

Effect of different doses of manure on growth of Rui (*Labeo rohita*), Catla (*Catla catla*) and Carpio (*Cyprinus carpio*) polyculture

Sadhan Chandra Sarker^{1*}, Md. Rezaul Hasan², Md Altaf Hossain Chowdhari³, MNS Mamun Siddiky⁴

¹Senior Upazilla Fisheries Officer, Noakhali Sadar, Noakhali, Bangladesh

²Department of Aquaculture, Bangladesh Agricultural University, Mymensingh 2202, Bangladesh

³Fisheries Extension Officer, Upazila Fisheries Office, Raigonj, Sirajgonj, Bangladesh

⁴Bangladesh Fisheries Research Institute, Brackish water Station, Paikgacha, Khulna-9280, Bangladesh

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*Corresponding Author:

Sadhan Chandra Sarker

Email: sarkersc04@gmail.com

ABSTRACT

A six months experiment was conducted from January to June 2000 to explore the effects of different doses of manure on the growth of Rui (*Labeo rohita*), Catla (*Catla catla*) and Carpio (*Cyprinus carpio*). Ponds each having a surface area of 44 m² and water depth of 1 m was used. Four treatments each in triplicate were used in the study: cow manure at high dose (CH: 1610.74 kg/ha) and low dose (CL: 805.37 kg/ha) and poultry manure at high dose (PH: 1116.28 kg/ha) and low dose (PL: 558.14 kg/ha). All the manures were applied fortnightly. Sampling was done at monthly intervals. Three species of fishes (Rui, Catla, Carpio) were stocked at the density of 8000/ha at the ratio of Rui:Catla:Carpio = 4:3:3. The highest and the lowest percent of weight gain of all the fishes were recorded in PH treatment which was followed by the treatment CH, PL, and CL, respectively. The same trend was also recorded in case of percent of specific growth rate (% SGR) in all the fishes among all the treatment. The recorded values of all the water quality parameters were within the productive range.

INTRODUCTION

Although aquaculture is the world's fastest growing agro-food sector but in Bangladesh it is a very important for food security. Aquaculture has the prospective to be an important means in concentrating issues such as malnutrition and poverty. Fisheries sector is one of the most important sectors of Bangladesh. It contributes 5% of the gross Domestic product (GDP), 16.8% of the agricultural production and 8% of the export earnings (DOF, 1999). Bangladesh earned 1457.41 crore take by exporting fish and fishery products (DOF, 1998).

Several factors are very crucial for successful aquaculture practices, among which fertilization is most important. Organic fertilizers enhance the production of both phytoplankton and zooplankton in ponds (Alikunhi, et al. 1955 and Bhimachar, 1971) and it is the cheapest and simplest means of increasing aquatic productivity (Kriegel and heinrich, 1939). Both the organic and inorganic fertilizers are used in fish ponds for increasing fish production by developing natural fish food organisms in the pond and it is the most important methods of intensifications of stock (Merla, 1976). Abundance of plankton and chironomid larval were found in greater number in manured ponds, especially in treated ponds with poultry manure, than in ponds that received applications of chemical fertilizers (Rappaport et al., 1977, Moavrt al., 1977 and Schroeder, 1978). According to hickling (1962) organic fertilizers are especially efficient in increasing the abundance of zooplankton and benthic organism and Lower dosage of organic fertilizer should be applied to ponds during the rainy reason (Bombeo et al., 1989).

A Healthy aquatic environment and the production of sufficient fish food organisms play very important role in successful fish culture practices. Among the primary factors limiting the productivity of a water body, the quantity of available nutrients is very important which enhance the growth of living organisms. Fertilization supply these nutrients which overcome the deficiency of natural fish food organism. As a result, maximum possible fish yield is obtained from a water body. To explore the above fact the present research work was undertaken to achieve the following objectives: i) to evaluate the manurial effect on the water quality parameters, ii) to evaluate the manurial effect on the growth rate of fishes iii) to recommend the suitable manure and its dose for maximum growth rate of fishes.

