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Effect Of Organic Manuring On Growth Of Indian Major Carps

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ABSTRACT

A pond experiment was conducted to evaluate the effect of organic manuring on growth of Indian major carps in composite (Polyculture) fish culture at experimental farm Deptt. of Fisheries, N.D. University of Agriculture & Technology, Kumarganj, Faizabad during 2013-14. Experiment was comprised of three treatments viz. T1- Control (No feeding), T_2-Cow dung + Poultry Manure, T_3 - Vermin compost + supplementary feeding with organic fish feed. In T_1 (control) pond no fertilizer was applied while in the treatment no. 2 ponds were properly fertilized with cow dung @ 2.5 t/ha after three days of liming and supplementary feeding with poultry manure @ 2.5 t/ha. In treatment no. 3 ponds were fertilized with vermin compost (5 t/ha) one week before stocking and supplementary feeding with organic fish feed. The organic fish feed contained earth worm meal, maize meal and soybean meal with crude protein content at 32%. Random samples of about 10 fishes were taken from each corner of the pond for morphometric measurements. The major fish growth parameters i.e specific growth rate (SGR) was also calculated. The individual fish growth is more in the pond fertilized with vermin compost + supplementary feeding with organic fish feed compared to control treatment confirming the utilization of fish feed for growth of fish in both the treatments. At harvest the highest individual fish weight was recorded in T_3 (Vermin compost + supplementary feeding with organic fish feed) followed by T_2 (Cow dung + Poultry Manure) and T_1 (Control). The harvested weight of fish in all the culture systems with different types of fish species were significantly different from each other ($p < 0.05$). The highest value of SGR (1.38% per day) was obtained in Rohu with the treatment T_3 . The study clearly proves that fertilization of ponds with organic manure will not only improve the water quality of the culture ponds, but also will increase the growth rate as well as the productivity of the ponds.

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INTRODUCTION

India is the second largest producer of inland fishes after china with annual fish production of 9.06 million metric tons. Fisheries not only provides livelihood to over 14.5 million people but also provides more than 60% dietary protein to fish eating population. Foreign exchange earnings to the tune of US$ 3.51 billion (2012–13) get from fish and fisheries products. India is home to more than 10 percent of the global fish diversity. The share of inland fisheries and aquaculture in total fish production was more than 85% with annual growth rate of 6%. The freshwater aquaculture comprises of the culture of carp fishes, culture of catfishes (air breathing and non-air breathing), culture of freshwater prawns, culture of pangasius, and culture of tilapia. Uttar Pradesh is one of the richest state of fresh water resources in the country comprises of 28,500 km of rivers and canals, 3.15 lakh ha of reservoirs and 1.61 lakh ha of ponds and tanks. The annual fish production of the state was estimated about 4.49 lakh tonnes with mean fish yield of about 2.6 tones/ha/year. Inadequate quantity of fingerlings for stocking and imbalanced fertilization of the reservoirs & lakes are the major constraint to fish production in Uttar Pradesh. On account of the vast natural resources, even a marginal increase in fish yield rates of the reservoirs and ponds in the state can contribute a substantial quantity of fish to the production basket. The major fish production systems adopted in India constitutes of Indian major carps viz. catla, Rohu, Mrigal. These are cultured mostly in extensive manner involving stocking and fertilization with chemical fertilizers and artificial supplementary feeds. With the adoption of commercial fish farming technique in recent years, fish production has been increased two to three folds. Commercial fish farming is characterized by high stocking density of fish, use of chemical fertilizers, antibiotic and other harmful synthetic products. This has led to imbalance in pond ecosystem, resulting in degradation of aquatic flora and fauna (Holmer *et al.*, 2008), leading to increased risk to human health. Organic fish production is becoming popular among

farming community. Several works has been carried out work in organic fish farming utilizing organic manures/ livestock manures as fertilizers (Behrends *et al*., 1983; Mims *et al*., 1991). Wide range of organic manures viz. grass, leaves, sewage, livestock manure, domestic wastes, night soil, dried blood meal have been used as a nutrient for growth of phytoplankton and zooplankton in aqua culture. Yadava and Garg (1992) found that an application of cow dung along with supplemental feed increases fish production more than two folds as compared to cow dung treated ponds only or supplemental feed alone. Balasubramanian and Bai (1994) utilized biogas-plant effluent in fish polyculture and total fish production of 6653 kg/ha/year was obtained without any supplementary feeding. Use of water hyacinth compost as fish pond manure was studied by Sahu *et al*. (2002). More fish production was resulted in the fish pond fertilized with water hyacinth compost in comparison with ponds fertilized with inorganic chemical fertilizers. studied the use of water hyacinth compost as manure in nursery ponds for larval rearing of *Labeo rohita*. Better performance with regard to growth and survivability of the larvae was recorded in the ponds treated with water hyacinth compost than in either the ponds treated with inorganic fertilizers.

In view of the above observation effect of organic manuring on fish production of composite fish culture was studied in 2013-14.

MATERIALS & METHODS

Experimental design

Effect of organic manuring on growth of Indian major carps in composite fish culture was studied during 2013-14. Composite fish culture (Polyculture) is one of the major fish farming technique developed for increasing fish culture productivity per unit area. It involves stocking and growing two or more compatible and complimentary fish species like Indian Major Carps (IMCs), Chinese Carps and the Common Carp in water body like pond to maximize fish production by fullest utilization of all available niches in the pond ecosystem. The principle behind the CFC is to produce maximum quantity of fish per unit area from a scientifically managed water body by stocking fast growing, economically important, compatible species having shortest food chain utilizing the all ecological niches of the water body.

