https://doi.org/10.29321/MAJ.10.A03043

Madras agric. J. 65 (1) : 42—45, Jan., 1978

Fish Production in Cemented Masonry Tanks under Semi-static Water Conditions

V. NATARAJAN[1]

Two circular cemented masonry tanks, each of 113m² area and 0.85 m depth, with fluctuating water levels, when utilised for fish culture, yielded a gross/net production of 2405.8/2057.2 Kg and 1560.0/1177.2 Kg/ha./year. Given only artificial feeding, *Cirrhinus mrigala* and *Labeo calbasu* recorded appreciable growth. The prospects of fish production in masonry tanks and particularly ryots raising additional fish crops by diverting the flow of water to the fields through a dug-out earthen fish pond, thereby integrating fish culture with agriculture, have been indicated.

Fish culture in earthen ponds with static water bodies is a wide-spread practice; whereas cement cisterns are being primarily put to limited use as fish nurseries. Literature concerning the utility of cement tanks in the fish culture and production processes is scarce. Ranganathan *et al* (1967) observed the natural spawning of *Cirrhinus mrigala* in cement tanks, with the successful breeding of induced pairs in the *happa* fixed in the tank. Spurgeon (1945) found possibilities of culturing *Osphronemus gorami* in cement cisterns. Alikunhi and Singh (1972) carried out a short-term experiment (2-4 months) to study the survival, growth, maturity and production of the grey mullet, *Mugil parsia* in cement cisterns with fertilization and both with and without supplementary feeding. The practice of the private enterprise in Jordan to construct a series of cement tanks, diverting the flow of freshwater spring through them and culturing fish has been reported, but production figures are not available (FAO, 1973). As against these, the use of cement tanks for fish production under semi-static water conditions and without fertilization in India is uncommon. Results of experimental work in this dirction are presented in this contribution.

MATERIALS AND METHODS

Two circular cement tanks, each of 113 m² and 0.85 m depth situated in the campus of the Tamil Nadu Agricultural University, Coimbatore have been used in the present study. These tanks were mainly intended as reservoirs for storing water pumped from deep tube wells and draining the same for irrigating the crops depending on demand, the tanks thus, functioning with semi-static water levels. Consequently, there had been irregularity in the periodicity and quantum of water withdrawn and replenished and these also varied from one tank to the other. However, it was ensured that the water height did not

1. Department of Fishery Science, Tamil Nadu Agricultural University, Coimbatore - 641003.

fall below 30 cm and raise beyond 70 cm. No fertilization was attempted owing to the frequent replenishment of water. Fishes of yearling size were introduced in the tanks, which were artificially fed daily (except on Sundays) with groundnut oil cake and rice bran in equal ratio at 5 per cent of the total body weight. The entire fish stock was harvested at the end of 11 months and survival, growth and production asses sed.

RESULTS AND DISCUSSION

The data of fish stocking and harvesting in the two tanks are presented in the Table.

The water in the tanks had the following range of physicochemical characteristics :- Water temperature : 26.9-32.4°C, Colour: clear to greenish appearance due to algal mat at the bottom and floating algal mass, dissolved oxygen: 9.0-20.8 ppm, pH: 8.0-8.8 and methyl orange alkalinity: 302 ppm.

Survival: The recovery has been quite high, ranging from 80 to 100%. This is understandable, as the water had the favourable properties in its dissolved oxygen and pH, besides the periodic replenishment of water. The stocking density was 6,000 numbers and 348.6 kg/ha in the I tank, while it was 7080 numbers and 347.3 kg/ha in the II tank.

Growth: As there was no natural food in the tanks, excepting the algal and slowly accumulating debris, the fishes have mostly to depend on the artificial feed, which was, hence, raised

TABLE. Fish stocking and harvesting Data in the two tanks

Species	Stocking				Harvesting				Recovery %	Mean monthly growth	
	Date	No.	Mean size mm	Mean size g	Date	No.	Mean size mm	Mean size g		mm	g
				I TANK							
Labeo fimbriatus	30.6.74	60	190	60 (91.4)	29.5.75	56	300	343 (77.1)	93	10	26
Cirrhinus mrigala	30.6.74	5	150	50 (3.8)	29.5.75	5	440	790 (15.8)	100	26	70
Labea calbasu	30.6.74	3	195	63 (4.8)	29.5.75	3	365	587 (7.1)	100	15	48
				II TANK							
Catla catla	30.6.74	10	150	50 (12.7)	29.5.75	10	293	312 (19.2)	100	13	24
Labeo rohita	30.6.74	15	155	45 (17.2)	29.5.75	12	307	328 (24.2)	80	14	26
Cyprinus carpio	30.6.74	55	80	50 (70.1)	29.5.75	54	212	170 (56.6)	98	12	11

(Numbers in parentheses indicate per cent composition by weight).

to 5 per cent of the body weight of the stock. Comparison of the growth rates will reveal the species of fishes accepting the feed given and maintaining the growth. From the Table, it is evident, that the mean monthly increment of *C. mrigala* (26 mm, 70 g) and *L. calbasu* (15 mm, 48 g) has been remarkable over the others. The higher growth rates of these species can be adduced to their easy acceptability of the feed, bottom feeding habit and lesser numbers in the stock. The growth of *S. rohita* and *L. fimbriatus* comes next. This is particularly noticeable in the case of the latter, considering its high density in the stock. *C. catla*, the fastest growing Indian major carp, has registered a monthly increment of only 13 mm and 24 g, despite its fewer numbers in the population, which is indicative of its poor reception to the artificial diets. The disappointing feature was that of *Cyprinus carpio*, a benthic omnivore (Sinha, 1972), adding on only 12 mm and 11 g as its mean monthly increment possibly due to its density in the stock and also the absence of soil bottom. The pattern of change in the percentage composition during stocking and harvesting points to the differential growth and production amongst the species.

Production : Fish production (gross/net) under this environment worked out to 7405.8/2057.2 kg/ha/year in the I tank, while in II tank, the yield was 1560.0/1172.2 kg/ha/year. The results thus, indicate nearly two to four-fold increased production in cement tanks, as against the estimated average Indian production from ponds of about 600 kg/ha/year (Jhingran, 1975). The production achieved also compares favourably with those obtained by Alikunhi *et al.* (1971) under composite fish culture experiments ranging from 700 to 4900 kg/ha/year. Alikunhi and Singh (*op. cit*) found the fish production in 18 m^3 cement cisterns with soil bottom and fertilization and stocked with *Mugil parsia* fingerlings at a density of 60,000 numbers/360 kg/ha to be 2600 kg/ha/year in the tank with supplementary feeding and 1565 kg/ha/year in the tank without feeding. Gross fish productions as high as 3,174 and 6,521 kg/ha/year were recorded through culture of Indian major carps alone and in combination with exotic carps respectively (Anon, 1973). An increased production to the tune of 7,720 kg/ha/year under composite fish culture with Indian and Chinese carps and with fertilization, feeding and replenishment of water (six times during the course of one year) has also been recently reported (Anon, 1974). Thus, replenishment of water helps to augment production, which could possibly have been the favourable factor, resulting in the notable production encountered in the cement tanks.

The study reveals the prospects of utilising cement tanks for fish production and in particular, the possibilities of raising additional fish crops by agriculturists by diverting the flow of water to the fields through a dug-out earthen fish pond under semi-static conditions, without appreciable water loss in the process are stressed for adoption, wherever fessible. This would be one

of the steps towards integration of fish culture with agriculture.

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