EFFECT OF DIFFERENT LEVELS OF POULTRY DROPPINGS ON GROWTH PERFORMANCE OF MAJOR CARPS

S. Abbas, I. Ahmed and P. Akhtar[1]

Department of Zoology and Fisheries, [1]Department of Animal Breeding and Genetics, University of Agriculture, Faisalabad, Pakistan

ABSTRACT

This experiment was conducted to assess the response of fertilizing fish ponds with different levels of poultry droppings on growth performance of major carps. The treated ponds were manured with poultry droppings at the rate of 0.15 (T_1) and 0.20 (T_2) g N/100g wet fish body weight daily and one pond was kept as control. In the control pond, the average body weight gains of 82.9, 98.8 and 101.6g were recorded for *Catla catla, Labeo rohita* and *Cirrhinus mrigala,* receptively. However, in the treated ponds T_1 and T_2, the average body weight gains were 185.3 and 251.3, 194.9 and 197.5, 276.0 and 254.8g for *Catla catla, Labeo rohita* and *Cirrhinus mrigala*, respectively. The fertilization of ponds with poultry droppings caused marked increase in fish production. The treated ponds T_1 and T_2 showed 2.26 and 2.59 times greater fish production as compared to that of control pond. So it was concluded that higher dose of organic fertilizer (poultry dropping) increased fish production.

Key words: Major carps, growth, poultry droppings.

INTRODUCTION

Today, more than half of the world population depends upon fish as a source of animal protein. The demand for fish is expanding rapidly in the world because of increasing population.

Inland aquaculture is the field that can adequately be used for quality protein production because fish is an excellent food, nutritionally equivalent to meet in protein contents, high in essential minerals and low in saturated fats. Fish as a food can be expected in mitigating malnutrition because it is easily digestible and nutritionally equivalent, rather better than beef or mutton in quality. It offers better type of essential minerals, amino acids and is low in undesirable saturated fats (Hussain, 1986).

To improve productive efficiency of fish and to have a maximum yield from limited resources of fresh water bodies, it is necessary to manage available freshwater bodies so as to provide the fish with balanced food in sufficient quantities ensuring their maximum growth in shortest possible time. The fertilization of fish ponds assures a more hygienic, economic and simple mean of increasing fish production as compared to artificial feeding. The use of organic manure to increase the production of fish pond was known to Chinese as far back as 4th and 5th centuries (Ali, 1993). Therefore, the present study was designed to assess the effect of fertilizing fish ponds with different levels of poultry droppings on growth performance of major carps.

MATERIALS AND METHODS

The experiment was conducted using three fish ponds, each having dimension of $25 \times 8 \times 1.5$ m (length x width x depth), located at the Fisheries Research Farms, University of Agriculture, Faisalabad. To stabilize the pH and disinfect the ponds, liming was done with calcium oxide at the rate of 8.5 kg/pond (Hora and Pillay, 1962). The inlets of ponds were properly screened with guaze of fine mash to avoid the entry of intruders or exit of fish from the ponds. The ponds were filled with water up to a level of 1.0m.

Each pond was stocked with 20 *Labeo rohita,* 15 *Catla catla* and 15 *Cirrhinus mrigala*. One of these ponds was kept control whereas the other two were treated with organic manure. The treated ponds were manured with poultry droppings at the rate of 0.15 (T_1) and 0.20 (T_2) g N/100g wet fish body weight daily. At the time of stocking, the growth parameters such as body weight and total length of three species were recorded. After 15 days interval a sample of fish specimens of each species was captured randomly from each pond by using drag net to monitor the growth.

The data were subjected to statistical analysis following Steel and Torrie (1986). The comparison of mean values for various parameters and significance of interaction among species, treatment, and fortnights were computed by using analysis of variance and Duncan's Multiple Range test with repeated sampling.

