Pak. Jour. Agri. Sci.
24 (1) 24, 1987

NUTRIENT REQUIREMENTS OF THE FISH

ii. Fertilization with SSP and artificial feed supplementation of pond.

A. N. Sheri, M. B. Sial, M. Javed and F. Sarwat

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

The effect of artificial feed plus inorganic fertilizer on the growth performance of 3 major carps, viz: *Catla catla*, *Labeo rohita* and *Cirrhina mrigala* was determined for the period of nine months, using 2 ponds one as control, while the other as treated. Fertilization was done by single superphosphate at the rate of 100gm per month and artificial feed with 29.21% protein in the form of pellets was added at the rate of 2% of wet fish body weight daily in the treated pond.

Statistical analysis showed that artificial feeding plus fertilization of pond exerted highly significant effect on the weight gains in all the 3 fish species. Similar trends were observed in the feed conversion efficiency. However, some differences in the degree of significance in fork length and total length were noticed. The total production of all the 3 fish species/acre/year in the control and treated ponds was computed to be 624.14 kg and 1573.66 kg, respectively.

INTRODUCTION

Adequate supplies of quality foods is essential for human population of rapidly developing countries, like Pakistan. As far the vegetable part of dietary, it may be considered self sufficient but the protein in general and those of animals in particular for human consumption are lacking very much. To meet the exaggerated demands it has become possible through only aquatic resources that have so far been left unexplored fully. In Punjab the major carps present a good future. The have potentials to grow faster in katcha ponds and thus proper management can make its production efficient and economical. It is possible to increase the yield of such fishes/acre/year. As an emergency measure fish rearing in the country under such condition is very practical step and before embarking upon a country wide programme, some projects are pertinent to establish basic data.

Fertilization of fish bonds with inorganic materials and artificial feed supplementation have been attempted with positive results (Hepher, 1963; Boyd, 1976; Dimitrov, 1974). Important role played by artificial feed was shown by Jhingran (1974). Method of polyculture serves the purpose of intensive fish production as bottom, middle and surface flora and fauna can best be utilized by fishes of different feeding habits (Hepher and Pruginin, 1981 and Stanly *et al.*, 1978).

The present investigation was undertaken to establish the standards for the application of SSP and artificial feed supplementation on various aspects of growth of 3 major carps viz. *Catla catla*, *Lebea rohita* and *Cirrhina mrigala*.

MATERIALS AND METHODS

The methods adopted were same as given by Sheri *et al.* (1936-i) with the exception of following modifications:

i) Stocking density used was *Catla catla* 14; *Labeo rohita* 34 and *Cirrhina mrigala* 8 (ii) Fertilization was done by single super phosphate at the rate of 100 gm per month and artificial feed with 29.21% protein, consisting of meat meal 10%, blood meal 10%, fish meal 10%, bone meal 10%, rice polishing 30%, salt 2%, multivitamins 1% and wheat flour 27% in the form of pellets of 05mm size (Szumiec, 1969) was added at the rate of 2% of wet fish body weight daily in the treated pond for the period of 9 months (from 7.1.1984 to 3.10.1984).

RESULTS AND DISCUSSION

1. *Growth Rates of Fish*

The data were collected on sampling basis and records on average body weights, fork lengths and total lengths were obtained from both the control and treated ponds at the start of the experiment till the end of it at monthly intervals. The necessary interpretations are given in the following paragraphs.

a) *Body weight*

The initial and final average body weights of *Catla catla* in the control pond were 25.00 and 302.72 gm while the same in the treated pond rose from 27.14 to 810.04 gm. Maximum growth of 62.74 gm was observed during the month of July in control and 171.85 gm in the treated pond. As regards *Labeo rohita* the initial and final weights in the control pond were 27.50 gm and 238.20

gm whereas in the treated pond the weights were 36.70 and 605.00 gm, respectively. Maximum growth occurred during the month of July in the control (45.50 gm) and June (160.50 gm) in the experimental pond. In case of *Cirrhina mrigala*, the average initial and final weights were 15.50 and 194.50 gm in the control and 17.50, 389.00 gm, respectively in the treated pond. Maximum growth in this species of fish occurred during the month of June (37.70 gm) in the control and during July (80.70 gm) in the treated pond. Overall picture appeared that *Catla catla* gained maximum weight 58.92 gm/month which was higher than that of other two species. As regards the influence of treatment, it exerted highly significant influence on weight gain (24.72 gm in control but 63.89 gm in supplemented pond). The seasonal differences were also highly significant. (Table 1). June and July (temperature, 30-32°C) being the best months for weight gains of fishes.

