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REARING OF *LABEO BATA* IN SEWAGE-FED FISH CULTURE POND

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ABSTRACT

***Labeo bata* is a highly priced fish which commanding good consumer preference, even if the size is very small (15 to 20 g each), especially in West Bengal. With a view to evaluating the culture potential of this fish, repeated experiments were conducted at the Wastewater Aquaculture Division of the Central Institute of Freshwater Aquaculture. Rahara, West Bengal, during 1991-93 in ponds fed with treated domestic sewage effluent. An average production of 1270.63 kg per ha was obtained within 6 to 10 months for a uniform stocking density of 50,000 seed per ha. The average size attained by the fish in the different sets of experiments varied from 23.3 to 37.9 g as against the initial weight of 0.096 to 0.193 g. Details of management, growth, survival, quantity of sewage used and pond nutrient status and productivity are dealt with in this communication.**

Labeo bata (bata), a highly priced median carp, has treamendous consumers' choice especially in West Bengal even when it is very small in size. Unlike major carps, bata has added advantage of its marketability for edible purpose when its size varies from 15-20g. This specific character makes it possible to culture the specimen in seasonal pond also. Much was not known about the suitable culture methodology and its production prior to the comprehensive studies made on its culute and production by the authors.

Sewage-fed system has been found to be one of the best for the culture of bata as the sewage effluent is rich in both organic and inorganic fertilizers resulting enormous growth of primary and secondary producers. Bata is one of the suitable species which can utilise the available plankton biomass for quick growth. As such mono-culture of this species was initiated in ponds of Wastewater Aquaculture Division of CIFA for the first time and details are investigated.

Experiments were conducted phasewise in four ponds measuring 0.08 ha each. Ponds were prepared during June-July by bailing out water sun-dried before monsoon. Then treated domestic sewage water was taken into each pond uniformly at the rate of about 3 million gallon/ha followed by the application of lime @ 200 kg/ha and kept for stabilization for 20-25 days. Dissolved oxygen was measured and bottom raking was done prior to stocking of bata fry @ 50,000/ha which were produced by

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Table 1 : *Pondwise stocking and harvesting detail of L.bata*

Details	Experiment-I		Experiments-II	
	Pond-A	Pond-B	Pond-A	Pond-B
Pond size (ha)	0.08	0.08	0.08	0.08
Stocking density (no./ha)	50,000	50,000	50,000	50,000
Liberation weight (g)	0.096	0.096	0.193	0.193
Final weight (g)	24.4	37.0	37.9	23.3
Culture period (day)	300	180	300	300
Survival (%)	80.2	39.7	81.5	83.4
Production (kg/ha)	1215.0	903.1	1521.6	1442.8

hypophysation and reared at the farm itself. Post stocking management was done by regular intaking of sewage into each pond at a rate of 0.041-1.23 million gallon/ha and monthly netting for maintaining the ponds' productivity and to assess the growth of the stocked fish. Final harvest was done by lowering of about 75% water level and adding of sewage water.

Hydrobiological studies were also carried out in the experimental ponds regularly following standard methods. (APHA, 1984).

Table 1 shows details of stocking, survival and production of bata in different ponds during the two phases of experiment. Table 2 represents the physico-chemical parameters of the

Table 2 : *Range and average (in parenthesis) values of physico-chemical parameters of water of the experimental set and quantities of nutrients recycled (kg / ha)*

	Set - I	Set - II
Temperature (°C)	(20.6-31.0	20.6-31.0
	(27.2)	(27.3)
pH	7.2-7.9	7.2-8.0
	(7.6)	(7.7)
DO (ppm)	2.0-8.6	2.4-8.6
	(4.2)	(6.0)
CO_2 (ppm)	12.0-30.8	10.0-30.6
	(20.8)	(20.7)
Total alkalinity (ppm)	104.0-254.0	102.0-264.0
	(164.6)	(167.7)
BOD_5 (ppm)	14.5-24.6	12.4-22.0
	(16.8)	(15.0)
Quantity of nutrients recycled (kg/ha)		
TAN	104.0	99.4
P_2O_5	30.0	28.8
K	212.5	203.8

ponds and the quantity of nutrients recycled during the culture operation. Datta *et al.*, (1986) reported the production range of bata from 152.2-275.1 kg/ha within 10-12 months when it was cultured in sewage-fed paddy plots at the densities of 2,500-12,500/ha in mixed-culture system. Average final size attained from 44.1-66.5g indicating 0.08-0.13g growth increment/day.

