Impact of Species Composition and Artificial Feed on the Growth of Carps

M. C. NANDEESHA*

Regional Research Station, University of Agricultural Sciences, Dharwad - 580 005, *Karnataka*

and

C. K. MURTHY**

Department of Fisheries, Government of Karnataka, Dharwad - 580 001, *Karnataka*

Two trials conducted to demonstrate the suitability of composite carp culture in a small, seasonal, shallow village pond with varied species composition and stocking density indicated the possibility of obtaining higher production with reduced number of species. During the first trial, the Indian major carps, silver carp, common carp and fringelipped carp were stocked at a density of 5625 fingerlings/ha in the pond in which the maximum water spread area was 1600 m². The fish grown over a period of seven months yielded a production of only 242 kg. However, during the second trial, an increase in production by 60.33% was achieved over the same period in the same pond by stocking only the Indian major carps and common carp at a density of 4687.5 fingerlings/ha and feeding them daily with silkworm faecal matter based artificial feed at about 5% of their body weight. The results indicated that for seasonal, shallow ponds stocking of only three species of carps, namely, catla, rohu and common carp would suffice to get optimum yield.

The carrying capacity of a pond is not a constant factor and can be increased with selective stocking, feeding, fertilization etc. In India, carps have been cultured for centuries, but the national average production is around 600 kg/ha/yr. Investigations have shown the possibility of obtaining productions as high as 10,000 kg/ha/yr through proper management practices (Chaudhuri *et al.*, 1975; Varghese *et al.*, 1976). One of the management practices suggested to enhance the yield of carps is the adoption of composite culture of six species of carps, namely, catla *(Catla catla)*, rohu *(Labeo rohita)*, mrigal *(Cirrhinus mrigala)*, silver carp *(Hypophthalmichthys molitrix)*, grass carp *(Ctenopharyngodon idella)* and common carp *(Cyprinus carpio)*. Although this combination has been proved to be beneficial in perennial ponds with good depth of water, its applicability for small, seasonal, shallow ponds is not clearly understood. In this communication the results of 2 trials of composite carp culture with varied species composition and density in a village pond of above nature are reported.

Materials and Methods

The small, seasonal pond selected for demonstration had a maximum water spread area and depth of 1600 m² and 2.0 m respectively. The pond is generally filled to the maximum in June – July and the water level starts receding from December onwards and reaches minimum of 200 – 300 m² with a depth of less than 0.5 m by March–April. If there are no pre-monsoon showers, the pond almost dries up after this period. The selected pond caters to the water needs of the village people and animals. It is enriched regularly with the wastes of animals and was found to be rich in plankton. Hence, no fertilization was done during both the trials.

* Present address: Department of Aquaculture, College of Fisheries, Mangalore - 575 002

** Department of Fisheries, Government of Karnataka, Mysore - 570 011

Stocking

The stocking density was decided based on the maximum water spread area of the pond. During the first year, fingerlings of major carps along with that of fringelipped, carp *(Labeo fimbriatus)* were stocked at a total density of 5625/ha as shown in Table 1. Based on the growth performance obtained in the first year, the species composition and ratio was altered during the second stocking and only fingerlings of Indian major carps and common carp were stocked at a total density of 4687.5/ha.

Feeding

During the first trial, the fish were raised on the natural food available in the pond and feeding was resorted to only during the second trial. Feeding was done once daily at about 5% of their body weight with a cooked mixture of rice bran, oil cake and silkworm faecal matter (37:30:33).

Growth period

During both the years, the fish were grown for a period of seven months. After six months of stocking, the fish were periodically harvested and sold in the market.

Results and Discussion

The data pertaining to growth, percentage contribution of each species and survival during the two trials are presented in Tables 1 and 2 respectively. In the first trial, the growth attained by common carp was superior (850 g) to the rest of the species stocked. Among the surface feeders, namely catla and silver carp, the former recorded better growth (470 g) and contributed more than its stocking percentage to total production. The poor growth (275 g) and survival (42.96%) of silver carp appears to be due to the poor water quality and competition between the two surface feeders. All the silver carp harvested had an outgrowth in the lower lip which can directly be correlated to water quality (Nandeesha *et al.,* unpublished). Further, it has been observed by previous workers that any large variation in the early growth of these two species ultimately leads to the suppression of growth of species which is smaller in size (Sukumaran *et al.,* 1968; Nandeesha *et al.,* 1986). Mrigal, which competes for food and space with common carp recorded very poor growth of only 150 g; it was only next to that of fringelipped carp (95 g). The growth of common carp, prior to maturity has always been found to be higher than that of mrigal in composite culture (Varghese *et al.,* 1976). Although all common carp had attained maturity, none had bred. Its contribution to total production was almost two times higher than the initial stocking percentage. The column feeder, rohu, attained a weight of 270 g and contributed almost equal to its stocking percentage.

