

Studies on growth and mortality of *Cyprinus carpio* (Lin.) in floating ponds

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Abstract

Growth and mortality rate of *Cyprinus carpio* (Linnaeus) under five different dietary conditions were studied in fifteen floating net cages in ponds of the Bangladesh Agricultural University Campus, Mymensingh. Growth rate was found to vary under different dietary conditions. The feed with mixture of 25% rice bran, 5% wheat bran, 30% linseed oil cake and 40% water hyacinth leaf meal exhibited the highest growth rate. The gain of log of body weight per unit increase of log of total length was significant. Significant survivals of the fishes was found.

Key words : Floating cage, Supplemental feed

Introduction

Fish culture in floating cages is yet to be popularized in Bangladesh. One of the major constraints behind intensive fish farming in Bangladesh is the multi-ownership of ponds which can be solved through use of floating cages for fish culture. Among the various reasons, lack of knowledge in the selection of appropriate species, preparation of low-cost balanced diets and determination of appropriate stocking density are still the major set backs for the development of floating cage fish culture (Mollah *et al.* 1987). The experiments so far done in Bangladesh indicate that it can registrar spectacular increase over the same under conventional pond farming (Aminul Hoque 1978). Fish culture in cages could be developed by improving stocking density, feeding methods, selection of species and regulating the culture cycle for maximum profitability (Sodikin 1977).

Cyprinus carpio is a phytophagous fast growing species, well suited to farming in ponds and lakes. In the present study the authors attempted to

establish the growth condition of this species by obtaining net gain, relationship between total length and body weight and condition factor. Also an attempt was undertaken to know the mortality rate. All of the above knowledge are very important for the scientific culture and management in floating ponds. The present study reports the growth response of carp to various supplementary diets in floating net cages. With the above considerations in mind an attempt has been made to culture *Cyprinus carpio* (Lin.) in floating ponds using supplemental feeds.

Materials and methods

Experiment was carried out for five different dietary conditions (Treatment I : rice bran 35% + wheat bran 30% + linseed oil cake 15% + fish meal 20%, Treatment II : rice bran 25% + wheat bran 17% + linseed oil cake 28% + fish meal 10% + ipil-ipil leaf meal 20%, Treatment III : rice bran 10% + wheat bran 10% + linseed oil cake 35% + ipil-ipil leaf meal 45%, Treatment IV : rice bran 25% + wheat bran 17% + linseed oil cake 28% + fish meal 10% + water hyacinth leaf meal 20%, and Treatment V : rice bran 25% + wheat bran 5% + linseed oil cake 30% + water hyacinth leaf meal 40%) for the period of six months in floating ponds made of synthetic netting materials of mesh size 5.0 mm fitted to a bamboo frame. About 25% protein level was maintained in each treatment.

The experiment was carried out for a period of six months in a pond of 3 hectares. Size of each cage was 1 m x 1 m x 2 m. Three hundred fry of *C. carpio*. belonging to the same age group and more or less similar sizes were stocked in 15 cages. The initial length was 7.36 cm and the initial weight was 5.94 gm. They were conditioned in a portable small plastic pool for 24 hours before being released in the floating ponds. Fishes were stocked at the rate of 20/m³ in each net cage. Feed was supplied once (morning) in 24 hours at the rate of 5% of total body weight of fishes throughout the experimental period. Twenty percent of the fishes in each pond were supplied at random using hand net and their lengths and weights were measured. Sampling was carried out at an interval of 15 days.

Total length and body weight relationship was established using the formula outlined by Doha and Dewan (1967) :

$$W = aL^n,$$

where, W = weight, L = length, 'a' = constant, and 'n' = an exponent. The calculation of co-efficient of condition (K) was done by using the formula $K = W/L^3$ (Doha and Dewan 1967). t-statistic was used by using the formula given by Quddus and Dewan (1988). The technique of analysis of variance was used to see the effect of various treatment combinations.

Results and discussion

The original data reveals that the maximum average gain in length (6.07 cm per six months) and in weight (24.52 gm per six months) was investigated by applying the diet with mixture of rice bran 25%, wheat bran 5%, linseed oil cake 30% and water hyacinth leaf meal 40%. The production of *C. carpio* in per cubic meter waterbody was obtained due to different supplementary diets. The Treatment I gave the maximum productivity (371.45 g/m^3) and Treatment IV gave the minimum productivity (371.45 g/m^3). The results regarding cumulative growth (in gram) of *C. carpio* due to the effect of various treatments had been presented in Fig. 1 which shows that the cumulative growth increases gradually due to effect of all the treatments. This figure also reveals that the Treatment I and Treatment II had better effect on fish growth than that of the Treatment III and Treatment IV at the end of the study period.