MATERIALS AND METHODS

The experiment was carried out for a period of six months from January to June, 2000 in ponds situated at the South-west corner of the Faculty of Fisheries, Bangladesh Agricultural University, Mymensingh. The experimental ponds were rectangular in shape, each having a surface of area of 44m² and an average depth of 1 m. The ponds were prepared to start the experiment by adopting the following manners: Aquatic vegetation were cleared off by repeated cutting, the banked and embankment of the ponds were repaired in some broken places, the predatory and the weed fishes were also removed by repeated netting using cast and seine net, the ponds were limed at a dose of 250kg/ha.

Design of experiment

The experiment was conducted in Randomized Block Design (RBD). Four treatments namely, poultry manure

high (PH) 1610.74 kg/ha, cowdung manure high (CH) 1116.28 kg/ha, poultry manure low (PL) 558.14 kg/ha and cowdung manure low (CL) 805.37 kg/ha were used in the experiment, respectively. Each of the treatments were run in triplicates. Fertilization was done at 15 days intervals.

Water quality parameters

The physical and chemical parameters of water were recorded at fortnightly intervals. The water temperature and transparency were recorded by centigrade thermometer and secchi disc respectively. Water depth was estimated by a meter scale. Dissolved oxygen content of water was measured by DO meter (YSI model 58, made in USA) while the pH of meter (Jenway model 3020, made in UK).

Fry stocking

The fishes were stocked at a density of 8000/ha after 10 days of fertilization. Three species of fishes (Rui, Catla, Carpio) were stocked at the ratio of Rui:Catla:Carpio = 4:3:3. Fish meal, rice bran and wheat bran (fish meal: rice bran: wheat bran = 10:40:5) were supplied once daily at the rate of 5% body weight.

Fish growth estimation

Thirty percent of the total fishes were caught to estimate the fish growth. After measuring the weight all the fishes were released into the ponds without delay.

RESULTS AND DISCUSSION

Water quality parameters

Water temperature, transparency, dissolved oxygen, pH, were recorded during the experimental period (Table 1). All physico-chemical parameters were within the productive of fish culture. During the investigation period (January to June, 2000), water temperature was ranged from 22 to 31^oc. There was a little variation of temperature among all the treatment. Jhingran (1991) quoted the water temperature between 18 to 37.8^oc. Dewan et al. (1991) recorded the water temperature ranged from 29.3 to 34.0^oc. The values of the water transparency in the ponds under different treatments were fluctuated from 27 to 35cm. The result is more or similar to Boyd (1982). Dissolved oxygen do content of water ranged from 5 to 7.5 mg/L. The present findings more or less similar with the findings of Bhuyan (1970), Alikunhi (1957), Banerjee (1967). Swingle 1957 stated that water having a pH range of 5.6 to 9.0 are the most suitable for pond fish culture Banerjee 1967 observed that water having pH 6.5 to 7.5 were the best for fish pond. Ellis 1937 reported that pH values between 6.5 to 8.5 productivity of water for aquatic life. Ali et al. 1980 found the fluctuation of pH between 7.5 to 9.5. DOF (1996) reported that the range of pH of a suitable water body for fish culture would be 6.5 to 8.5. These findings more or less agree with the findings of the present study.

Table 1. Variation of water quality parameters throughout the whole experimental period.

Water quality parameters	Treatments	January	February	March	April	May	June
Temperature	PH(Poultry High)	23.0	24.0	24.0	30.5	31.0	30.0
	CH(Cowdung High)	25.0	24.5	23.5	31.0	29.0	30.0
	PL(Poultry Low)	23.0	24.0	22.0	30.0	29.0	29.5
	CL(Cowdung Low)	24.5	22.5	25.0	29.5	30.0	30.0
Transparency	PH(Poultry High)	30.0	29.0	28.0	24.0	27.0	25.0
	CH(Cowdung High)	32.0	30.0	30.0	28.0	27.0	26.0
	PL(Poultry Low)	33.0	35.0	34.0	33.0	34.0	35.0
	CL(Cowdung Low)	35.0	34.0	33.0	35.0	35.0	34.0
Dissolved oxygen	PH(Poultry High)	7.5	8.0	7.5	7.0	6.5	7.0
	CH(Cowdung High)	6.5	6.0	7.5	6.5	6.0	5.6
	PL(Poultry Low)	7.0	6.5	7.5	6.0	5.0	6.0
	CL(Cowdung Low)	6.0	6.7	7.0	7.5	6.5	7.0
pH	PH(Poultry High)	7.0	7.5	8.2	7.5	7.0	8.0
	CH(Cowdung High)	7.5	7.0	7.2	8.0	7.3	6.5
	PL(Poultry Low)	6.5	6.0	6.5	7.0	6.2	7.5
	CL(Cowdung Low)	7.5	7.0	6.5	6.0	6.2	7.0

