Effect of Artificially Prepared Food and Algal Food on the Growth of *Lebistes reticulates*

Basharat Sadiq[1], Ghazala Yasmeen Butt[1], Farooq Ahmad[2,*] and Rashid Mahmood[2]

[1]Department of Botany, Government College University, Lahore, Pakistan
[2]Sustainable Development Study Centre, Government College University, Lahore, Pakistan

*Corresponding author: E-mail: fagondal82@yahoo.com

Two algal species *Chladophora aegagropila* and *Gomphonema geminatum* was collected from botanical garden of GC University, Lahore and further processed to prepare food for guppy fish (*Lebistes reticulates*), bought from a local fish market of Lahore. The fish that was fed with algal species showed high trends towards growth, length and weight than fish in artificially prepared food bought from commercial market. During this research work artificially prepared food was used as control and algal food was used as experimental media. Limnological study was also conducted in which dissolve oxygen, pH, temperature, total dissolve solvents, carbonates, bicarbonates, calcium, magnesium and chloride ions were also evaluated. The high rate of growth in algal food was due to presence of more protein content than artificially prepared food.

Keywords: Guppy fish, Limnological study, Zooplankton, Microalgae.

INTRODUCTION

Food composition and feeding habits changed due to seasonal variations but algal food has its own importance in every season [1]. In water reservoirs biotic factors are important component of an aquatic ecosystem and these play important role not only for fish production but also for functions of an aquatic ecosystem. As primary producer's algae in an aquatic ecosystem has great importance and is the subject of great interest. In aquatic food web, algae as primary producers make trophic status of water bodies [2]. Apart from Zooplankton and larval feeding, Special species of microalgae, *Chlorella* sp. and *Spirulina laxa* addition to the normally used fish feed composition seems to fulfill the demands of market. *Spirulina laxa* biomass effects colour enhancement due to the presence of phycocyanin or carotenoids in *Dunaliella* sp. were used by Ornamental fish's. Aquaculture fish population related to health status and feed utilization. Immune system of fish enhanced by the addition microalgae, investigations were done on crap [3]. The optimum production depends on vital and the most important daily feed [4].

EXPERIMENTAL

Experimental setup was comprised of two treatments in which artificially prepared food and naturally occurring algae from ponds used as feed for fishes. Glass aquaria were used for this experiment having 76 L capacity each (2.5′ × 1.5′ × 1′).

Algae were collected from freshwater ponds of Government College University Botanic Garden from the stagnant water of ponds. Algae were collected by the forceps and picking by hands. Plastic lid bottles were used for the storage of these specimens. Some of these specimens were preserved in 4 % formalin. Along with algae collection water of samples were also carried out to check the water quality. Various parameters of water were also measured during algae collection *e.g.* pH by pH paper, atmospheric temperature and water temperature were determined by hand held thermometer and location of sites with Global Positioning System (GPS). Weather and water conditions were also recorded.

Neon blue guppy male & female, neon red guppy male & female were chosen for experiments. Above species were purchased from fish land Aquarium, Samnabad Lahore and transported to the phycology Lab Botany Department GC University Lahore. Pinch of $KMnO_4$ was used for the disinfection of all aquaria and after cleaning three to four times all aquaria were filled with fresh water. Before stocking of fishes standard parameters such as temperature, dissolved oxygen and pH of fresh water were recorded. The process of acclimatization was for two months. All fishes were feed with rice polish during acclimatization. Daily siphoning in which one third water of aquaria was changed during acclimatization. Throughout the experiment 12L:12D photo-period was maintained by using artificial light.

After acclimatization phase of two months two fish species were stocked in artificially prepared food (control) and algal

food (experimental) aquaria each fish has average weight 0.36 g, 1.36 g in control and 0.54 g and 1.88 g in experimental aquaria. Fishes were weighted every week to check the growth rate of-fishes in-terms-of weight gain, standard-length and total length, the experiment duration was 5 weeks.

RESULTS AND DISCUSSION

To determine growth rate, standard length, total length increase experiment was conducted on two aquaria in which one aquarium was with prepared feed for fish *Lebistes reticulates* and referred as control aquarium while on the other hand second aquaria was fresh algae as feed for *Lebistes reticulates* and referred as experimental aquaria. During the experiment limnological study was also conducted in which dissolve oxygen, pH, temperature, total dissolve solvents, carbonates, bicarbonates, calcium, nagnesium ions and chloride ions were also evaluated (Tables 1 and 2).

Fig. 1. Average weight of *Lebistes reticulates* control and experimental aquaria

Fig. 2. Average standard length of *Lebistes reticulates* control and experimental aquaria

Fig. 3. Average total length of *Lebistes reticulates* control and experimental aquaria

TABLE-1
ANALYSIS OF VARIOUS PARAMETERS OF
WATER QUALITY IN CONTROL AQUARIUM

Tests	Control aquarium				
	1st week	2nd week	3rd week	4th week	5th week
Dissolve oxygen	8.1	12.3	9.6	9.9	7.1
pH	8.5	8.9	7.9	7.6	7.3
Total dissolved solids	1.4	1.3	1.4	0.3	0.8
Carbonates	–	12.0	2.0	–	10.0
Bicarbonates	9.0	6.0	2.0	12.0	2.0
Calcium ion	3.0	3.1	2.5	2.7	2.1
Magnesium ion	0.9	1.5	2.0	0.8	1.2
Chlorine ion	37.0	8.0	3.0	34.5	49.0

TABLE-2
ANALYSIS OF VARIOUS PARAMETERS OF
WATER QUALITY IN EXPERIMENTAL AQUARIUM

Tests	Experimental aquarium				
	1st week	2nd week	3rd week	4th week	5th week
Dissolve oxygen	9.1	12.5	9.4	10.0	12.0
pH	8.5	8.9	8.3	7.84	7.6
Total dissolved solids	1.3	2.1	3.3	0.4	0.7
Carbonates	–	14.0	–	20.0	–
Bicarbonates	5.5	2.0	16.0	13.0	3.0
Calcium ion	3.5	5.5	3.5	4.0	3.0
Magnesium ion	1.5	0.1	1.3	1.4	2.8
Chlorine ion	26.0	8.5	3.0	28.0	27.0

All these values from the start of experiment to till end remains favourable for the growth of fishes in control and experimental aquaria due to siphoning every seven days which eliminates the hazardous nitrogenous wastes. After last week of experiment, the experimental *Lebistes reticulates* showed high rates of % average weight, % average standard length and % average total length as compared to control of *Lebistes reticulates* as shown in Figs. 1-3.

