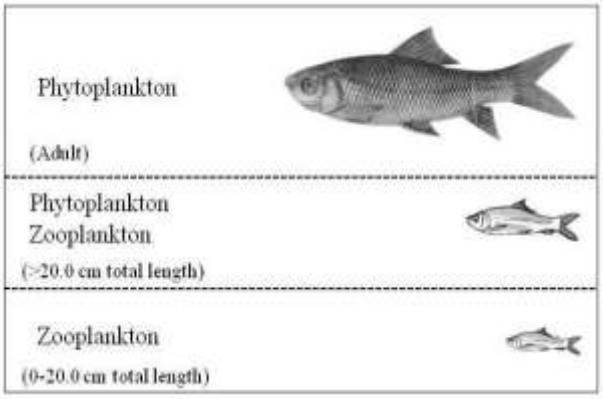

Fig. 2: Niche apportionment by *Labeo rohita* for the feeding during growing. At fingerlings period of the 0-20 cm in entire length, rohu wholly ingests zooplankton, at >20 cm in the whole it consumes both zooplankton and the phytoplankton and in the matured adult period, the fish ingests wholly on the phytoplankton.

REFERENCES

1. *P. Keshavanath, B. Gangadhar, T.J. Ramesh, J.M. van Rooij, M.C.M. Beveridge, D.J. Baird, "Use of artificial substrates to enhance production of freshwater herbivorous fish in pond culture", Aquaculture Research, 12, 189-197, 2001a.*
2. *V.G. Jhingran, "Fish and Fisheries of India", 3rd edn, Hindustan Publishing Corporation, Delhi, India, 1991.*
3. *M.I.U. Miah, S. Dewan, M. Wahiduzzaman, "Studies on the type and amount of food taken by silver carp Hypophthalmichthys molitrix (val.) and its diet patterns of feeding in Bangladesh pond", Bangladesh Journal of Fisheries, 7, 49-54, 1984.*
4. *S. Ahmed, A.F.M.A. Rahman, M.G. Mustafa, M.B. Hossain, N. Nahar, "Nutrient composition of indigenous and exotic fishes of rainfed waterlogged paddy fields in Lakshmipur, Bangladesh", World Journal of Zoology, 7(2), 135-140, 2012.*
5. *N.N. Memon, F.N. Talpur, M.I. Bhanger, "Nutritional aspects and seasonal influence on fatt y acid composition of carp (Labeo rohita) from the Indus River, Pakistan", Polish Journal of Food and Nutrition Sciences, 60(3), 217-223, 2010.*
6. *N. Roos, M.M. Islam, S.H. Thilsted, "Small Indigenous Fish Species in Aquaculture in Bangladesh: Contribution to Vitamin A, Calcium, and Iron Intakes", Journal of Nutrition, 133, 4021S– 4026S, 2003.*
7. *V.G. Jhingran, R.S.V. Pullin, "A hatchery manual for the common, Chinese and Indian major carp", 191p Asian Development Bank, ICLARM Studies and Reviews, 1985.*
8. *S.M. Das, S.K. Moitra, "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, 1955.*
9. *S. Dewan, M.M. Ali, M.A. Islam, "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, 1977.*
10. *N.F.E.P. "Production enhancement of Indian major carps, Labeo rohita (Ham.) using bamboo trimmings as a substrate for the growth of periphyton", NFEP paper No. 10, Northwest Fisheries Extension Project, Parbatipur, Dinajpur, Bangladesh, 1997.*
11. *M.R. Ramesh, K.M. Shankar, C.V. Mohan, T.J. Varghese, "Comparison of three plant substrates for enhancing carp growth through bacterial biofilm", Aquaculture Engineering, 19, 119131, 1999.*
12. *M.E. Azim, M.A. Wahab, A.A. van Dam, M.C.M. Beveridge, M.C.J. Verdegem, "The potential of periphyton-based culture of two Indian major carps, Rohu Labeo rohita (Hamilton) and gonia Labeo gonius (Linnaeus)", Aquaculture Research, 32, 209216, 2001.*
13. *R.A. Khan, A.Q. Siddique, "Food selection by Labeo rohita and its feeding relationship with other major carps", Hydrobiologia, 43(3-4), 429-442, 1973.*
14. *M.E. Azim, M.C.J. Verdegem, M.M. Rahman, M.A. Wahab, A.A. van Dam, M.C.M. Beveridge, "Evaluation of polyculture with Indian major carps in periphyton based ponds", Aquaculture, 213, 131-149, 2002.*
15. *S. Majumder, P. Ghosh, S.K. Saha, S.K. Saikia, "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, 2016.*
16. *P. Keshavanath, T.J. Ramesh, B. Gangadhara, M.C.M.*
17. *M. Alam, S. Sharma, J.K. Pathak, "Food preferences of Labeo rohita (Hamilton) in river Ramganga, Uttar Pradesh, India", International Journal of Fisheries and Aquaculture Sciences, 1(2), 99-105, 2011.*
18. *S. Rai, Y. Yil, M.A. Wahab, A.N. Bart, J.S. Diana, "Comparison of rice straw and bamboo stick substrates in periphyton-based carp polyculture systems", Aquaculture Research, 39, 464-473, 2008.*
19. *K.M. Shankar, C.V. Mohan, M.C. Nandeesha, "Promotion of substrate based microbial biofilm in ponds-a low cost technology to boost fish production", NAGA, The ICLARM Quarterly, 21, 18-22, 1998.*
20. *M.M. Rahman, Y.M. Hossain, Q. Jo, S.K. Kim, J. Ohtomi, C. Meyer, "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, 2008.*
21. *S.K. Saikia, S. Majumder, S. Nandi, S.K. Saha, "Feeding ecology of the freshwater fish Rohu, Labeo rohita (Hamilton 1822): A case of*

ISSN (Online): 2455-3662
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intelligent feeding in the periphyton-based environment", Zoology and Ecology, 23(4), 266-274, 2013.

22. *M.M. Rahman, M.C.J. Verdegam, L.A.J. Nagelkerke, M.A. Wahab, A. Milstein, J.A.J. Verreth, "Growth, production and food preference of Labeo rohita (H.) in monoculture and in polycutlure with Common carp Cyprinus carpio (L.) under fed and non-fed ponds", Aquaculture, 257(1-4), 359-372, 2006.*
23. *B. Moss, "Ecology of Freshwaters, Man and Medium, Past to Future", 3rd edn, Blackwell Science Ltd, Oxford, 1998.*
24. *A.K.Y. Haroon, K.A. Pittman, "Niche measurements and feeding strategies of Barbodes gonionotus and Oreochromis spp. from rice fields in Bangladesh", Bangladesh Journal of Fisheries Research, 4, 13-26, 2000.*
25. *M.W. Miller, A. Falace "Evaluation methods for trophic resource factor-nutrients, primary production, and associated assemblages", In: Seaman Jr. W (ed.) Artificial Reef Evaluation with Application to Natural Habitats, CRC Press, Florida, USA, pp. 95-126, 2000.*