Table 2. Water quality parameters over the whole experimental period

Treatment	Temperature(^o C)	Water transparency (cm)	Dissolved oxygen (mg/L)	pH
PH	27.08	27.17	7.25	7.53
CH	27.16	28.83	6.35	7.25
PL	26.25	34.00	6.33	6.61
CL	26.91	34.33	6.78	6.70

Fish growth

In case of percent weight gain of Rui, the maximum and minimum values were recorded 233.33 and 3.70 in the treatments PH and CL in the month of January and June, respectively. The percent weight gain of Catla was maximum 166.67 in PH treatment in the month of January and minimum 2.23 in CL treatment in the month of June. The maximum and minimum percent weight gain of Carpio was 175.00 in the month of January and 1.92 in the month of June in PH treatment. Halder (1977) reported that rapid growth of rohu and catla was found during the period of January to February followed by February to March. The growth rates of both species were the poorest in the month of April in the ponds through a substantial higher growth rate observed in the previous months (Table 1).

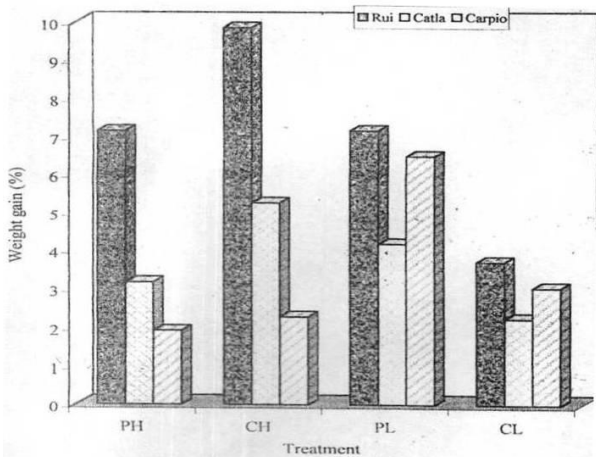


Figure 1. Growth rate of fishes in the month of June under different treatments

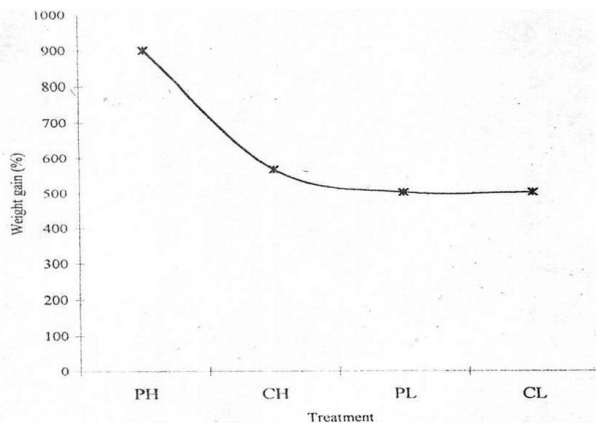


Figure 2. Growth rate of Rui (*Labeo rohita*) under different treatments over the whole experiment periods.

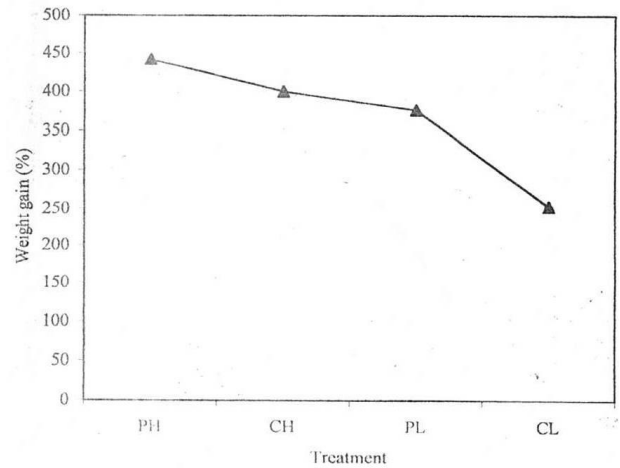


Figure 3. Growth rate of Catla (*Catla catla*) under different treatments over the whole experiment periods.

