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GROWTH RESPONSE OF MAJOR CARPS IN SEMI-INTENSIVE PONDS SUPPLEMENTED WITH RICE POLISHING

I. Ahmed, K. Abbas and M. Hafeez-ur-Rehman

Department of Zoology and Fisheries, University of Agriculture, Faisalabad, Pakistan

ABSTRACT

A project was designed to evaluate the growth performance of major carps in semi-intensive fish culture system. Two earthen ponds were selected to study the effect of rice polishing (12% crude protein) as supplementary feed in fertilized ponds on the growth of major carps. Both the ponds were manured with cowdung at the rate of 0.10gN/100g wet fish body weight daily. Each pond was stocked with 30 *Labeo rohita*, 15 *Cirrhinus mrigala* and 25 *Catla catla.* The treated pond was supplemented with rice polishing at the rate of 4% wet fish body weight daily for a period of six months. The other pond was taken as control. The treated pond showed a significant increase ($P<0.01$) in fish production. The net fish production was found to be 832.23 and 563.50 kg/ha/year in the treated and the control ponds, respectively. The treated pond showed 1.477 times greater fish production than that of the control pond. The fish showed relatively better growth during warmer months of study under both the treatments.

Key words: Rice polishing, cowdung, major carps, growth performance.

INTRODUCTION

Fish is an important component of human diet, as it is a rich source of animal proteins. Fish as a food can be expected to gradually resolve the threatening problem of malnutrition. Keeping in view the nutritional (Gerking, 1966) as well as medicinal value of fish meat, it is a need of the time to utilize all the available resources to develop fish industry through simple agricultural practices. Among the new trends in fish culture, integrated semi-intensive system seems to be the most acceptable due to the fact that various agricultural wastes and low value feedstuff can be utilized as a cost-effective source of fish feed. Fertilizers increase the level of primary productivity, dissolved oxygen, pH and total phosphorus (Qin *et al*., 1995). They increase fish production without risk of dietary diseases and also play an important role in the formation of soil structure. The growth of fish is strongly correlated with increase in phytoplankton and zooplankton productivity as a result of fertilization. Under polyculture system, the use of organic and inorganic fertilizers provides basic nutrients and elements required for the production of phytoplankton and zooplankton which serve as a major source of food for fish (Javed *et al*., 1990).

Supplementary feeding plays a vital role in semi-intensive system, offering the best means to enhance fish production within shortest possible time. It is useful in conversion of low value animal and vegetable proteins into quality proteins (Devaraj and Krishna, 1981). Javed *et al*. (1993) reported that supplementary feed exerted a significant effect on the body weight, fork length and total length of fish species, *Labeo rohita, Cirrhinus mrigala* and *Catla catla* in the treated ponds.

Keeping in view the significance of fertilization and supplementary feeding, the present study was conducted to assess the growth performance of major carps in integrated semi-intensive ponds supplemented with rice polishing.

MATERIALS AND METHODS

The experiment was conducted in two earthen ponds, each measuring 25 x 8 x 1.5m, located at the Fisheries Research Farms, University of Agriculture, Faisalabad. After preliminary preparations, each pond was stocked with 30 *Labeo rohita*, 15 *Cirrhinus mrigala* and 25 *Catla catla*. Both the ponds were fertilized with cowdung at the rate of 0.10g N/100g wet fish body weight. The treated pond was supplemented with rice polishing at the rate of 4% wet fish body weight daily for a period of six months. The other pond served as control. The amount of feed was increased fortnightly according to the measurement of fresh fish body weight. Fish growth was measured in terms of increase in body weight by random capturing of each fish species from both the ponds on each fortnight, throughout the experimental period. After obtaining the data, the fish were released back into their respective ponds. The data of growth parameters were subjected to statistical analysis through microcomputer, using MSTAT and MICROSTAT packages, following Steel *et al*. (1996).

RESULTS

The initial body weight of *Labeo rohita*, *Cirrhinus mrigala* and *Catla catla* averaged 51.9 ± 4.02, 49.3 ± 3.85 and 61.2 ± 4.51 for the control pond, while 49.7 ± 3.85, 53.1 ± 5.32 and 59.4 ± 4.51g for the treated pond, respectively (Table 1). At final harvest, the average body weight was found to be 173.2 ± 8.42, 157.8 ± 7.40 and 165.5 ± 5.50g in the control pond, while 226.3 ± 8.50, 201.8 ± 8.44 and 223.4 ± 6.50g in the treated pond, respectively. There was a net body weight gain of 121.3, 108.5 and 104.3g in the control pond and 176.6, 148.7 and 164.0g in the treated pond for *Labeo rohita*, *Cirrhinus mrigala* and *Catla catla*, respectively (Table 2). The net fish yield for all the species together was calculated to be 563.50 kg/ha/year in the control pond and 832.23 kg/ha/year in the treated pond. There was 1.477 times greater net fish production in the treated pond than that in the control pond. There was a significant difference among fortnights, fish species and ponds for the gain in body weight ($P<0.01$). *Labeo rohita* showed the best growth in overall weight gain (Table 3).

