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Comparative Growth Study of Indian Major Carps and Exotic Carps in Pond Polyculture System

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Abstract An experiment was carried out to compare the growth performance of Indian major Carps (IMC) and exotic carps in polyculture system in two earthen ponds during July, 2015 to February, 2016. Areas of both the experimental ponds were of 0.1 hectare with an average depth of 1.5 meter. In pond one Indian major carp (IMC) catla (*Catla catla*), rohu (*Labeo rohita*) and mrigal (*Cirrhinus mrigala*) and in pond two exotic carp, silver carp (*Hypophthalmichthys molitrix*), grass carp (*Ctenopharingodon idella*) and common carp (*Cyprinus carpio*) were stocked at the rate of 6,500 fingerlings/ha. The stocked fishes in both the ponds were fed at the rate 3% of body weight with rice bran (RB) and mustard oil cake (MOC) at 1: 1. It was observed that, the gain fish body weight and total length of the fish stocked in pond two were maximum compared to that of fish stocked in pond one.

Keywords Growth, Indian major carp, Exotic carp, Rice bran, Mustard oil cake.

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Introduction

Polyculture is the system in which fast growing compatible species of different feeding habits are stocked in different proportions in the same pond has been practicing from the very beginning of the fish culture in China and in Indian sub-continent. The basic principles of the polyculture , i. e. culture of species of different feeding habits in the same pond is the best utilization of natural foods of different strata and zones without any harm to each other. It is a fact that, polyculture may produce an expected result if the fish with different feeding habits are stocked in proper ratios and combinations. In polyculture system one species improve the food accessibility for other species and as a result amplify the entire fish [1—2]. Fish is the major protein source contributing about 58% of total animal protein intake. Fish is the most excellent source of protein for human. Fish can be a valuable and cheap source to supplement the protein provisions to malnourished population of the world. Fish is regarded one of the most valuable resources to supplement the protein provisions in human diet [3]. Since, fish protein is considered as the cheap source of animal protein, fish production has captured a greater attention due to the wrldwide scarcity of animal protein. The growth performance of Indian major carps (*Labeo rohita, Catla catla* and *Cirrhinus mrigala*) can be improved by providing accessible enough amount of natural food and balanced artificial diet. Keeping the production performance of polyculture system an on farm trial (OFT) was conducted on

Table 1. Monthly increase in average length of fish in two ponds.

Month	Catla		Rohu		Mrigal		Grass carp		Silver carp		Common carp	
	Body length (cm)	Inc Body length (cm)	Body length (cm)	Inc Body length (cm)	Body length (cm)	Inc body length (cm)	Body length (cm)	Inc body length (cm)	Body length (cm)	Inc body length (cm)	Body length (cm)	Inc body length (cm)
Jul	13.4	–	12.2	–	11.3	–	15.3	–	15.8	–	9.9	–
Aug	20.8	7.4	18.3	6.1	16.5	5.2	23.5	8.2	25.1	9.3	18.3	8.4
Sep	24.8	4	25.1	6.7	22.9	6.4	28.2	4.7	29.6	4.5	24	5.7
Oct	27.3	2.5	26.6	1.5	27.1	4.2	31.7	3.5	33.2	3.6	28.7	4.7
Nov	29.6	2.3	27.9	1.3	29.3	2.2	34	2.3	35.4	2.2	31.3	2.6
Dec	31.8	2.2	30.7	2.8	30	0.7	35.6	1.6	36.5	1.1	33.7	2.4
Jan	33.3	1.6	33.3	2.6	31.4	1.4	36.4	0.8	37.7	1.2	34.9	1.2
Feb	34.2	0.9	34.4	1.1	31.9	0.5	37.9	1.5	38.4	0.7	35.7	0.8

composite fish culture to find out the best combination of fishes in culture system to achieve the highest yield.

Materials and Methods

The experiment was conducted in two earthen ponds at Digor Srikona village under Tapang Agricultural developmental Block of Cachar district, Assam. Fish were stocked in each pond of 0.1 hectare with an average depth of 1.5 meter. Liming was done at the rate of 630 kg/ha to adjust the pH and disinfect the ponds by dusting method. The ponds were screened with a guaze of fine mesh to avoid the entry of any intruders into or exit of fish from pond. After taking all these measures ponds were filled with water up to 1.5 m. This water level was maintained throughout the experimental period. The artificial feed (rice bran and mustard oil cake at 1 : 1) was given at the rate of 3% body weight of fish/day in two equal meals during morning (08 : 00h) and evening (18 : 00h).

In pond 1, 260 Catla (*Catla catla*), 195 rohu (*Labeo rohita*) and 195 mrigal (*Cirrhinus mrigala*) were stocked and in pond 2, 195 grass carp (*Ctenopharyngodon idella*) were stocked with 260 silver carp (*Hypophthalmichthys molitrix*) and 195 common carp (*Cyprinus carpio*). At the time of stocking the growth parameters such as total body weight and total length of fishes were measured . Both the ponds were sampled monthly to monitor the growth performance viz. body weight and total length. After recording the data the fishes were released back in their respective ponds.

