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Effect of Different Doses of Fertilizer (Nitrophos) on the Growth Performance of Major Carps

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ABSTRACT

An experiment was conducted to see the effect of different doses of fertilizer Nitrophos ranging from 0.05 to 0.3 mg on the growth performance of major carps viz. *Labeo rohita*, *Catla catla*, *Cirrhinus mrigala* raised in six earthen ponds measuring 30 x 16 x 1.5 m for a period of nine months. The response of treatments towards increase in fish weight and total length was significantly different. Three fish species performed differently in the six ponds, for their growth parameters. The fertilizers of ponds enhanced the gross fish yield / pond / 9 months. Increase in body weight of each species was maximum in T_6 (0.3 g) and T_5 (0.25 g) followed by T_4 (0.2 g) and T_3 (0.15 g) while a poor increase in body weight was observed in T_2 (0.1 mg) and T_1 (0.5 g).

Key Words: Carps; Fertlizer; Nitrophos; Body weight

INTRODUCTION

Aquatic resources are among the major alternatives for the production of animal protein. Fish is one of the best aquatic animals that can help in augmenting protein supply for human use. Fresh water farming also contributes significantly to the total out-put but the main importance of this source lies in the fact that it has immense potential for growth. In order to get maximum fish production from limited area it is essential to use fertilizers both organic and inorganic, for the production of microscopic and macroscopic flora and fauna. Fertilization also increases the fish production without the risk of dietary diseases (Hepher, 1963). The importance of fertilization of pond is indisputable. It has been used for centuries on carp ponds in Asia and Europe. A lot of work has been done on the application of organic and inorganic fertilizers in the fishponds. Sheikh (1984) reported that the growth of fish was strongly correlated with the increase of fish food (zooplankton & phytoplankton) in the treated pond as a result of fertilization with N. P. K. (20:20:5). Experiments conducted by Boyd (1981) and Sheri *et al.* (1986) have furnished information about the yield of fish as a result of fertilization in fish ponds. In view of great importance of inorganic fertilizers, the present project is therefore, planned to see the effect of different doses of fertilizer on the growth performance of major carps.

MATERIALS AND METHODS

The experiment was conducted using six earthen ponds having dimensions of 30 x 16 x 1.5 m located at Fisheries Research Farm, University of Agriculture, Faisalabad. Each pond has three fish species i.e., *Labeo rohita*, *Catla catla* and *Cirrhinus mrigala* in the ratio of 40:30:30, respectively. At the time of stocking, the morphometric characteristics i e. body weight and total length of the fish were measured. All the ponds were fertilized weekly with nitrophos on the basis of nitrogen contents ranging from 0.05 to 0.3% of wet body weight of fish daily. The different treatments used in the study are as follows. In pond i fertilization was done at the rate of 0.05 mg, pond ii 0.1 mg, pond iii 0.15 mg, pond iv 0.2 mg, pond v 0.25 mg and pond vi 0.3 mg N / 100 g of fish.

The experiment was continued for nine months. After every month fish from all the ponds were taken out to monitor their growth and were released back into their respective ponds. The amount of fertilizer was calculated on the basis of fresh body weight of fish every monthly interval.

RESULTS AND DISCUSSION

The growth of three fish species as influenced by different treatments was studied as follows.

Average body weight. In T_1, the initial average body weights of *Labeo rohita*, *Catla catla* and *Cirrhinus mrigala* were observed to be 77.5, 67.3 and 102.5 g, respectively. While the final average body weights of the same species shows 336.7, 295.3 and 422.3 g, respectively. Minimum 7.8 to 6.7 and 19.5 g increase in body weight was noted in 5th (2-2-1997) observation of all three species. Maximum 52.8, 51.8 and 63.9 g increase in body weight was observed in 10th (2-7-1997) and 9th (2-6-1997) observations. This was due to the higher temperature because fish feed at higher rate at optimum temperature. This trend is in harmony with the findings of Jana *et al.* (1979), who reported that maximum gross production in the summer month of July with the rise

Table I. Monthly increase in body weight (g) of *Labeo rohita* under different treatments