RESULTS

Body weight

The initial average body weight of *Catla catla* was observed to be 137.4, 138.2 and 133.2g and final average body weight was observed to be 220.3, 323.5 and 330.7g in control and treated ponds T_1 and T_2, respectively (Table 1). Minimum (5.7g) increase in body weight was noted in 4th fortnight in control pond and 8.1 and 8.6g increase in body weight was noted in first fortnight in T_1 and T_2. Maximum (11.5, 29.1 and 28.4g) increase in body weight was observed in 9th fortnight in the three ponds (Table 2).

The initial body weight of *Labeo rohita* averaged 125.4, 134.5 and 158.6g and final body weight averaged 224.2, 385.8 and 434.6g in control and treated ponds T_1 and T_2, respectively (Table 1). Minimum (6.0, 10.5 and 12.7g) increase in body weight was noted in first fortnight, while maximum (15.1, 45.6, 45.7g) increase was observed in 9th fortnight in control, T_1 and T_2 ponds, respectively (Table 2).

The initial body weight of *Cirrhinus mrigala* averaged 122.7, 121.8 and 128.1g and final body weight averaged 224.3, 316.7 and 382.9g in control, T_1 and T_2 ponds respectively (Table 1). Minimum (5.1, 8.1 and 7.9g) increase in average body weight was observed in first fortnight while maximum (15.5, 29.6 and 41.4g) increase was observed in 9th fortnight in control, T_1 and T_2 ponds, respectively (Table 2).

Statistical analysis revealed that the three species, treatments as well as the fortnights, differed significantly ($p<0.05$). The interaction between fortnights and treatment and species x treatment was highly significant ($p<0.01$).

Total fish production

After five months of rearing, all the three ponds were harvested for final fish catch. Survival rate for all the fish species was 100%. The gain in body weight of *Catla catla* was noted as 82.9, 185.3 and 197.5 g and for *Labeo rohita* it was recorded as 98.8, 251.3 and 276.0g in control, T_1 and T_2 ponds, respectively. The gain in average body weight of *cirrhinus mrigala* was noted as 101.6, 194.9 and 254.8g in all these three ponds, respectively (Table 1).

Net fish production of 1.24, 1.97 and 1.53, 2.78, 5.03 and 2.92, and 2.96, 5.52 and 3.82 kg/pond/5 month was calculated for three fish species in the three ponds respectively. Net fish production for three fish species averaged 2.98, 4.74 and 3.66, 6.67, 12.06 and 7.02, and 7.11, 13.25 and 9.17 kg/pond/year in control, T_1 and T_2 ponds respectively. Net fish production of 60.41, 95.99 and 74.03, 135.02, 244.14 and 142.01, and 143.91, 268.14 and 185.66 kg/acre/year was recorded for *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala* in the three ponds. The net fish production/ha/year was calculated for these three fish species as 149.20, 237.08 and 182.85, 333.49, 603.03 and 350.76, and 355.45, 662.30 and 458.57 kg/ha/ year for control, T_1 and T_2 ponds respectively (Table 1).

The gross fish production of three fish species was recorded to be 1338.16, 2077.97 and 2327.17 kg/ha/year in control, T_1 and T_2 ponds. The net fish production of three fish species in control, T_1 and T_2 ponds was recorded as 569.12, 1287.28 and 1476.32 kg\ha \year, respectively (Table 1).

DISCUSSION

In the present experiment, the maximum weight gain in *Catla catla, Labeo rohita* and *Cirrhinus mrigala* was observed in treated pond T_2 in which 0.20 g N/100 g was applied, follows by T_1 (0.15 g N) and control pond. Similar results were observed by Javed *et al.* (1990), who reported highly significant increase in weight, fork and total length of *Catla catla, Labeo rohita* and *Cirrhinus mrigala* under broiler manure fertilization. Similarly, Hassan and Javed (1999) reported that three fish species gained significantly different weight under the different levels of broiler droppings.