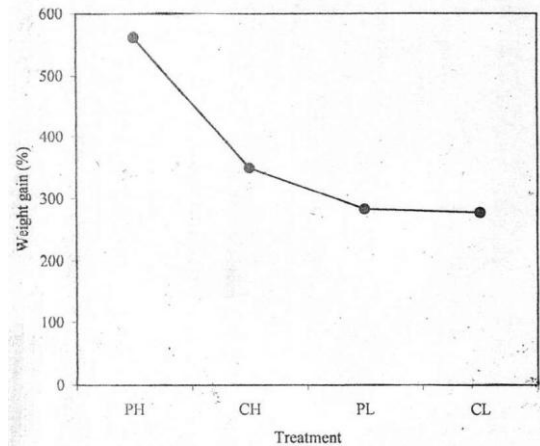


Figure 4. Growth rate of Carpio (*Cyprinus carpio*) under different treatments over the whole experiment periods.

On an average, the growth rate of Rui over the whole experimental period, the maximum percent of weight gain was found 900.00 in PH treatment and the minimum was 499.57 in CL treatment (Table 2). The maximum percent of weight gain of Catla was found 441.67 and the minimum was 253.75 in PH and CL treatment, respectively (Table 3). The minimum percent of weight gain of Carpio was found 562.00 in PH treatment and the minimum was 277.78 in CL treatment (Table 4).

Varghese and Shankar (1981) conducted five series of fish ponds fertilization using cattle dung, pig dung, poultry manure, sheep manure and sewage sludge on Indian major carps and concluded that poultry manure was the best among the treatments. Mitra *et. al* (1987) reported that poultry manure alone gave better growth of fish than that of the poultry manure in combination with pig or-cow manure. Fang *et al* (1988) recorded the highest yield of fish treated with chicken manured ponds followed by that of the duck, pig and the cow manure ponds. Laha *et al.* (1990) also reported that poultry manure were found to enhance the growth of carps than other manures as well as obtained better production of fish which supported the findings of the present research. The PH treatment showed the best result among all the treatments in case of fish growth. This is due to the better ability of poultry manure to enhance the production of plankton.

Table 3. Growth rate of fishes under different treatments over the whole experimental period.

Species	Treatment	Initial Weight (g)	Final Weight (g)	Weight gain (%)	SGR (%)
Rui (<i>Labeo rohita</i>)	PH	60.00	60.00	900.00	1.28
	CH	31.00	30.00	566.67	1.05
	PL	30.00	30.00	500.00	1.00
	CL	28.00	28.00	499.57	1.00
Catla (<i>Catla catla</i>)	PH	32.50	32.50	441.67	0.94
	CH	30.00	30.00	400.00	0.89
	PL	50.00	50.00	376.19	0.87
	CL	30.67	30.67	253.75	0.70
Carpio (<i>Cyprinus carpio</i>)	PH	132.50	132.50	562.50	1.05
	CH	90.00	90.00	350.00	0.84
	PL	76.67	76.67	283.35	0.75
	CL	85.00	85.00	277.78	0.74

CONCLUSION

The present research was conducted for a period of six months from January to June 2000 to evaluate the effect of manure on the growth rate of fishes. The values of water temperature and water transparency were found to ranged from 22-31°C and 24-35 cm, respectively. Dissolved oxygen concentration of the treated ponds fluctuated from 5 to 7.5 mg/L. pH values ranged from 6 to 8.2. The maximum and minimum percent of weight of all fishes over the whole experimental period was found best in PH treatment followed by CH, PL and CL treatment, respectively. The similar trend was reported in case of percent of specific growth rate (SGR) in all the fishes among all the treatments. From the aforesaid research findings, it can be concluded that the PH treatment is the best among all the treatments. Therefore the fish farmers can be encourage to use the suitable dose of poultry manure (1116.28kg/ha) for increasing the production of fishes.

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