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EFFECT OF ARTIFICIAL FEED, FERTILIZER AND MANURE ON THE PERFORMANCE OF MAJOR CARPS.

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Growth performance of 20 *Catla catla*, 34 *Labeo rohita* and 20 *Cirrhinus mrigala* was studied under different fertilizers and artificial feeding regimes in three earthernponds measuring 0.0112 ha. each. Treatment I consisted of fertilizer Pannaqua pac, N : P : K, 20:20:5 (16 Kg in instalments) and artificial feed comprising of 95% rice bran and 5% fish meal (50% C. P.) at a rate of 4.5-7. 5% of body weight, fertilizer (12 Kg in 12 instalments) and organic manure 103 Kg as a whole was applied in the second treatment in Pond 2, Pond 3 contained no additives and was designated as control.

The increase in weight in *Catla catla* was 2577 gm, 8040 gm, 8805 gm, in *Labeo rohita* 9010 gm, 19762 gm, 26898 gm and in *Cirrhinus mrigala* 2793 gm, 4964 gm, 9867 gm in the control pond, treated pond 1 and treated pond 2, respectively. Total fish production of 667.26 Kg, 1257.60 Kg and 1647.82 Kg per acre per year was recorded in the control pond, treated pond 1 and treated pond 2, respectively in the period of one year.

INTRODUCTION

In Pakistan, there are large areas of land which are not suitable for exploitation in the livestock farming sector and could profitably be used for fish pond construction. To get maximum yield from a limited area of fresh water, it is essential to use artificial feed, manure and fertilizer. Artificial feed is decidedly the most efficient means of turning low value food into high quality animal proteins. It plays an important role in intensive fish culture by maintaining a higher density of fish than the natural fertility of pond could support.

The carp feeding experiments were first begun in Israel (Hepher and Chervinski, 1965). These experiments showed that feeding the carp with protein diet resulted in higher yields. These results were later confirmed by field trails

carried out at commercial fish farms by Chervinski *et al.* (1968). Pond fertilization aims at greater fish production through an increased growth of food organisms.

The present study was designed to see the effect of Inorganic fertilizer, cow manure and artificial feed on the growth of *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala* in polyculture.

MATERIALS AND METHODS

The experiment, to assess the effect of artificial feed and fertilizer in pond 1, and that of artificial feed, fertilizer and manure in pond 2 on the growth of major carps viz., *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala*, was carried out from February 1, 1982 to February 1, 1983 at Government Fish Seed Hatchery, Satiana Road, Faisalabad, keeping pond 3 as a control.

Three Katcha fish ponds, each measuring 15m x 7.5m x 1.5m i. e. 0.0112 ha, were selected. These were dried, limed with Calcium Carbonate (5 Kg per pond) and rewatered. The liming was done to disinfect the pond and to stabilize the pH of water. Fertilizer Pannaqua pac, N. P. K. 20 : 20 : 5, by NFC Faisalabad (16 Kg in 12 instalments) and artificial feed, 95% rice bran and 5% fish meal (377 Kg in total at the daily ration rate of 4.5 - 7.5% body weight), were added in pond 1. The artificial feed, (475 Kg in total at daily ration rate of 4.0 - 5.0% body weight), fertilizer (12 Kg in 12 instalments) and manure (103 Kg) were put in pond 2; whereas pond 3 was kept as a control.

Twenty *C. catla*, 34 *L. rohita* and 14 *C. mrigala* were stocked in each of the treated and control ponds. Eight fish were randomly selected from each pond during each month to monitor the growth pattarn and to readajust the quantity of food. After recording the necessary data, the fish were stocked back in their respective ponds for recording data in future months.

Statistical treatment has been dealt in detail in a new article presented separately.

RESULTS AND DISCUSSION

The growth of the three fish species viz., *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala* (i) with no additives (control), (ii) with artificial feeding and

fertilizing and (iii) with artificial feeding, fertilizing and manuring has been studied by collecting the data on several characteristics. The detailed discussion, keeping in view these parameters, will be covered in the following paragraph.

a) *Growth rate of fish* : The growth rates with respect to body weight in each of the three fish species in control and treated ponds are discussed as under :

Body weight : The maximum growth of *C. catla* in control pond was noted during the month of September which was closely followed by the month of July where the gains per month were 37 and 35 gm, respectively (Table 1). In pond 1, the rate of increase in weight during the first four months was the lowest. The average rate of increase during the last four months remained 24 to 29 gm, The maximum gain was noticed during July (80.6 gm) which was closely followed by August (71.5 gm) and September (70.0 gm). In pond 2, the increase in weight were not higher than those in pond 1. However, the maximum growth was noticed during September (72.9 gm) which was closely followed by growth during July (69.4 gm). The lower gain during August, could be due to sampling fluctuations. Table 1 clearly describe the growth pattern of *C. catla* in the three types of ponds.