Date	T_1		T_2		T_3		T_4		T_5		T_6	
	Body wt.	Increase in wt.	Body wt.	Increase in wt.	Body wt.	Increase in wt.	Body wt.	Increase in wt.	Body wt.	Increase in wt.	Body wt.	Increase in wt.
2-10-96	77.5	-	77.5	-	78.6	-	77.9	-	78.2	-	77.6	-
2-11-96	94.8	17.3	95.9	18.4	99.1	20.5	100.5	22.6	102.5	24.3	103.2	25.6
2-12-96	113.4	18.6	116.4	20.5	124.4	25.3	128.3	27.8	131.7	29.2	134.4	31.2
2-1-97	123.9	10.5	125.0	8.6	134.9	10.5	140.9	12.6	146.2	14.5	150.5	16.1
2-2-97	131.7	7.8	134.8	9.8	150.7	15.8	159.2	18.3	167.8	21.6	173.3	22.8
2-3-97	152.2	20.5	165.6	30.8	191.6	40.9	213.1	53.9	128.5	60.7	241.9	68.6
2-4-97	188.6	35.8	211.9	46.3	146.9	55.3	285.9	72.8	308.0	79.5	326.4	84.5
2-5-97	233.6	45.6	271.4	59.5	314.3	67.4	373.4	87.5	403.8	95.8	428.7	102.3
2-6-97	283.9	50.3	336.2	64.8	400.1	85.8	468.7	95.3	519.3	115.5	548.5	119.8
2-7-97	336.7	52.8	404.8	68.6	499.0	98.9	589.1	120.4	649.8	124.5	679.7	131.2

Table II. Monthly increase in body weight (g) of *Catla catla* under different treatments

Date	T_1		T_2		T_3		T_4		T_5		T_6	
	Body wt.	Increase in wt.	Body wt.	Increase in wt.	Body wt.	Increase in wt.	Body wt.	Increase in wt.	Body wt.	Increase in wt.	Body wt.	Increase in wt.
2-10-96	67.3	-	68.6	-	67.9	-	68.5	-	69.4	-	70.1	-
2-11-96	80.8	13.5	84.3	15.7	83.3	15.4	83.9	15.4	83.2	13.8	83.9	13.8
2-12-96	95.5	14.6	102.6	18.3	100.6	17.1	101.7	17.8	100.6	17.4	99.3	15.4
2-1-97	107.9	12.5	116.8	14.2	116.2	15.6	116.9	15.2	106.4	15.8	113.6	13.3
2-2-97	118.5	10.6	128.7	11.9	130.0	13.8	130.3	13.4	129.2	12.8	127.2	13.6
2-3-97	125.5	6.7	142.4	13.7	152.9	22.9	154.9	24.6	163.8	34.6	166.1	38.9
2-4-97	152.1	26.9	173.8	31.4	196.6	43.7	207.4	52.5	241.9	78.1	249.7	83.6
2-5-97	192.9	40.8	232.6	58.8	279.4	82.8	300.5	93.1	378.6	96.7	359.9	110.2
2-6-97	224.7	51.8	301.9	69.3	378.0	99.4	428.2	127.7	482.5	143.9	509.5	149.6
2-7-97	295.3	50.6	378.6	76.7	468.3	89.5	558.7	130.5	608.2	125.7	649.8	140.3

Table III. Monthly increase in body weight (g) of *Cirrhinus mrigala* under different treatments

Date	T_1		T_2		T_3		T_4		T_5		T_6	
	Body wt.	Increase in wt.	Body wt.	Increase in wt.	Body wt.	Increase in wt.	Body wt.	Increase in wt.	Body wt.	Increase in wt.	Body wt.	Increase in wt.
2-10-96	102.5	-	104.1	-	101.7	-	104.5	-	101.8	-	102.6	-
2-11-96	130.8	28.3	134.9	30.8	134.2	32.5	138.4	33.9	134.3	38.5	135.9	33.3
2-12-96	154.3	23.5	163.0	28.1	162.8	28.6	167.7	29.3	161.7	27.4	164.7	28.8
2-1-97	173.9	19.6	184.7	21.7	182.9	20.1	190.4	22.7	181.6	19.9	185.6	20.9
2-2-97	193.4	19.5	207.2	22.5	201.8	18.9	213.9	23.5	202.4	20.8	207.3	21.7
2-3-97	216.3	22.8	234.0	26.8	237.1	35.3	254.4	40.5	239.9	45.5	154.6	47.3
2-4-97	250.5	34.3	280.2	46.2	296.9	59.8	339.1	83.7	336.2	88.3	338.2	83.6
2-5-97	303.1	52.6	342.8	62.6	387.2	90.3	446.3	107.2	453.1	116.9	465.5	127.3
2-6-97	367.0	63.9	431.1	88.3	476.4	89.2	565.2	118.9	575.9	122.8	598.2	132.7
2-7-97	422.3	55.3	507.5	76.4	579.0	102.6	665.0	99.8	693.2	117.3	720.4	122.2

of temperature of water while the minimal production was recorded in September.