The present investigation indicated the production range of 903.1 to 1521.6 kg/ha averaging 1270.6 kg within a rearing period of 180-300. days. The survival rate of the species in different ponds varied from 39.7-83.4% indicating an average of 71.5%. Though the survival rate of the species in the present investigation is at par with that of what Datta *et al.* (1986) reported, in reality, the present survival rate was encouraging since the survivality was recorded from the fry state whereas in the previous experiments stockings were done with advanced fingerling of bata in paddy plot. Although paddy plots are found to be the ideal eco-system for this fish, creation of identical conditions in ponds having a very good growth of plankton gives comparable results.

An average survival rate of 71.0% maximum being 83.4% for bata fry rearing seems to be quite satisfactory

Table 3 : *Monthwise average values of sewage intake, plankton volume and absolute growth increment of fish/day*

Month	Average quantity of sewage taken (gallon)		Average plankton volume (ml/50*l*)		Average growth increment of fish/day (g)	
	Expt.I	Expt.II	Expt.I	Expt.II	Expt.I	Expt.II
July	23662*	23662*	8.4	9.6	-	-
August	428	428	0.2	0.4	(fishes stocked)	
September	3279	3279	0.8	0.6	0.111	0.073
October	3706	5844	2.0	2.5	0.138	0.088
November	7127	4134	1.2	1.4	0.127	0.114
December	14254	14254	1.0	0.5	0.103	0.096
January	14254	11403	2.2	8.0	0.098	0.0.91
February	5702	5702	10.0	8.6	0.089	0.080
March	2898	2898	8.0	6.0	Sampling not done	
April	8553	8553	3.0	6.0	0.110	0.074
May	7217	7217	3.2	6.2	Sampling not done	
June	X	X	X	X	0.133	0.080
Average :	8280 (1.04 Lakhs gallon/ha)	7943 (0.99 Lakhs gallon/ha)	3.6	4.5		

* Initial sewage intake during preparation

and comparable with fry rearing of major carps. This may be attributed to the maintenance of the congenial ecosystem for the fishes.

Plankton plays an important and far reaching role in the biological productivity of different water bodies. This becomes very true in sewage ponds where plankton is the principal food component for the fishes and has direct link with the fish production (Bhowmik *et al.*, 1993). In the present observation also a high plankton biomass could be maintained by judicious and regular application of treated sewage. Bhowmik *et al.* (1993) reported phytoplankton percentage of 72.2 where as in the present investigation phytoplankton constituted 90.9% in the ponds of experiment no. 1 and 86.0% in the ponds of other experiment. Volume of plankton was found to be higher initially after preparation of ponds with sewage effluent @ 2.96 million gallon/ha. The values in both the sets of experiments were lowered down in the months of August and September, immediately after stocking (Table 3). Studies on plankton further reveal that the phytoplankton dominated over the zooplankton throughout the investigation period ranging from 83.6-94.7% in the ponds of experiment No.1 compared to 60.6-94.7% in the ponds under experiment No.2. In general, higher values of phytoplankton in both the sets were recorded from the month of January to March (2880-8060 /l) whereas higher values of zooplankton (620-860 /l) were noted in January and February. Lower values (300-1600 /l) of phytoplankton were encountered during August-September while lean period of zooplankton was recorded in December (76-88 /l).

Major forms of phytoplankton comprised of Chlorophyceae and Myxophyceae followed by Bacillariophyceae. Copepoda, Cladocra and Rotifera were the major groups of zooplankton.

Growth analysis in both the sets indicates that the species showed higher growth during October-November (0.114-0.138g/day) and a sharp decline in growth was recorded during winter months (January-February) ranging from 0.07-0.09g/day thereafter a steady pick up was noticed from the month of April onwards coinciding the plankton peak and increasing trend of temp. Table 3 shows monthwise fish growth, sewage intake, and plankton volume.

The results indicate that this species has tremendous scope in sewage-fed culture system vis-a-vis the higher return due to its high market price even at a very small size in comparison to major carps (3-4 times higher price than that of major carps).

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