DISCUSSION

The results of the present study show that average gain in body weight of all the fish species together was less in the control pond than that in the pond treated with supplementary feed (rice polishing). The supplementary feeding caused a significant increase in fish yield in the treated pond. The net fish production in the treated pond was found to be 832.23 kg/ha/year, while in the control pond it was 563.50 kg/ha/year. So, the semi-intensive condition gave 1.477 times greater fish production than the simple extensive one. These results are in line with those obtained by Sumitra *et al*. (1981), who reported a significant increase in fish yield due to the effect of organic fertilizer on the planktonic productivity of a commercial pond. Hassan *et al*. (2000) reported that cowdung fertilization exerted significant effect on the growth performance of major carps. These results are also in confirmatory with those of Aziz *et al*. (2002), who studied the growth performance of major carps in fertilized ponds supplemented with feed containing 28% crude protein and reported that a planktonic productivity of 22.14 mg/l produced an average fish yield of 7826.08g. These workers, through the regression studies, calculated the contribution of primary productivity towards increase in fish yield to be 57.40%.

In the present experiment, the enhanced production in the treated pond can be justified by the fact that crude protein in the form of rice polishing was not only taken as feed by the fish but also the leftover protein contributed to the fertility of the treated pond. Javed *et al*. (1993) concluded that use of artificial feed was beneficial in two ways, (i) direct utilization of feed, (ii) indirect response of leftover feed in terms of planktonic productivity. The nitrogen supplemented in the form of crude protein resulted in significant increase in body weight of the fish. Virk and Saxena (2003) also reported that *Cyprinus carpio* and *Labeo rohita* in semi-intensive polyculture ponds supplemented with diet containing Amaranthus seeds, showed better growth as compared to the control pond because Amaranthus seeds provided quality proteins to the fish.

The fish showed better growth during warmer months of study under both the treatments. Goolish and Adelman (1984) also recorded significantly positive increase in the growth rate of fish (*Cyprinus carpio*) with concomitant increase in temperature. The net fish yield in the treated pond in the present study (832.236 kg/ha/year) was lower than the net yield (2928.54 kg/ha/year) found by Javed *et al*. (1992) in semi-intensive ponds. This contradiction owed to the average lower water temperature (20.3 and 19.8 ^{o}C in the control and the treated pond, respectively throughout this experimental period) as was reported by Villaluz and Ungui (1983). They studied the effect of temperature on activity, feeding and growth of milk fish and concluded that low temperature (22.6^{o}C) decreased activity and food intake, while high temperature (up to 33^{o}C) had the opposite effect. Growth was faster at higher temperature and slower at low temperature.

In conclusion, the vegetable protein which is cheaper than animal protein can be used in the form of supplementary feed in semi-intensive fish culture system for better fish production.

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Table 2: Fish production in the ponds

Parameters	Control			Treated		
	Labeo rohita	***Cirrhinus mrigala***	***Catal catla***	***Labeo rohita***	***Cirrhinus mrigala***	***Catal catla***
No. of stocked fishes	30	15	25	30	15	25
Survival rate	100%	100%	100%	100%	100%	100%
Initial average weight (g)	51.9	49.3	61.2	49.7	53.1	59.4
Final average weight (g)	173.2	157.8	165.5	226.3	201.8	223.4
Gain average weight (g)	121.3	108.5	104.3	176.6	148.7	164.0
Gross fish production /pond/ 6 months (g)	5196.0	2367.0	4137.5	6789.0	3027.0	5585.0
Gross fish production/pond/year (kg)	11.156	5.082	8.883	14.576	6.499	11.991
Gross fish production/acre year (kg)	150.554	68.583	119.879	196.708	87.706	161.823
Gross fish production/ha/ year (kg)	371.87	169.41	296.101	485.87	216.14	399.70
Net fish production/pond/ 6 months(g)	3639.0	1627.5	2607.5	5298.0	2230.5	4100.0
Net fish production/pond/year(kg)	7.813	3.494	5.598	11.375	4.789	8.80
Net fish production/acre/year (kg)	105.439	47.153	75.547	153.509	64.629	118.799
Net fish production/ha/year (kg)	260.434	116.468	186.601	379.167	159.634	293.435
	Control	**Treated**				
Gross fish production (kg/ha/year)	837.381	1102.210				
Net fish production (kg/ha/year)	563.503	832.236				

Table 3: comparison of increase in body weight (g) of major carps

Factors	**Increase in body weight**
Species	
Labeo rohita	13.805A
Cirrhinus mrigala	11.691B
Catla catla	12.200B
Fortnights	
01-10-2001	9.283E
16-10-2001	12.834D
01-11-2001	19.500C
16-11-2001	17.550B
02-12-2001	6.167F
17-12-2001	4.567FG
02-01-2002	3.500G
61-01-2002	8.484E
31-01-2002	15.150C
15-02-2002	18.500B
02-03-2002	22.717A

The means with different letters differ significantly P<0.01).

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