In T_2, the initial and final average body weights of three species were noted to be 77.5-404.8, 68.6-378.6 and 104.1-505.5 g, respectively. Minimum 8.6, 11.9 and 21.7 gm increase in body weight was noted in 4th (2-1-1997) and 5th (2-2-1997) observations while maximum increase 68.6, 76.7 and 88.3 g in 9th and 10th (2-6-1997 to 2-7-1997) observations. In T_3, the initial and final average body weights were noted to be 78.6-499.0, 67.9-468.3 and 101.7-579.0 g, respectively. Minimum 10.5, 13.8 and 18.9 g increase in body weight was observed in 4th (2-1-1997) and 5th (2-2-1997) observations while maximum increase 98.9, 99.4 and 102.6 g in the 10th (2-7-1997) and 9th (2-6-1997) observations. In T_4 the initial and final body weights were noted to be 77.9-589.1, 68.5-558.7 and 104.5-665.0 g, respectively. Minimum 12.6, 13.4 and 22.7 g increase in body weight was noted while maximum increase 120.4, 130.5 and 118.9 g in the 10th (2-7-1997) and 9th (2-6-1997) observations.

In T_5 the initial and final average body weights were noted to be 78.2-643.0, 69.4-608.2 and 101.8-693.2 g respectively. Minimum increase 14.5, 12.8 and 19.9 g in body weight was observed in 4th (2-1-1997) and 5th (2-2-

Table IV. Analysis of variance of body weight of three fish species viz., *Labeo rohita, Catla catla* and *Cirrhinus mrigala* under different treatments

S. O. V.	D. F	S. S	M. S	F. Value
Treatments	5	218761.52	43752.30	957.71**
Species	2	203867.55	101933.78	2231.27**
Months	9	380880.89	423210.10	9263.82**
M x S	18	23189.30	1288.29	28.20**
S x T	10	5211.65	521.16	11.41**
M x T	45	290513.28	6455.85	141.31**
Error	90	4111.57	45.68	-
Total	179	455454.76	-	-

Table V. Comparison of means

Treatments	Mean	Species	Mean	Months	Mean
Pond 1	184.32 $_F$	*Labeo rohita*	234.492 $_B$	October	144.906 $_G$
Pond 2	208.643 $_E$	*Catla catla*	201.638 $_C$	November	161.522 $_F$
Pond 3	232.453 $_D$	*Cirrhinus mrigala*	283.492 $_A$	December	196.800 $_E$
Pond 4	259.097 $_C$			January	257.200 $_D$
Pond 5	271.723 $_B$			February	340.384 $_D$
Pond 6	282.210 $_A$			March	439.784 $_B$
				April	538.856 $_A$
				May	83.128 $_J$
				June	105.772 $_I$
				July	129.056 $_H$

The column means followed by the same letters are statistically similar at $P < 0.05$

1997) observations. Maximum increase in body weights 124.5, 143.9 and 122.8 g in 10th (2-7-1997) and 9th (2-6-1997) observations. In T_6 the initial and final body weights were noted to be 77.6-679.7, 70.1-649.8 and 102.6-720.4 g, respectively. Minimum 16.1, 13.6 and 20.9 g increase in body weight was observed in the 4th (2-1-1997) and 5th (2-2-1997) observations. Species showed a maximum increase of 131.2, 149.6 and 132.7 g in the 10th (2-7-1997) and 9th (2-6-1997) observations (Table I, II & III).

The results reveal that the three species, treatments as well as the months differ significantly and there was highly significant difference among weight gain in fish under treatments and months. This was also confirmed by Goolish and Adelman (1984) that potential for growth of Juvenile carp (*Cyprinus carpio*). The fish were given different qualities of feed and accustomed to 12, 18, 24 and 30°C temperature respectively, and the quantity of diet for maintenance was 0.4, 0.75, 1.20 and 1.90% of body weight daily. The overall maximum scope for growth, defined as the difference between the rations for maximum growth and the maintenance ration, occurred at 27°C. The results showed that maximum weight gain in fishes observed in pond 6 in which 0.3 g N was applied followed by pond 5, 4, 3, 2 and pond 1, respectively. The weight increase was possible due to more planktonic biomass, because the higher growth rate of fish corresponded with the increase in planktonic life which showed their maximum densities at high phosphate concentration of the water (Sin, 1987). Chiba (1971) studied among various environmental factors, the effect of temperature on the fish growth and found maximum growth rate when temperature of pond was maximum. The results obtained during the present investigation are substantiated by the views of these workers, as the increase in the body weight was more in warmer months.

The response of treatments towards increase in fish weight was significantly different. Three fish species performed differently in six ponds (Table IV & V). At the end of nine months experimental period all the six ponds were harvested for final fish catch. Gross fish production in T_1, T_2, T_3, T_4, T_5 and T_6 was calculated to be 34.99, 42.77, 51.38, 60.27, 63.78 and 68.29 Kg / 9 months, respectively. The net fish yields per hectare per year under the influence of said treatments were computed as 742.58, 956.09, 1280.21, 1441.63, 1568.29 and 1664.73 Kg, respectively.

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