The growth pattern of carps during the second trial was totally different as could

Table 1. *Details of stocking and production of fish during* 1983–84 *(without artificial diet)*

Variety of fish	Number stocked	Number harvested	Percentage composition	Percentage survival	Initial average weight g	Final average weight g	Total weight of fish harvested kg	Percentage contribution	Gross production kg/ha/yr
Catla	315	204	35.00	64.76	4.00	470.00	96.00	39.67	1028.5
Rohu	180	167	20.00	92.78	3.00	270.00	46.00	19.01	492.86
Mrigal	90	56	10.00	62.22	3.00	150.00	8.00	2.31	85.71
Common carp	90	83	10.00	92.22	4.00	850.00	70.00	28.93	750.00
Silver carp	135	58	15.00	42.96	2.50	275.00	15.00	6.19	160.71
Fringelipped carp	90	73	10.00	81.11	6.00	95.00	7.00	2.89	75.00
Total	900	641	100.00				242.00		2592.85

Table 2. *Details of stocking and production of fish during* 1984–85 *(with artificial diet)*

Variety of fish	Number stocked	Number harvested	Percentage survival	Percentage composition of each species	Initial average weight g	Final average weight g	Total weight of fish harvested kg	Percentage contribution	Gross production kg/ha/yr
Catla	300	196	65.33	40.00	5.00	552.00	108.00	27.83	1157.14
Rohu	150	143	95.33	20.00	12.00	797.00	114.00	29.38	1221.43
Mrigal	100	96	96.00	13.33	9.50	469.00	45.00	11.60	482.14
Common carp	200	193	96.50	26 67	4.00	627.00	121.00	31.19	1296.43
Total	750	624		100.00			388.00		4157.14

be made out from Table 2. The weight attained by all the four species was higher than that in the first trial. Rohu recorded the best growth (797 g) which was probably due to its higher initial weight and also artificial feeding. In a feeding trial, Nandeesha *et al.* (1986) recorded the best growth of rohu and poor growth of catla with silkworm faecal matter based diet. The growth of mrigal was impressive (469 g); however, it remained lower than that of common carp (627 g). Though common carp exhibited good growth among the species employed, its performance was poor compared to that of the previous trial (Tables 1 and 2). This could be attributed to the higher number of common carp, stocked during the second year. Catla recorded better weight during the second trial (552 g) probably due to artificial feeding and absence of silver carp. Among the four species, common carp contributed the highest to total fish production (31.19%), while the contribution of mrigal was the least (11.60%). Catla (27.83%) and Rohu (29.38%) contributed almost equally. The increase in production by 60.33% during the second year was due to reduced number of species and addition of artificial feed. Lakshmanan *et al.* (1979) reported a production of 2000 kg/ha/6 months in six species culture, while Varghese *et al.* (1980) obtained a production of 3133.75 kg/ha/6 months in water bodies with constant water spread area. The production obtained in the present study is comparable to these values.

The results of the two trials clearly demonstrate that small, seasonal, shallow ponds could be effectively utilized for multi-species culture of carps. A combination of catla, rohu and common carp appears to be more suitable for such ponds.

The authors are grateful to Dr. K. V. Devaraj, Chief Scientific Officer (Inland Fisheries), Veterinary College, Bangalore and Dr. P. Keshavanath, Associate Professor of Aquaculture, College of Fisheries, Mangalore for encouragement and help in writing this paper. Financial assistance of the Pasteur Society, Mangalore and the co-operation of the Maruthi Yuvaka Sangha of Yethinagudda village of Dharwad district, Karnataka for conducting this trial are gratefully acknowledged.

References

Chaudhuri, H., Chakrabarthy, R. D., Sen, P. R., Rao, N.G.S. & Jena, S. (1975) *Aquaculture* 6, 343

Lakshmanan, M.A.V., Rao, P.L.N., Selvaraj, C. & Rai, S. P. (1979) Symposium on Inland Aquaculture, Feb. 12–14, Central Inland Fisheries Research Institute, Barrackpore (abstract).

Nandeesha, M. C., Devaraj, K. V. & Sudhakara, N. S. (1986) *Proc. The First Asian Fisheries Forum, Manila, Philippines* (In press).

Sukumaran, K. K., Singh, B. B., Murthy, D. S. & Chakrabarti, P. C. (1968) *Proc. Indo-pacific Fish. Coun.* 13, 185

Varghese, T. J., Satyanarayana Rao, G. P. & Shetty, H. P. C. (1976) *Mysore J. Agric. Sci.* 10, 681

Varghese, T. J., Singit, G. S., Keshavanath, P., Konda Reddy, P. & Vasudevappa, C. (1980) *Mysore J. Agric. Sci.* 14, 232.