

# Development of Giant Freshwater Prawn Broodstock

K. N. Mohanta

## Abstract

The commercial success of a giant freshwater prawn (*Macrobrachium rosenbergii*) hatchery depends upon the uninterrupted supply of the desired quantity and quality of broodstock. This study was an attempt to develop the broodstock near a hatchery, to be used for seed production throughout the year. The hatchery produced seed were stocked at the rate of 3/m<sup>2</sup> after initial pond preparation. The prawns were fed with a pelleted diet (3 mm size) prepared by using locally available feed ingredients. The seed had an initial weight of 0.30 g and attained an average weight of 92.0 g and 62.0 g in males and females, respectively, within 11 months. Berried prawns were observed starting from the month of June (5%), after six months of stocking, with a maximum in September (60%). The percentage of berried prawns increased from June to September when the water temperature was optimum and decreased from December when it got cold. The broodstock developed in this experiment could be used in the hatchery after six months of stocking, and brooders could be used to produce seed for two seasons before being sold in the market.

## Introduction

The availability of berried individuals over an extended period (preferably throughout the year) is essential for the successful management of a giant freshwater prawn (*Macrobrachium rosenbergii*) hatchery. Most hatcheries use berried prawns caught from the wild, except in Taiwan where broodstock are cultured by obtaining healthy egg-bearing females from hatcheries (Hsieh et al. 1989). The dependence on wild broodstock affects the planning and management of hatcheries due to the seasonal non-availability of berried prawns. Transporting wild stock to hatcheries not only increases the costs but also causes stress to the animals resulting in low hatching rates. In view of this, a study was undertaken to develop broodstock of *M. rosenbergii* in a pond adjacent to the hatchery to ensure an uninterrupted supply of broodstock for the hatchery. The results of this study are presented here.

Table 1. Feeding schedule for *M. rosenbergii* broodstock in pond.

Month	Estimated (biomass g)	Feed (% of body weight)	Feed (g / day)
Jan	180	20	36.0
Feb	500	15	75.0
Mar	1,350	10	135.0
Apr	4,000	6	240.0
May	8,000	5	400.0
June	8,750	4	350.0
July	12,250	3	367.5
Aug	14,000	3	420.0
Sep	15,300	3	459.0
Oct	16,500	2	330.0
Nov	19,500	2	390.0
Dec	18,000	2	360.0

## Materials and Methods

The study was carried out in a pond of 200 m<sup>2</sup> with a water depth of 1.2 m, at the farm of Central Institute of Freshwater Aquaculture, Bhubaneswar, India, over a period of 12 months from January to December. The pond was prepared free from predators and initially

manured with cattle manure at the rate of 2,500 kg/ha. No manure was used subsequently. After manuring, liming was done at the rate of 100 kg/ha. During the last week of January, hatchery produced seeds of *M. rosenbergii* were stocked at a density of 3/m<sup>2</sup>. The water in the pond was replenished once a month to compensate for the loss due to evaporation and seepage. The prawns were fed pelleted feed

containing 39% protein, at 2-20% of biomass at different periods of rearing (Table 1). The feed was broadcast in the pond once a day between 1630 to 1730 hours. The biomass increase was recorded at monthly intervals by sampling with the help of a cast net. Growth, maturity and general health of the prawns were observed. The maturity stages were classified based on the external examination of the ovary for colour and size in relation to the carapace cavity (Rao 1991; Rao and Tripathi 1993). The physico-chemical characteristics of the pond water are given in Table 2. The temperature of water during the study ranged from 8.50 to 33.20°C.

## Results

The seed had an initial average weight of 0.30 g. They attained an average weight of 92 g in males and 65 g in females in 11 months of rearing (Table 3), with a monthly increment of 0.70 to 20.0 g in males and 0.70 to 12.0 g in females. The growth rate was low during the months of January and February and high during June and July. The gonadal progression in females started from May, after six months of metamorphosis. The percentage of berried prawns among females varied from 5% in June to 60% in September. The prawns attained first maturity at a weight of 35 g.

## Discussion

The study indicated that healthy broodstock can be developed within six months of rearing and can be used for breeding. The maturity and breeding cycles of *M. rosenbergii* in the pond environment was similar to those in natural water (Rao 1991). It was observed that the larvae hatched from the larger berried

Table 2. Water quality parameters in pond.

Parameters	Range
Water Temperature (°C)	8.50 - 33.20
pH	6.26 - 8.40
Hardness (mg CaCO <sub>3</sub> /l)	64.00 - 82.00
Dissolved oxygen (mg /l)	5.20 - 8.10
Ammonia-Nitrogen (µg NH <sub>3</sub> -N /l)	0.22 - 4.48
Nitrite-Nitrogen (µg NO <sub>2</sub> -N /l)	0.02 - 0.91
Nitrate-Nitrogen (µg NO <sub>3</sub> -N /l)	0.12 - 10.48

Table 3. Growth Pattern of *M. rosenbergii* in pond.

Month	Sample No.	Average Weight (g)		Growth Increment (g)	
		Male	Female	Male	Female
Jan	20	0.30	0.30	-	-
Feb	20	1.00	1.00	0.70	0.70
Mar	25	4.00	3.00	3.00	2.00
Apr	30	12.00	10.00	8.00	7.00
May	30	20.00	16.00	8.00	6.00
June	20	35.00	28.00	10.00	12.00
July	25	45.00	40.00	15.00	12.00
Aug	30	55.00	48.00	15.00	8.00
Sep	20	75.00	55.25	20.00	7.25
Oct	25	85.00	60.30	10.40	4.75
Nov	20	90.20	63.00	4.80	2.70
Dec	20	92.00	65.00	1.80	2.00

Table 4. Maturity of *M. rosenbergii* in pond.

Month	Age (month)	Maturity stage	% of berried individuals
Jan	1	-	-
Feb	2	-	-
Mar	3	-	-
Apr	4	-	-
May	4	II - III	-
June	6	II - IV	5
July	7	II - IV	10
Aug	8	II - IV	50
Sep	9	II - IV	60
Oct	10	II - IV	40
Nov	11	II - IV	30
Dec	12	II - IV	20

prawns exhibit better growth and metamorphosis, resulting in a shorter larval culture period (Rao et al. 1994). Therefore, by developing the broodstock in a pond, it is possible to select berried prawns from the broodstock pond with an individual weight ranging from 75 to 100 g to produce healthy larvae

in a shorter duration. Low stocking density was maintained in the pond to get mature prawns within six months. It was observed that the growth was nearly the same in males and females up to August. In September the males grew faster (20.0 g) as compared to females (7.25 g), when the number of berried prawns

was at the maximum. The percentage of berried prawns increased from the month of June up to September, when the water temperature was optimum, and decreased from September to December, when the water temperature was low. Water quality parameters were maintained within tolerable limits.

### Conclusion

Broodstock development in ponds adjacent to a hatchery is a feasible and efficient option. It allows the hatchery access to suitable sized berried prawns throughout the year and also reduces transportation stress and cost of using wild stocks.

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**K.N. Mohanta** is from the Central Institute of Freshwater Aquaculture, Kausalyaganga, Bhubaneswar, Orissa, India 751002