Vidyodaya J., Arts, Sci., & Lett., Vol. 14, No. 2 — June 1986 — pp. 97–101

RESEARCH NOTE

SOME GROWTH AND SURVIVAL PARAMETERS OF GIANT FRESHWATER PRAWN (*MACROBRACHIUM ROSENBERGII* DEMAN) STOCKED IN TWO SHALLOW CEMENT PONDS

J. JINADASA

Dept. of Zoology, University of Sri Jayewardenepura, Nugegoda, Sri Lanka

The giant freshwater prawn (*M. rosenbergii*) is found in almost all freshwater bodies and upper reaches of lagoons in Sri Lanka (Costa, 1969). Its annual production from these waters is in the region of about 1000 to 1500 kgs. Although the techniques of larvl production, their rearing upto post larval stage and their subsequent commercial cultivation is completely understood and practised in most of the countries of the world, these techniques are not yet fully understood and practised under local condirions in Sri Lanka. But it had been stocked in the seasonal tanks of the dry zone, where, about 50% survival rate with a mean weight of 250 gms have been obtained (Senanayake, 1986, personal communication). The experimental cultivation of fresh water prawns in Sri Lanka was initiated by Lever Brothers and their hatchery started in 1980 (Fredinando, 1981). Further, the Department of Inland Fisheries has also initiated a pilot hatchery to produce post larvae to distribute among the private fish farmers. Their first batch of post larvae of about a few thousands were distributed among the fish farmers in 1984. At present the Department of Inland Fisheries produce fairly large quantities of post larvae of *M. rosenbergii* and they are being used to stock the seasonal tanks with encouraging results.

The purpose of the present study was, therefore, to understand some survival and growth parameters of the giant fresh water prawn stocked in two shallow cement ponds without providing any supplementary food. In this account it should be noted that the above ponds were not specifically designed and constructed for the above purpose.

Two rectangular cement ponds each with an area of 75 M^2 (15M × 5M) were selected. These were directed in the North south direction and each one of the ponds was situated between two, four storey buildings. Both ponds received sun light from about 10 am to about 3 pm and contained a fully grown aquatic vegetation consisting of *Cobomba* Lotus, and Salvinia. One pond, number 1 did not contain Salvinia. The depth of the pond were the same throughout and contained about 40 cm of water. The cement bottom contained a 10 cm detrituus layer, which consisted of desmids, filamentous

green algae, like *Zygnema* and *Spirogyra*. The detritus layer also supported a rich population of *Aelosoma* sp and Notorid larvae of the genus *Hydrocoptus* (Noteridae, Coleoptera). The water column contained freshwater unicellular and colonial green algae. Further it also supported a very rich phopulation of caridians that accounted for more than 6 to 8 per liter of water. The fish fauna of the ponds was composed of *S. mossambicus* of the size 17 to 26 cm. and there were about 400 of them. Further, there were about 100 to 150 fingerlings per $M.^3$

Each pond was stocked in June 1981 with five hundred post larvae of *M. rosenbergii* of length ranging from about 2 to 3 cm, brought from the Lever Brothers hatchery at Seeduva. They were allowed to feed on the natural food material found in the pond. Dissolved oxygen content, alkalinity and pH were measured according to standard methods once a month by the students of the Applied Biology goiup (1981 – 1984).

The quality of water measured once a month from 1981 to 1983 is shown in table 1. (Here, only the means within the whole period are given, as the data for

TABLE 1. The mean water temperature, dissolved oxygen, pH and alkalinity of the pond water

	Man water temperature CO		*Dis. oxygen*	*pH*	*Alkalinity expessed as ccN/10HCL required to neutralise 100 cc of pond water*
	Morning	*Evening*			
Pond 1	27(±2)	29(±5)	7.5 (±0.)	6.5	3.0
Pond 2	28(±3)	31(±4)	5.3 (±0.3)	6.	2.5

the period under study was not obtained continuouslsy due to various reasons) From which it is seen that the pond No. 1 was better in limnological parameters, compared to pond No. 2 This richness could be attributed to its surrounding vegetation, which consisted of ferns (*Neprolepis* and *Maratia*) and *Helicornia*. These provided leafy matter to the pond No. 1. Further, the water column too supported a rich vegetation of *Salvinia*, which also supplied further leafy matter.