Maximum weight gain in treated pond was noted in 9th fortnight due to optimum temperature while the lowest weight gain was observed in first fortnight due to highest temperature. Villaluz and Unggui (1983) reported that low temperature (22.6°C) decreased the activity and food intake whereas the high temperature (upto 33°C) had the opposite effects. They also reported that growth and development were faster at high temperature. Khan *et al.* (1995) reported that water temperature was the most important variable, which contributed significantly towards the fish yield increments under intensive culture of grass carps (*Ctenopharyngodon idella*) with three isochloric diets viz. 30, 35 and 40% crude protein and control (without additives). In 30, 35 and 40 percent crude protein and in controlled diet, 93.97, 96.58, 94.3 and 83.13% variation in fish yield was due to water temperature. Ahmad (1996) reported that the best temperature which had positive and significant influence on increase in fish weights was ranging from 39.32 to 32.95°C.

In the present experiment, higher fish production was observed in T_2 and T_1 as compared to that of control pond. Similarly, Hassan (1996) reported that broiler droppings added on the basis of nitrogen content gave the best net fish yield of 3617.50 kg/ha/year. Mahboob and Sheri (1997) studied the growth performance of six fish species viz., *Catla catla, Labeo*

Table 1: Total fish production of three fish species under control and treated ponds

	Control			T_1			T_2		
	Catla catla	***Labeo rohita***	***C. mrigala***	***Catla catla***	***Labeo rohita***	***C. mrigala***	***Catla catla***	***Labeo rohita***	***C. mrigala***
No of fish stocked	15	20	15	15	20	15	15	20	15
Survival rate (%)	100	100	100	100	100	100	100	100	100
Initial average weight (g)	137.4	125.4	122.7	138.2	134.5	121.8	133.2	158.6	128.1
Final average weight (g)	220.3	224.2	224.3	323.5	385.8	316.7	330.7	434.6	382.9
Average weight gain (g)	82.9	98.8	101.6	185.3	251.3	194.9	197.5	276.0	254.8
Gross fish production/pond /5 month (kg)	3.30	4.48	3.36	4.85	7.72	4.75	4.96	8.69	5.74
Gross fish production/pond/year (kg)	7.93	10.76	8.07	11.65	18.52	11.40	11.91	20.86	13.74
Gross fish production/acre/year (kg)	160.52	217.82	163.43	235.72	374.82	230.76	240.96	422.22	278.99
Gross fish production/hectare/year (kg)	396.48	538.00	403.68	582.22	925.79	569.97	595.17	1042.88	689.12
Net fish production/pond/5 month (kg)	1.24	1.97	1.53	2.78	5.03	2.92	2.96	5.52	3.82
Net fish production/pond/year (kg)	2.98	4.74	3.66	6.67	12.06	7.02	7.11	13.25	9.17
Net fish production/acre/year (kg)	60.41	95.99	74.03	135.02	244.14	142.01	143.91	268.14	185.66
Net fish production/hectare/year	149.20	237.08	182.85	333.49	603.03	350.76	355.45	662.30	458.57
Gross fish production/ha/year (kg) (All three species)		1338.16			2077.97			2327.17	
Net fish production/ha/year (kg) (All three species)		569.12			1287.28			1476.32	

Table 2: Fortnightly increase in body weight (g) of *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala* in control and treated ponds

Fortnights	Dates	Control			T_1			T_2		
		Catla catla	*Labeo rohita*	*C. mrigala*	*Catla catla*	*Labeo rohita*	*C. mrigala*	*Catla catla*	*Labeo rohita*	*C. mrigala*
1	16-04-2001	6.9	6.0	5.1	8.1	10.5	8.1	8.6	12.7	7.9
2	01-05-2001	8.8	7.6	8.5	11.5	12.4	12.7	10.5	15.9	10.9
3	16-05-2001	8.6	7.0	8.6	16.6	16.7	15.6	16.5	24.9	18.6
4	01-06-2001	5.7	8.9	10.5	15.1	15.5	18.4	15.6	24.6	20.5
5	16-06-2001	6.1	9.7	9.6	18.9	18.7	17.5	20.4	26.1	18.6
6	01-07-2001	6.4	11.4	8.6	18.4	26.5	20.5	21.6	26.9	28.8
7	16-07-2001	8.5	8.9	11.4	16.6	26.0	22.4	24.3	24.1	34.1
8	01-08-2001	9.8	11.1	13.0	24.5	35.9	24.1	25.9	33.6	36.5
9	16-08-2001	11.5	15.1	15.5	29.1	45.6	29.6	28.4	45.7	41.4
10	01-09-2001	10.2	13.6	11.8	26.5	43.5	26.0	25.7	41.5	37.5
Mean ± SD		8.25 ± 1.933	9.93 ± 2.894	10.26 ± 2.882	18.53 ± 6.570	39.08 ± 12.72	19.49 ± 6.424	19.75 ± 6.75	27.6 ± 10.258	25.48 ± 11.76