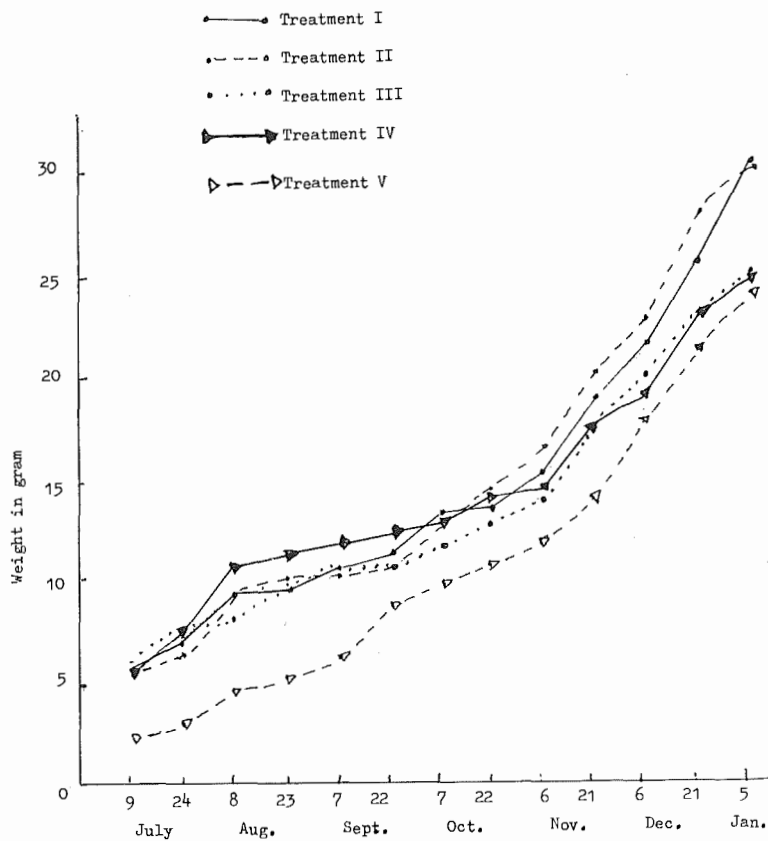


Fig. 1. Average cumulative growth of *Cyprinus carpio* (Lin.) in terms of increase in weight under same stocking rates over a period of six months.

Analysis of variance indicated that gain in length under different mixture of diets was significant ($F = 27.00$) at 1% level of probability and that gain in weight

was significant at 5% level of probability. The t-values of the Table 1 reveals that the relationship between log of total length and log of body weight obtained under different dietary conditions were significant. This results agreed with the result of Barua et. al. (1988). Statistical test also reveals that the Treatment I and Treatment II were significantly better effect on fish growth than the other treatments. Moreover, Treatment V exhibit highly significant increase of log of body weight with the increase of per unit log of body length (Table 1). This result occurred mainly due to application of higher rate of linseed oil cake, ipil-ipil leaf meal and water hyacinth leaf meal in replace of fish meal.

Table 1. T-values and Co-efficient of condition of *Cyprinus carpio* under different dietary conditions

Treatment s	t-value	Co-efficient of condition	
		Range	Mean
I	25.76*	1.09 to 1.92	1.59
II	26.14*	1.28 to 1.99	1.62
III	46.79**	1.32 to 1.95	1.74
IV	20.21*	04 to 1.92	1.74
V	45.04**	1.36 to 2.13	1.69

The ranges and mean values of condition factor in Table 1 shows that the conditions for fishes under same stocking rates were more or less similar. Doha and Dewan (1967) and Islam et al. (1978) reported that condition factor of *Tilapia mossambica* (Peters) was 1.69. Islam et al. (1978) also reported that the condition factor of *Oreochromis niloticus* ranges from 1.66 to 1.88, which agree well with the findings of the present study. This agrees with the findings of Viola (1975) who reported severe decrease in growth of carps in cages when two-thirds of fish meal of control ration containing 15% of fish meal were replaced by soybean meal.

Mortality of fishes among different treatment groups as recorded during investigation period is presented in Table 2.

Table 2. Survival and mortality of fingerlings at same stocking rates after six months of rearing

Treatments	Replication	Stocking rate		Survival/pond		Mortality/pond	
		per m ³ of	pond	No	%	No	%
I	1	20	20 s	19	95.00	1	5.00
	2	20	20	20	100.00	0	0
	3	20	20	18	90.00	2	10.00
	Mean			19	95.00	5.00	
II	1	20	20	18	90.00	2	10.00
	2	20	20	18	90.00	2	10.00
	3	20	20	20	100.00	0	0
	Mean		18.67	93.33	1.33	6.67	
III	1	20	20	20	100.00	0	0
	2	20	20	20	100.00	0	0
	3	20	20	20	100.00	0	0
	Mean			20	100.00	0	0
IV	1	20	20	19	95.00	1	5.00
	2	20	20	18	90.00	2	10.00
	3	20	20	20	100.00	0	
	Mean			19	95.00	1	5.0
V	1	20	20	18	90.00	2	10.00
	2	20	20	19	95.00	1	5.00
	3	20	20	15	75.00	5	5.00
	Mean			17.33	86.67	2.67	13.33

The highest mortality (13.33%) was exhibited for Treatment V and no mortality was recorded for Treatment III. The highest mortality may be due to the effect of higher rate of water hyacinth leaf meal or other factors (fry condition, size, transportation, environmental condition etc.). However, the total growth of fish due to the effect of this treatment is the best. This contradiction of higher growth and mortality within the same treatment group may be overcome through a further study with a large number of replications. F-statistic indicated that there was no significant variation among the mortality of *C. carpio* due to different dietary conditions. It is recommended that in future, effects of variation in the amount of animal protein on the growth of fishes should be studied with management cost. It is further suggested that investigation with cheaper and easily available animal protein feed such as frog meal, slaughter house waste, etc., and a little amount of protein from plant sources, such as water hyacinth

leaf meal and ipil-ipil leaf meal, may be used in the feed trial of fishes in floating ponds.

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