The interaction, species x month (S x M) was non-significant showing that the fish did not deviate from the general trend in gaining weight. The interaction between months x treatment was significant.

b) *Fork length* :

The initial and final fork lengths of *Catla catla*, *Labeo rohita* and *Cirrhina mrigala* in control pond were 117.50 and 246.87, 113.40 and 227.50, 112.60 and 234.9 mm, while the ranges for treated pond appeared to be 118.00 and 326.78. 120.50 and 310.50, 115.20 and 280.20 mm, respectively. The maximum increase in fork length of *Catla catla* was noticed in the month of June (38.92 mm) in the control and 49.24 mm in the month of May in the treated pond. In case of *Labeo rohita* the maximum increase was observed during the months of May and June (22.50 and 22.40mm, respectively) in control pond, but the value of forklength increase in treated pond was 47.60mm during the month of June. As regards the *Cirrhina mrigala*, greatest increase in the fork length was seen during the month of August (25.60 mm) in the control and during June (41.50 mm) in the treated pond. Statistical analysis showed that difference was highly significant between treatment. Seasonal/month difference was also highly significant. May to July were the best months for fork length to develop and increase in length. The interactions, species x treatment, species x months and months x treatment were non-significant, indicating thereby a general trend of fishes to develop fork length (Table 1).

Table 1. *Mean squares for various characteristics*

S.O.V.	Df.	Mean Squares		
		Gain in weight	Gain in fork length	Gain in total length
S	2	3627.26**	37.29NS	26.16NS
M	8	5150.91**	465.99**	478.68**
T	1	20622.51**	726.07**	822.74**
S x M	16	285.09NS	32.29N.S	44.19NS
S x T	2	1359.33**	22.80NS	25.36NS
M x T	8	1347.95**	66.32NS	55.45NS
Error	16	170.43	70.17	69.24
Total	53			

	Mean values for		
i) Species	Weight gain	Fork length gain	Total length gain
Cutla catla	58.92 a	18.79 a	20.88
Labeo rohita	43.28 b	16.89 a	18.69
Cirrhina mrigala	30.587c	15.96 a	16.77
S.E.	3.077	1.974	1.961
ii) Treatments			
Treated	63.89 a	20.88 a	22.68 a
Control	24.72 b	13.55 b	14.87 b
S.E.	2.511	1.612	1.601
iii) Months			
Jan.	7.06 d	7.30 c	8.17 c
Feb.	12.17 d	7.45 c	8.38 c
Mar.	19.52 cd	10.95 c	13.70 bc
Apr.	30.06 c	17.37 bc	19.42 bc
May.	47.44 b	29.56 a	30.69 a
Jun.	84.22 a	31.02 a	32.87 a
Jul.	84.68 a	22.60 ab	24.35 ab
Aug.	63.54 b	14.11 bc	16.42 bc
Sep.	49.66 b	14.58 bc	15.04 bc
S.E.	5.329	3.419	3.397

c) *Total length*

Catla catla had initial and final total lengths in the control and treated ponds as 142.50, 285.71 and 143.30, 375.89 mm, respectively. The maximum increase was noticed during the month of June (40.20 mm) in the control and during May (49.04 mm) in the supplemented pond. In the case of *Labeo rohita*, the initial and final lengths were 138.90 mm and 270.00 mm in control, while 147.20 and 352.50 mm in the treated pond. The maximum increment of total length in the control and treated ponds remained as 26.80 and 49.80 mm during the month of June. As regards *Cirrhina mrigala*, the initial and final lengths in the control and treated ponds were 138.20, 265.50 mm and 141.50, 316.00 mm, respectively. The maximum increase in the control pond was noticed during August (27.90 mm) and that in the treated it went upto 41.30 mm in June.

Statistical analysis showed that the average gain in total length of 3 fish species used in the study were not significantly different, although *Catla catla* showed a gain/month/fish relatively higher (20.88 mm) than other species. As regards the effect of treatment, the increase in total length was 14.87 mm in fishes of control pond and 22.68 mm in those of treated pond. The difference was highly significant. The effect of month was also highly significant, May and June being the best months for development of total length of fish. Due to significant interaction between species x months, it was clear that the fishes went on gaining the length increase according to the general pattern.