The stomach contents of 13 prawns with carapace length ranging from about 4.10 cm to about 6.00 cm examined contained 90% of detritus matter consisting of decaying leafy particles, pieces of fresh plant matter, fish rays, spines and fish scales of fingerlings. The balance food consisted of fresh green filamentous algae, pieces of cooked rice and brewed tea waste. The last of the three items had been thrown into the ponds by university employees. But their quantities were very small. Also, the waste material, mainly, brewed tea, did not account for more than 250 gms per day, from a tiny canteen, which operated for a few months.

The exact survival rate of the prawns was not determined as the pond overflowed whenever there were heavy rains, which was about four times within the period of study. Also, on four occassions a few of the adult prawns were found dead due to canibalism (?). which is very common among *M. rosenbergii.* At the end of 11 months, about 7 to 8% of the larvae stocked were available to harvest. Compensating for the prawns escaped and the the number dead, the total survival rate in these ponds could be about 10% to 12%, which is too low compared to the survival rates of this species of prawns cultivated in small reservoirs (Danai Limpadanai and Tansakul, 1980, Ferdi-Ferdinando and Manawadu, 1980, Cohen and Zohar, 1984). In Sri Lanka, the survival rate of *M. rosenbergii* stocked in seasonal tanks at Udawalawe is about 50% (Senanayake, 1986, personal communication). These results suggest that 2 to 3 cm long post larvae probably experienced heavy mortalities and could be far too small to stock in ponds of the above nature.

TABLE II. The age, carapace length, total length and the weight of cultivated prawns

Age (*months*)	*Carapace length* N	(*cm*)	*Total length* (*cm*)	*Weight* (*gms*)	*Loo* (*cm*)	*Woo* (*gms*)
II	7	2.10	.3	12.5		
IV	6	3.5	15.0	61.0		
V	4	4.30	17.0	77.0		
VIII	3	6.2	22.0	105.0		
XI	5	7.6	26.0	145.0		
					31	156

N — Sample number

The mean carapace lengths, total lengths and the weights of the prawns observed at regular intervals are shown in Table II. From Table II it is seen that they are much smaller than that of the wild populations obseved in most parts of Sri Lanka (Costa, 1979). However, they are much larger than those some other workers have obtained under almost identical conditions. In India, cutivctivation of *M. rosenbergii* in ponds, where the depth ranged from about 1 to about 1½ m, with supplimentary feeding have produced prawns weighing about 100 gms in five to six months (Kurian and Sebastian, 1976). In many other places the growth rates reported have been poore than the growth rates obtained in this study (Diajadiredja and Suharater, 1908; Popper and Davidson, 1980; Cohen and Zohar 1984; Smith *eta* 1980; Sandifer and Smith, 1980). In Sri Lanka, the only existing pilot prawn farm for the same species has produced prawns with a mean weight of about 43 gms in 5 to 7 months, where the prawns have been fed with broiler starte (Fredinando and Manawadu, 1980). The size of prawns harvested at the, end of six months from Thunkama, seasonal tanks, Udawalawe showed a mean weight of about 250 gms with a mean carapace length of 9 cm (Senanayake, 1986, personal communication and where the author witnessed the harvest) Which was far superior to the results obtained anywhere else in the region.

The relatively high growth rates obtained in the present experiment may be an indication that *M. rosenbergii* although readily accepted man made food in the form of pellets, even containing protein rich broiler starter (Ferdinando and Manawadu, 1980), their food conversion and the subsequent growth rates are better, when they were allowed to feed mostly on detritus matter of plant origin, with small quantities of fresh fish and other animal protein, such a natural mixture may be containing large quantities of nutritive components which were not found in the man made, protein rich artificial pellet food. The deteritus of the ponds, which was the main food of the prawns, consisted of leafy matter (96%), remnents of fish (03%) and others (01%) by weight Therefore, such a natural mixture of food, with natural habitat, almost identic to the one they live, promoted their growth with a high conversion rate and suggests that as far as possible, the food and the habitat of *M. rosenbergii* for a better growth should be very close to that of natural habitat.

