Indian J. Fish., 65(1): 116-118, 2018
DOI: 10.21077/ijf.2018.65.1.61139-19

Note

Evaluation of claw development in giant freshwater prawn, *Macrobrachium rosenbergii* (de Man, 1879)

P. P. SURESH BABU[1], P. SRINIVASARAO[3], I. F. BIJU[3], C. DHARMADURAI[3] AND A. M. BABITHA RANI [3]

[1]*Calicut Research Centre of ICAR-Central Marine Fisheries Research Institute, West Hill P. O., Calicut - 673 005 Kerala, India*
[2]*Kakinada Centre of ICAR-Central Institute of Fisheries Education, Beach Road, Kakinada - 533 007 Andhra Pradesh, India*
[3]*ICAR-Central Institute of Fisheries Education, Panch Marg, Off Yari Road, Andheri West, Mumbai - 400 061 Maharashtra, India*
e-mail: sbabukkd@rediffmail.com

ABSTRACT

Dynamics of claw development in *Macrobrachium rosenbergii* (de Man, 1879) was evaluated through monosex culture. The segregated males and females were stocked separately in two earthen ponds of 200 m^2 area, at a density of 2.5 m^{-2} and reared for 3 months. Percentage contribution of claw weight to body weight (PCB) increased from 8.96 to 14.4% in the first month, but the change was minimal (14.4 to 17.19%) during the rest of the culture period. In order to delineate the relationship further, the data obtained was pooled together and classified into different classes based on the body weight (class interval 10 g). Interestingly, PCB in males decreased gradually upto 30 - 40 g weight class and then increased considerably for higher weight classes. But for females, the increase in PCB was marginal.

Keywords: Body weight, Claw weight, Freshwater prawn, Harvest, Monosex

Biology of *Macrobrachium rosenbergii* (de Man, 1879) is a fascinating subject for research due to its complex population structure (Cohen *et al*., 1981; Ra'anan *et al.,* 1991) and heterogenic growth pattern (New, 1994). *M. rosenbergii* has a well developed second cheliped (claw) and the claw morphometry varies among the sexes and morphotypes (Sandifer and Smith, 1985; Suresh Babu *et al.,* 2015). Claw weight contributes to considerable portion of the body weight of the harvested freshwater prawn (Lin and Boonyaratpalin, 1988) leading to economic loss to the consumer (Suresh Babu *et al.,* 2015). Even though bigger male prawns have higher biomass, the percentage meat yield is minimum and the economic loss due to claw weight is maximum. On the other hand, female prawns provide comparatively higher somatic yield.

Dynamics of the process of claw development in freshwater prawn during farming is not well studied, till date. This information may help to chalk out a strategic harvesting plan in freshwater prawn farming for obtaining better meat yield since long duration culture may lead to more claw growth rather than somatic growth. In order to delineate the process of claw growth in freshwater prawn, the present study evaluated claw development in males and females of *M. rosenbergii* at regular intervals. For this, experimental farming was taken up at the freshwater fish farm of the Kakinada Centre of ICAR-Central Institute of Fisheries Education (ICAR-CIFE), Andhra Pradesh, India. The freshwater prawn rearing practices as per our previous study (Suresh Babu *et al.,* 2015) was adopted in the present work. Post-larvae (PL 10) obtained from the freshwater prawn hatchery of the Kakinada Centre of ICAR-CIFE, were grown initially (75 days) in cement nursery ponds (15 x 4.5 x 0.8 m) at 50 no. m^{-2}. Then the males and females were segregated and stocked separately in two 200 m^2 ponds (10 x 20 x 1.5 m) at a density of 2.5 prawns m^{-2}. A commercial prawn feed (crude protein 38%) was given three times a day @ 7, 5 and 3% of body weight during the first, second and third month of farming respectively (Suresh Babu *et al.*, 2009).

Monthly sampling was done using a cast net for recording body weight and claw weight. Three months after stocking, the ponds were drained out completely and the prawns were harvested. The morphometric characters, sex and morphotypes of the individual prawns were evaluated. Identification of sexes and morphotypes were done by observing appendix masculina and colour as well as size of chelate leg (New and Singholka, 1985). Morphometric measurements were recorded after

manually removing the claws. Total body weight (BW) and claw weight (CW) were recorded employing a top loading electronic balance (0.001 g accuracy). Prawns were grouped into different weight classes with a class interval of 10 g for further analysis. Percentage contribution of claw weight to body weight (PCB) was calculated using the following formula:

$$PCB = \frac{\text{Average CW}}{\text{Average BW}} \times 100$$

The data were analysed using one way ANOVA and Tukey's test employing SPSS version 16. Variation in BW and CW in prawns on different days of culture (DOC) are given in Table 1. Month-wise observations on claw development revealed that the claw weight increased from 1±0.17 g in the unsegregated stock to 8.88±0.96 g in males and to 1.18±0.09 g in females. In males, body weight and claw weight increased gradually as the culture proceeded. But in females, the claw weight showed only slight variation throughout the culture period. Larger clawed males usually have higher proportion of claw weight compared to the short clawed males (Lin and Boonyaratpalin, 1988).