2. *Feed Conversion Rations :*

During the period of 9 months, a total of 62.85 kg of artificial feed and 0.900 kg of inorganic fertilizer was added to the treated pond. The pond conversion was calculated to be 1.89, meaning thereby that 33.25 kg of total body weight of all the three fish species was gained in the treated pond due to 62.85 kg of artificial feed plus inorganic fertilizer. It was observed that conversion ratios were better in the warmer months of study. Thus present study confirmed that temperature showed positive effect on fish growth. The results obtained in this study are in conformity with Erokhina (1959), Swingle (1960), Hepher and Chervinski (1965) and Chervinski *et al.* (1968).

3. *Influence of Inputs on fish production :*

Average increase in body weight per month per fish for *Catla catla*, *Labeo rohita* and *Cirrhina mrigala* was 30.86 and 86.99 gm, 23.41 and 63.14 gm, 19.89

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

Title	Treated			Control		
	Catla catla	*Labeo rohita*	*Cirrhina mrigala*	*Catla catla*	*Labeo rohita*	*Cirrhina mrigala*
Number of fish stocked	14	34	8	14	34	8
Number of recovered	14	34	8	14	34	8
Survival %	100	100	100	100	100	100
Initial average weight (gm)	27.14	36.70	17.5	25.00	27.50	15.5
Final average weight (gm)	810.04	605.00	389.00	302.72	238.20	194.50
Total production/ pond/9 month (gm)	11340.56	20570.00	3112.00	4236.08	8098.80	1556.00
Total production/ acre/9 month kg	312.17	693.21	104.87	142.75	272.93	52.43
Gross production			All Species			All Species
Kg/aere/9 months			1180.25			468.11
(Approx.) Kg/acre/vear			1573.66			624.14

and 41.27 gm in the control and treated ponds, respectively. Total production per acre per 9 months for 14 *Catla catla*, 34 *Labeo rohita* and 8 *Cirrhina mrigala* was computed to be 142.75 and 312.17 kg, 272.93 and 693.21 kg, 52.43 and 104.87 kg for control and treated ponds, respectively. Total production of all the 3 fish species/acre/year in the control pond was 624.14 kg while it rose to 1573.66 kg in the treated pond (Table-2). From the results it is clear that there was a significant increase in body weight of fishes in the pond which received fertilizer plus artificial feed.

The results obtained in the present study are in line with those obtained by Chaudhri (1975), Varghose (1979) who conducted experiments for artificial feed Plus fertilizer application in fish ponds. The present observations are also inconformity with the results obtained by Jhingran (1974).

REFERENCES

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

Chaudhuri, H. 1975. A new high in fish production in India with record yields from fresh water ponds. Aquaculture, 6(5) : 343-56.

Chervinski, J., B. Hepher. and A. Tagari. 1968. The nutritive value of various fodder plants for carp. Bamidgeh, 29(1) : 6-15.

Dimitrov, M. 1974. Mineral fertilization of carp ponds in polyculture rearing. Aquaculture. 3 ; 273-285.

Erokhina, L. 1959. Opyt Primenena Gyranulirovannvo Korma. Rybovod. I. Rybolvo. 2 (4) : 8-10. (VIDE FAO SYMPOSIUM ON NEW DEVELOPMENT IN CARP AND TROUT NUTRITION, 1968).

Hepher, B. 1963. Ten year of research in fish pond fertilization in Israel. 2. Fertilizer dose and frequency of fertilization. Bamidgeh, 15(4) ; 78-92

Hepher, B., and J. Cherwinski. 1965. Studies on carp nutrition-the influence of protein rich diet on growth. Bamidgeh. 17 ; 31-46.

Hepher, B., and Y. Pruginin. 1981. Commercial fish Farming. John Wiley and Sons, New York.

Jhingran, V. G. 1974. Fish and Fisheries of India. Hindustan Publishing Co-

rporation. 272 P.

Sheri, A. N., M. B. Sial and M. Javed. 1936. Nutrient Requirements of the Fish i) Pond fertilization with N. P. K. (20 ; 20 ; 5) Pak. Jour. Agri. Sci. 23 (3-4) ; 266-277.

Stanley, B., W. H. Allsopand and F. Brain Davy. 1978. Fish farming on account of the aquaculture research programme supported by International Development Research Centre. Ottawa, PP. 19-20.

Swingle, H.S. 1960. Comparative evaluation of two Tillapias as pond fishes in Alabama. Trans. Amer. Fish. Soc., 89 ; 142-148.

Szumiec, J. 1969. Preliminary experiments with pellets for carps. FIFAC Tech. Pap. 9 ; 71-75.

Varghose, T.J. and Shantharm, B. 1979. Preliminary studies on the relative growth rates of three Indian major carp hybirds. Acadamy of Sciences 88 ; 209-216.