Shallow ponds with cement bottoms containing a thick layer of deteritus at the bottom could be used to cultivate *M. rosenbergii* without supplementary food. Then their growth rates are much better than that obtained under artificial conditions by feeding artificial food. When post larvae of 2 to 3 cm length were stocked in such ponds, they fed primarily on the detritus and the micro-fauna of the ponds and showed a mean weight of about 145 gms with a survival rate of about 11% within 11 months. As far as possible, the habitat of the culturable ponds should be very close to that of their natural habitat.

Acknowledgements

The author is thankful to Mr. R. L. Ferdinando of Lever Brothers for stocking the ponds with-post larvae obtained from their hatcheries. The limnological parameters of the ponds were studied by the B.Sc. (Cey) Degree third year Applied Biology students under the directions of the author as a part of their ecology program. I also thank Professor W. E. Ratnayake for correcting errors in the manuscript.

References

1. Cohen, Z. R. D. and Zohar., U. R. G., 1964. The production of fresh water prawn *Macrobrachium rosenbergii* in Israel. The effect of added substrate on yield in a monoculture system. Bamidgeh. Quarterly on aquaculture in Israel. Vol. 36. No. 2: 35-40
2. Costa., H. H., 1979. The Palaemonidae of the Inland Waters of Sri Lanka. Ceylon J. of Sci. (Bio. Sci.) Vol. 13, Nos. 1 and 2.
3. Costa., H. H., 1980. Preliminary studies on the breeding of the giant fresh water prawn (*Macrobrachium rosenbergii* de Man) using locally available diets. IFS report No. 9, Giant Prawn. 1980, 159-166, Sibyllegatan, Stockholm, Sweden
4. Danai Limpadanai and Tansakul., R. 1980. Culture of giant fresh water prawn (*Macrobrachium rosenbergii*) in small reservoir. Aquaculture. Vol. 20. No 2: 257-260.
5. Djajudiredja., R and Suharto., H. H. 1980. Notes on results of Macrobrachium rosenbergii, pond reared at different salinities. IFS, report, No. 9. Giant Prawn. 1980, 201-221, Sibyllegatan 47, Stockholm, Sweden

6. Ferdinando., R. L., and Manawadu., S. A.W. 1980. Some experiences of a commercial *Macrobrachium* farmer in Sri Lanka. IFS report No. 9, Giant Prawn. 1980, 736–743 Sibyllegatan, Stockholm, Sweden.

7. Ferdinando., R. L. 1981. The introduction of the culture of the Giant Prawn *Macrobrachium* Sri Lanka. Proceedings of a Symposium on prawn culture. Sri Lanka Association for the Advancement of Science, Section D. October, 1981.

8. Kurian., C. V. and Sebastian, V. O. 1976. Prawns and Prawn Fisheries of India. Hindustah Publishing Co. (India). 280 p.

9. Mendis., A. S. and Fernando, C. H. 1962. Fresh Water Fauna of Ceylon. Bull. Fish. Res. Stn. Ceylon. Vol. 12.

10. Popper., D. M. and Davidson, R. 1980 "An experiment in rearing fresh water prawns in brackish water polyculture" IFS report, Giant Prawn, 245-246, Sibyllogatan, Stockholm, Swe

11. Smith., T. I. J., Sandifer, P. A., and Jenkins., W. E. 1980. Growth and Survival of prawns *Macrobrachium rosenbergii* reared at different salinities. IFS report, Giant prawn, 309-328 Sibyllegatan, Stockholm, Sweden

12. Sandifer., P. A. and Smith, T. I. J., 1980 Semi-intensive grow-out of prawns (*Macrobrachium rosenbergii*) preliminary results and prospects. IFS report, Giant Prawn, 167-184. Sibyllegatan, Stockholm, Sweden