The maximum weight gain in *L. rohita* in control pond was recorded during August (52 gm). In pond 1, this species showed maximum weight gain during June (150 gm) followed by October (105 gm). *L. rohita* appeared to have more favourable response in pond 2 where the rapid weight gain started during April and continued upto September (Table 1).

As regards the third species *C. mrigala* no marked differences in weight gain were noticed among various months; the maximum value being 24 gm was seen for the months of July and October in the control pond. In treated pond 1, the greater gains were spread over the whole year except for first and the 3rd month; the maximum gain was, however, noticed during the month of July (53.0 gm) followed by September (50.0 gm). In pond 2 this species showed better growth in July and August during which the gains in weight were 177 and 163 gm, respectively. Table 1 show the performance of this species in the situation under study.

Generally, *L. rohita* has shown comparatively greater weight gains than the other two species. It is noticeable that pond with manure has shown higher

TABLE - I : Increase in body weight (gm) of three fish species in control and treated ponds.

Observation Date.	Catla catla						Labeo rohita						Cirrhinus mrigala					
	Control		Treated pond 1.		Treated pond 2.		Control		Treated pond 1.		Treated pond2.		Control		Treated pond 1.		Treated pond 2.	
	Wt.	Increase.	Wt.	Increase.	Wt.	Increase.	Wt.	Increase.	Wt.	Increase.	Wt.	Increase.	Wt.	Increase.	Wt.	Increase	Wt.	Increase
1.2.82	48	-	97.0	-	56.0	-	35.5	-	32.00	-	33.0	-	30.5	-	28.3	-	23.6	-
1.3.82	53	5	74.6	17.6	63.0	7.0	45.0	9.6	51.3	19.3	65.00	32.0	36.0	5.5	40.0	11.7	40.0	16.2
1.4.82	68	15	91.0	16.4	96.0	33.0	51.7	6.4	53.0	1.7	103.5	38.5	48.0	12.0	83.0	43.0	55.0	15.0
1.5.82	90	22	116.0	25.0	119.3	23.3	63.6	11.9	60.7	7.7	176.7	73.2	68.0	20.0	103.0	17.0	125.0	70.0
1.6.82	105	15	133.9	17.9	179.1	59.8	80.7	17.1	120.0	59.3	271.7	95.0	80.0	12.0	126.0	26.0	140.0	15.0
1.7.82	130	25	180.4	46.9	242.3	63.2	117.5	36.8	270.0	150.0	410.4	138.7	96.0	16.0	160.0	34.0	190.0	50.0
1.8.82	165	35	261.0	80.6	311.7	69.4	146.0	28.5	363.5	93.5	500.0	89.6	120.0	24.0	213.0	53.0	367.0	177.0
1.9.82	181	16	332.5	71.5	349.4	37.7	198.0	52.0	444.4	81.1	593.3	93.3	137.0	17.0	235.0	22.0	530.0	163.0
1.10.82	218	37	402.5	70.0	422.3	72.9	237.0	39.0	519.0	74.6	668.7	75.4	156.0	19.0	285.0	50.0	550.0	20.0
1.11.82	230	12	426.0	23.5	437.2	14.9	265.0	28.0	624.0	105.0	720.0	51.3	180.0	24.0	330.0	45.0	560.0	10.0
1.12.82	247	17	452.0	26.0	457.9	20.5	277.0	12.0	645.0	21.0	740.0	20.0	198.0	18.0	370.0	40.0	565.0	5.0
1.1.83	265	18	481.0	29.0	471.3	14.0	289.0	12.0	666.0	21.0	790.0	50.0	215.0	17.0	410.0	40.0	580.0	15.0
1.2.83	280	15	510.0	29.0	496.2	24.7	300.0	11.0	695.0	29.0	820.0	30.0	250.0	15.0	445.0	35.0	610.0	30.0

weight gain for *L. rohita* while *C. mrigala* and *C. catla* appeared to have not responded well to manuring as gain in its weight was slightly lesser than that in pond 1.

b) *Influence of Artificial feed, Fertilizer and Manure :* Average increase in weight per month in *C. catla* was 47.06 gm in pond 1; 39.00 gm in pond 2 as against 21.86 gm in control pond during the last 8 months of the experiment, whereas the respective averages for 12 months were 37.75, 36 00 and 19.33 gm. The increase in production of fish per acre was computed to be 267.73, 225.44 Kg for treated ponds 1 and 2, respectively during the last 8 months, while the production figures for the entire period were 326.00, 352.00 and 199.00 Kg for treated ponds 1, 2 and control, respectively (Table 2). These comparative values clearly indicate the difference due to feeding and fertilizing only, and feeding, fertilizing and manuring over the control group. Artificial feeding cum fertilizing has been quite effective in increasing the weight gain, whereas the addition of manure to artificial feeding and fertilizing has caused a further increase in the weight of fishes.