rohita, Cirrhiunus mrigala, Hypothalamicthys molitrix, Ctenopharyngeodon idella and *Cyprinus carpio* under the influence of artificial feed, broiler manure, buffalo manure, N:P:K (25:25:0) and a control pond for a period of one year. Broiler manure and N:P:K (25:25:0) fertilization remained the best treatments for maximum fish production of 9400 and 7300 kg/pond/year, while the fish production for artificial feed, buffalo manure and control pond were 6200, 4400, and 1500 kg/pond/year, respectively.

Supplementation of the ponds with poultry droppings caused a marked increase in fish production as compared to that of control pond. Treated ponds T_1 and T_2 showed 2.26 and 2.59 times greater fish production, respectively as compared to that of control pond. Similarly, Hayat *et al.* (1996) studied the growth of fish and water quality of fish pond under control and two levels of nitrogen (0.14 and 0.18g N/100g). The net fish yields under all the treatments were significantly affected by water temperature, as it caused 83.50, 87.3 and 81.10% variation under 0.14 and 0.18 g N and controlled regime. The increase in fish yield was positively correlated with existing planktonic biomass.

REFERENCES

Ahmad, M., 1996. Growth performance of fish under 25 per cent crude protein diet in integrated system of broiler droppings fertilization of ponds. M Phil. Thesis, Dept. Zool, Fish, Univ. Agric. Faisalabad.

Ali, S.S., 1993. An Introduction of Freshwater Fishery Biology, Univ. Grants Commission, Islamabad.

Hassan, M., 1996. Influence of pond fertilization with broiler droppings on the growth performance and meat quality of major carps. PhD. Thesis, Dept. Zool. Fish, Univ. Agric., Faisalabad.

Hassan, M. and M. Javed., 1999. Length-weight relationship and condition factor studies in three major carps reared under integrated polyculture system . Pakistan J. Biol. Sci., 2(4): 1620-1622.

Hayat, S., M. Javed and K. Hanif, 1996. Impact of poultry dropping fertilization of fish ponds on the physico-chemistry of water. Pakistan J. Livestock Poult., 2(2): 54-60.

Hora, S.L. and T.V.R. Pillay., 1962. Handbook on Fish Culture in the Indo-Pacific Region. FAO Fish Boil., 14: pp 204.

Hussain, S.A., 1986. Fish as a vital source of animal protein. Progressive Farming., 6(B): 13.

Javed, M., M.B. Sial and S.A. Zafar, 1990. Fish pond fertilization. 2. Influence of broiler manure fertilization on the growth performance of major carps. Pakistan J. Agri. Sci., 27 (3): 212-215.

Khan, H.A., M. Javed., A.N. Sheri., M. Ahmed and A.R. Shakoori, 1995. Multiple regression analysis of physico-chemical properties of water on net fish yield in intensive culture system. Proc. Pakistan Cong. Zool. Fish., Univ. Agric., Faisalabad, Pakistan, 15: 95-102.

Mahboob, S. and A.N. Sheri., 1997. Growth performance of major, common and Chinese carps under composite culture system with special reference to pond fertilization. J. Aquacult. Tropics, 12(3): 201-207.

Steel, R.G.D. and J.H. Torrie, 1986. Principles and Procedures of Statistics: A Biometrical Approach 2nd Ed.. McGraw Hill Book Co., Inc., New York, USA.

Villaluz, A. and A. Unggui, 1983. Effect of temperature on behaviour, growth, development and survival of young milk fish *Chanos chanos* (Forskal). Aquaculture., 35: 321-330.