In the present study, Indian major carps viz. catla, Rohu and Mrigal were cultured for a period of one year following three different management practices – T_1- Control (No feeding), T_2-Cow dung + Poultry Manure, T_3 - Vermin compost + supplementary feeding with organic fish feed. Each of the above culture practices were replicated thrice. 9 ponds each measuring 0.01 ha situated in the experimental farm of Department of fisheries, NDUAT, Kumarganj, Faizabad were used in the study. Before stocking ponds were cleaned of unwanted weeds and fishes by manual using fishnets. Alkaline nature of ponds was also maintained by adequately adding lime in the ponds as per the pH of the soil. All the culture ponds were filled with deep tube well water to a maximum depth of 1.5 m, and the same level was maintained throughout the study period by compensating the daily losses. In T_1 (control) pond no fertilizer was applied while in the treatment no. 2 ponds were properly fertilized with cow dung @ 2.5 t/ha after three days of liming and supplementary feeding with poultry manure @ 2.5 t/ha. In treatment no. 3 ponds were fertilized with vermin compost (5 t/ha) one week before stocking and supplementary feeding with organic fish feed. The organic fish feed contained earth worm meal, maize meal and soybean meal with crude protein content at 32%.

Culture of Indian Major Carps

Stocking of ponds was done with the fingerlings of three Indian major carps, Catla (*Catla catla,* Hamilton), Rohu (*Labeo rohita*, Hamilton,) and Mrigal (*Cirrhinus mrigala*, Hamilton) @ 10,000 fingerlings/ha with a ratio of 1:1:1. Seed stocks of equal size, good quality and disease free with good growth rate potential were selected for stocking (Xie *et al.,* 2011). Fingerlings of the three species (catla, rohu and mrigal) were obtained from the hatchery of Department of Fishries, Govt of Uttar Pradesh, Faizabad. Stocking was done in the early morning when the temperature of water was low. Before stocking, the fish seeds were kept in a 2% NaCl solution bath for 1-2 minutes and were then well acclimatized to pond water. The mean initial weights of catla, rohu and mrigal species were 20.0 g, 20.5 g and 21.0 g respectively. The feed was applied at different water depths (0.7 m, 1.0 m and 1.2 m) using nylon rope and nylon bag for feeding of surface, column and bottom feeders. This procedure increased access for the different feeders to feed and it also minimized energy loss. The supplementary feed was provided at the rate of 5% of fish biomass up to 30 days, 3% up to 60 days, 2% up to 160 days, 1% up to the rest of the culture period.

Determination of fish growth parameters

Random samples of about 10 fishes were taken from each corner of the pond for morphometric measurements. The major fish growth parameters i.e specific growth rate (SGR) was calculated following using the following equations:

$$\text{SGR } \% = \frac{100}{\text{culture period days}} (\log \text{final weight} - \log \text{initial weight}$$

Statistical analysis

Fish growth parameters were statistically analyzed by one-way ANOVA with different culture systems as the factor.

RESULTS & DISCUSSION

Data presented in table - 1 revealed that treatment no. 3 (vermin compost @ 5 t/ha + Supplemenatary feeding with organic fish feed) contributed greater individual weight gain and net fish production as compared to the treatment no. and 2. The individual fish growth is more in the pond fertilized with vermin compost + supplementary feeding with organic fish feed compared to control treatment confirming the utilization of fish feed for growth of fish in both the treatments. Fishes stocked in the experimental ponds were selected to have the same mean initial weight for different treatments. However, at harvest the highest individual fish weight was recorded in treatment no. 3 followed by treatment no. 2 and treatment no. 1. The harvested weight of fish in all the culture systems with different types of fish species were significantly different from each other ($p < 0.05$).The growth of Catla, Rohu and Mrigal in three different culture systems varied significantly. Growth of different species of fish is presented in Table -1.

The specific growth rate (SGR) of Indian major carps in different treatments is presented in Table 2. The highest value of SGR (1.38% per day) was obtained in Rohu with treatment no. 3. These results clearly show that fertilization of ponds with organic manure will not only improve the water quality of the culture ponds, but also will increase the growth rate as well as the productivity of the ponds.

Table 1: Mean values of initial and final weights of fish (g) for different treatments

Fish Species	Treatment	Initial weight (g)	Final weight (g)	Weight gain (g)
Catla	T_1	20.00	120.50	100.50
	T_2	20.00	675.50	655.50
	T_3	20.00	785.80	765.80
Rohu	T_1	20.50	272.25	251.75
	T_2	20.50	680.10	659.60
	T_3	20.50	777.25	756.75
Mrigal	T_1	21.00	250.50	229.50
	T_2	21.00	550.75	529.75
	T_3	21.00	605.20	584.20
CV (%)		0.95	10.35	

Table 2: Observed mean values of specific growth rate (%) in different treatments

Fish Species	Specific growth rate (%)/day		
	Control (No feeding)	Cow dung + poultry manure	Vermin compost + supplementary feeding with organic fish feed
Catla	0.905	1.15	1.19
Rohu	0.965	1.34	1.38
Mrigal	0.891	1.11	1.13

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