In the case of *L. rohita*, there was much more increase in fish weight in ponds with artificial feeding cum fertilizing than that of control pond. The average increase in weight during the entire period of experiment observed to be 55.24, 65.00 and 22.04 gm in treated ponds 1, 2 and control pond, respectively. Similarly the increase in production per acre for these ponds were 613.33, 663.72 and 265.14 kg, respectively during the last 8 months of study. Highly significant effect of artificial feeding supplemented by fertilizer is noticeable. In this case the addition of manure to artificial feedining/fertilizing appeared to be more effective for further gain in weight. *C. mrigala* showed an average increase of 34.72, 48.00 and 17.04 gm in weight per month in treated ponds 1, 2 and control pond, respectively. The increase in weight of this fish during the last 8 months was 158.72, 233.92 and 74.56 kg per acre, whereas the total weight achieved at the end of experiment was 189.87, 321.96 and 114.49 kg in the above mentioned ponds, respectively.

The total per acre production of all the three species was computed to be 1257.60, 1647.82 and 676.27 kg, respectively, for ponds 1, 2 and the control (Table 2). The species *L. rohita* and *C. mrigala* have responded much more

favourably to the addition of manure in pond 2, whereas *C. catla* has shown a negligible increase in weight in treated pond 2 as compared to treated pond 1, showing thereby no favourable response to the addition of manure to the fertilized pond.

Table 2 : *Total fish production in control and treated ponds.*

	Control Pond.			Treated Pond. 1.			Treated Pond. 2.		
	S_1	S_2	S_3	S_1	S_2	S_3	S_1	S_2	S_3
Number of fish stocked	20	34	14	20	34	14	20	34	14
Number of fish recovered	20	34	14	18	30	12	20	34	14
Initial average weight (gm)	48	35	30.5	57	32	28.3	56	33	23.8
Final average weight (gm)	280	300	230	510	695	445	496.25	820.00	610.00
Production per pond (gm)	5600	10200	3220	9180	20850	5340	9925	27820	10200
Production per acre (gm)	199111	3662667	114489	326400	741333	189867	352889	991289	303644
		667.267			1267.600			1647.822	
		S_1 *Catla catla*			S_2 *Labeo rohita*			S_3 *Cirrhinus mrigala*	

The present study is in accordance with the results of experiments conducted by Hepher (1962), and Wood & Sheddan (1971). They showed an increase in production of fish due to fertilization. Boyd (1976) observed an increase in the production of fish due to the effect of fertilizers on the growth of planktons.

The results of this study are also in confirmity with those obtained by Chaudhri (1975), Parameswaran (1971) and Jhingran (1974), who had shown an increase in the prodction of fish by the use of artificial feed.

REFERENCES

Boyd, C.E. 1976. Nitrogen fertilizer effect on production of *Tilapia* in ponds fertilized with phosphorus and potassium. Aquaculture, 7 : 385-390.

Chaudhuri, H. 1978. A new heigh in fish production in India with record yields from fresh water ponds. Aquaculture, 6 (5) : 343-56..

Chervinski, J., B. Hepher and A. Taugari. 1968. The nutritive values of various fodder plants for carp. Bamidgeh, 18 : 296.

Hepher, B. 1962. Ten years of research in fish ponds fertilization in Israel. I. The effect of fertilization on fish yields. Bamidgeh, 14 : 29-38.

Hepher, B., and J. Chervinski. 1965. Studies on carp nutrition - the influence of protein rich diets on growth. Bamidgeh, 17 : 31-46.

Jhingran, V.G. 1974. Fish and Fisheries of India. Hindustan Publ. Corp., 272 pp.

Parameswaran, S. 1971. Fish yield from Assam ponds kept under different experimental conditions. Indian J. Fish., 18 (1-2) : 67-83.

Wood, C., and T.L. Sheddan. 1971. Noris reservior fertilizer study. I. Effect of fertilizer on food chain organisms and fish production. J. Tran. Acad, Sci., 46 : 81-91.