During trial period of experiment *Lebistes reticulates* that feed on Algal diet showed higher rate of feed intake as compared to the *Lebistes reticulates* feeding on prepared diet. Algal diet having tasty flavour, high-quality nutrient composition and eye-catching composition attracted the fishes.
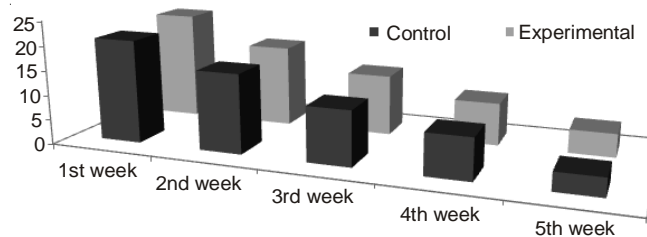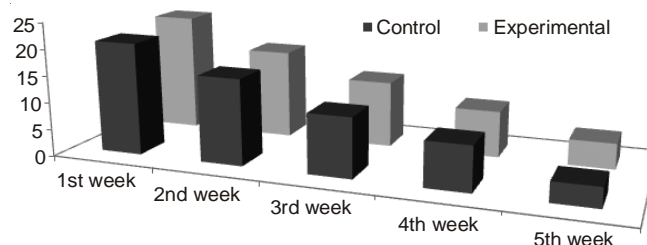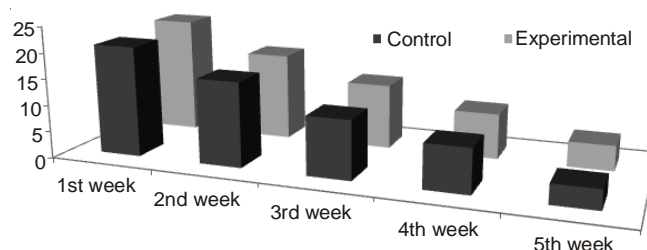
Yamamoto *et al.* [5] discovered that rainbow trout *(Onchorchynchusmykiss, Salmonidae)* preferred the diet which is rich in essential amino acids like algae [6]. Due to good protein contents algal diet seemed to preferred on artificial diet. Fishes growth was significantly enhanced by proper ratio of several algal proteins. Hossain and Jauncey [7] suggested that instead of single source in replacing fish diet various proteins in proper ratio were more effective. Algal feed having high nutritional values could be a better feeds; supplement for animal proteins like Tubifex [8].

Hardie *et al.* [9] conformed that important source of micronutrient like ascorbic acid, that improve the immune system of the fishes. It is also improves the growth and, standard length and total length by providing good health, resist stress, feed conversions and oxidation mechanisms. Algal diet is more important for enhancing the growth and muscle protein of fish than the controlled. Mahata *et al.* [10] reported high energy algal diet causes lipid deposition in fishes while the lipid deposition has negative correlation with artificial feed.

These studies suggest that efficacy of algae as feed incorporate into growth, standard length and total length was higher than control one. If algae were given as feed for longer period of time then it would provide us not only high proteins but also provide us micro and macro nutrients which are essential to fulfill dietary demands of humans. Therefore in order to improve commercial fish farming in Pakistan indigenous algae should be used as feed not only for edible fishes but also for ornamental fishes like *Labistes reticulates*.

ACKNOWLEDGEMENTS

REFERENCES

1. H.B.N. Hynes, *J. Anim. Ecol.*, **19**, 36 (1950).
2. J. Kalff and R. Knoechel, *Annu. Rev. Ecol. Syst.*, **9**, 475 (1978).
3. K. Schreckenbach, C. Thurmer, K. Loest, G. Trager and R. Hahlweg, *Fischer Teichwirt*, **1**, 10 (2001).
4. M.T. Alam, S.M. Rahmatullah, M.S. Alam and M.F. Rahman, *Univ. J. Rajshahi Univ.*, **21**, 41 (2002).
5. T. Yamamoto, T. Shima, H. Furuita, M. Shiraishi, F.J. Sánchez-Vázquez and M. Tabata, *Aquaculture*, **187**, 375 (2000).
6. V. Fournier, M.F. Gouillou-Coustans, R. Métailler, C. Vachot, M.J. Guedes, F. Tulli, A. Oliva-Teles, E. Tibaldit and S.J. Kaushik, *Br. J. Nutr.*, **87**, 459 (2002).
7. M.A. Hossain and K. Jauncy, *Malaysian Appl. Biol. J.*, **19**, 1 (1990).
8. N.A. Khatoon, R.S. Chaudhari, N. Sen and S. Kundu, *J. Bot. I. Soc.*, **64**, 85 (2010).
9. R.C. Hardie, B. Voss, O. Pongs and S.B. Laughlin, *Neuron*, **6**, 477 (1991).
10. S.C. Mahata, A.K.M.A. Bhuiyan, M. Zaher, M.A. Hossain and M.R. Hassan, *J. Ichthyol.*, **9**, 77 (1994).