Results and Discussion

Average total length

In pond 1, the initial average total length of catla, rohu and mrigal were observed to be 13.4 ± 0.36 cm, 12.2 ± 0.35 cm and 11.3 ± 0.57 cm respectively, while the final average total lengths were observed as 34.2 ±0.46 cm, 34.4 ±0.44 cm and 31.9 ± 0.49 cm respectively. The maximum increase in total length of catla 7.4 cm was observed in August while the maximum gain in lengths of rahu and mrigal was recorded 6.7 cm and 6.4 cm respectively in September. Similarly in pond 2, the maximum increase in total length of grass carp, silver carp and common carp were recorded to be 8.2 cm, 9.3 cm and 8.4 cm respectively in August while minimum increase in average total length of grass carp was recorded in January where it was 0.8 cm and that of silver carp and common carp it was 0.7 cm and 0.8 cm respectively in February. In pond 1 the minimum increase in average total length of catla, rohu and mrigal were recorded as 0.9 cm, 1.1 cm and 0.5 cm respectively in February (Table 1).

Average body weight

In pond 1, where indigenous species were stocked

Table 2. Monthly increase in average weight of fish in two ponds.

	Catla		Rohu		Mrigal		Grass carb		Sliver carp		Common carp	
Month	Body weight (g)	Inc Body weight (g)	Body weight (g)	Inc Body weight (g)	Body weight (g)	Inc Body weight (g)	Body weight (g)	Inc Body weight (g)	Body weight (g)	Inc Body weight (g)	Body weight (g)	Inc Body weight (g)
Jul	35	–	24.3	–	21	–	62.5	–	70.3	–	33.3	–
Aug	155.7	120.7	47.3	2.3	30.5	9.5	185.2	122.7	124.8	54.5	87.5	54.2
Sep	242.9	87.2	151.6	104.3	127	96.5	302.7	117.5	256.2	131.4	177.4	89.9
Oct	328.2	85.3	234.9	83.3	216	89	393.4	90.7	395	129.8	255.7	78.3
Nov	414	58.8	324.5	89.6	308.5	92.5	488.2	94.8	491.5	96.5	318.1	62.4
Dec	462	48	396.2	71.7	322	13.5	564.5	76.3	565.7	74.2	352.2	34.1
Jan	495	33	454.3	58.1	333.2	11.2	598.4	33.9	608.3	42.6	374.4	22.2
Feb	566	71	514.5	60.2	352	18.8	634.2	55.8	688.6	80.3	419	44.6

the initial average weights were 35.0 ± 0.49 g, 24.3 ± 2.94 g and 21.0 ± 6.73 g, for catla, rohu and mrigal respectively and final average weight were 566.0 ± 8.54 g, 515.3 ± 12.92 g and 352.0 ± 8.64 g. While in pond 2, the initial average body weight of grass carp, silver carp and common carp were 62.5 ± 5.46 g, 70.3 ± 6.22 g and 33.3 ± 2.86 g respectively. The final average body weights were observed as 634.2 ± 8.89 g, 688.6 ± 4.34 g and 419.0 ± 9.30 g. In pond 1 catla gained maximum weight of 120.7 g in the month of August, rohu and mrigal gained maximum body weight of 104.3 and 96.5 g respectively in the month of September. In pond 2 grass carp gained maximum body weight of 122.7 g in the month of August. Silver carp and common carp gained maximum body weight of 131.4 g and 89.9 g in the month of September (Table 2). Statistical analysis shows maximum specific growth rate in pond 1 where the IMC was stocked (Table 3).

In the present experiment the maximum gain in fish weight was observed in pond 1 in which stocking of the Indian major carps was done at the rate of 6,500 carp fingerlings /ha Saud et al. [4] reported faster length and weight gain of *Labeo rohita* by feeding the feed incorporated animal and plant protein. The minimum weight gain was observed in pond 2, which was stocked with exotic carps. Maximum weight gain in pond1 and pond 2 was noted during August and september and this was due to high water temperature while the lowest weight gain was observed in January. Lower values of monthly weight gain might be due to decreased food intake by fish at low temperatures [5]. It was earlier reported 30% incorporated protein in diet resulted better results with respect of growth [6-8] and SGR for *Labeo rohita, Cyprinus carpio* var *Nudus* and *Puntius gonionotus,* respectively.

Conclusion

It can be concluded from this study that the Indian

Table 3. Species wise weight gain% and specific growth rate. SGR = [Ln (FW) –Ln (IW))] * 100/240.

Stocked species	Initial length (mean ±se)	Final length (mean ± se)	Initial weight (mean ± se)	Final weight (mean ± se)	Weight gain (%)	SGR
Catla	13.4 ± 0.36	34.2 ± 0.46	35.0 ± 0.49	566.0 ± 8.54	1515.6	1.16
Rohu	12.2 ± 0.35	34.4 ± 0.44	24.3 ± 2.94	515.3 ± 12.92	2017.5	1.27
Mrigal	11.3 ± 0.57	31.9 ± 0.49	21.0 ± 6.73	352.0 ± 8.64	1573.7	1.17
Grass carp	15.3 ± 0.6	37.9 ± 0.4	62.5 ± 5.46	634.2 ± 8.89	914.1	0.97
Silver Carp	15.8 ± 0.38	38.4 ± 0.66	70.3 ± 6.22	688.6 ±4.34	879.6	0.95
Common carp	9.9 ± 0.35	35.7 ± 0.42	33.3 ± 2.86	419.0 ± 9.30	1159.5	1.06

major carps grow fast and hence are better to be cultivated in ponds to get greater economic gains. In this experiment the maximum gain in fish weight was observed in pond 1 where a combination of Indian major carps was stocked. Indian major carps are better in growth performance as compare to exotic carps.

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