The complex social structure of freshwater prawns with different morphotypes having varying claw size affects the accuracy in quantification of claw proportions at a given point of time. So further analyses on claw development in freshwater prawn was carried out by pooling all the data collected during the experiment (data from all the months) and segregating them into different classes based on body weight. Pooled data in the present work was classified into class interval of 10 g and presented in Table 2. There were 9 classes for males and only 4 classes for females based on body weight. PCB for different weight classes of males and females for the present study are depicted in Fig. 1. In males, the claw weight increased from 0.68 ± 0.11 (1-10 g class) to 20.64 ± 1.40 (80 g and above class). Interestingly, PCB decreased in males for the weight classes up to 30 - 40 g and increased considerably for weight classes above 40 g. This clearly indicates that up to 40 g, the relative claw weight with respect to body weight is lower and thereafter it increases drastically. In order to verify the specific trend in males, data collected from previous experiments were pooled and classified into similar weight classes and the PCB was calculated. PCB depicted as dotted lines in Fig. 1 shows a similar trend as that of the present study for males. Variation in PCB was comparatively less for different weight classes of females in the present study. Claws of females are small and contribute a constant

Table 1. Monthly increment in body weight and claw weight in males and females during the culture period (90 days)

Month	Male			Female		
	n	BW (g)	CW (g)	n	BW (g)	CW (g)
Initial#	30	11.15 ± 0.49	1.00 ± 0.17	30	11.15 ± 0.49	1.00 ± 0.17*
1	50	22.50 ± 0.99 (101.79)	3.24 ± 0.32 (224)	30	16.99 ± 0.57 (52.32)	1.01 ± 0.08* (negligible)
2	40	37.11 ± 1.74 (64.93)	5.93 ± 0.58 (83.02)	29	21.72 ± 1.08 (27.83)	1.08 ± 0.09* (negligible)
3	53	51.64 ± 2.90 (39.15)	8.88 ± 0.96 (49.74)	52	26.22 ± 0.81 (20.62)	1.18 ± 0.09* (negligible)

Stocking size in earthen pond during sex-wise segregation
*Values do not differ significantly within the column ($p<0.05$)
BW - body weight in g; CW - claw weight in g; Values are expressed as Mean ± SE; n = No. of animals sampled; Values in parentheses are percentage increment from the preceding measurement

Table 2. Body weight and claw weight (means ± SE) of different weight classes of *M. rosenbergii* reared for 90 days

Weight class	Male			Female		
	n	Body weight (g)	Claw weight (g)	n	Body weight (g)	Claw weight (g)
1 to 10 g	24	6.68 ± 0.39	0.68 ± 0.11	un differentiated claw		
10 to 20 g	41	15.43 ± 0.43	1.15 ± 0.14	60	16.85 ± 0.36	0.77 ± 0.04
20 to 30 g	102	26.18 ± 0.30	2.06 ± 0.19	99	25.74 ± 0.30	1.21 ± 0.06
30 to 40 g	92	35.09 ± 0.29	2.28 ± 0.18	57	34.12 ± 0.36	1.94 ± 0.23
40 to 50 g	53	45.51 ± 0.43	5.41 ± 0.52			
50 to 60 g	40	55.52 ± 0.67	8.11 ± 0.69			
60 to 70 g	27	65.14 ± 0.66	11.40 ± 0.97			
70 to 80 g	24	73.91 ± 0.59	13.84 ± 1.24			
80 and above	21	91.33 ± 1.90	20.64 ± 1.40			

#Females were available up to a maximum size of 40 g
*Values do not differ significantly within the column ($p<0.05$)
n = No. of animals sampled

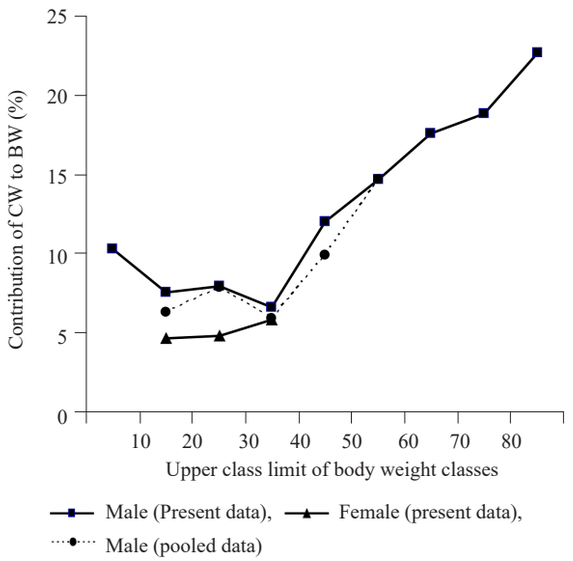

Fig. 1. Contribution of claw weight to body weight (%) among different weight classes of males and females of *M. rosenbergii*

percentage of body weight whereas the claws of males increases with increase in total body weight (Smith *et al.,* 1980).

Results of the present study clearly indicate that in male freshwater prawn, claw development is slower till 40 g size after which it increases drastically. Since a good quantum of energy derived from the feed is diverted for claw development in male prawns, an early harvesting strategy may be adopted for male freshwater prawns (with average harvest size of 50 to 60 g) leading to better somatic yield for the consumers. The culture period also can be cut short to fewer months similar to that of brackishwater shrimp farming. Female prawns can be retained till the males are completely harvested since their claw development has negligible impact on the harvest size. These strategies may attract more number of farmers to take up freshwater prawn farming as a short term farming practice.

Acknowledgements

Authors express their sincere gratitude to Dr. W. S. Lakra, former Director, ICAR-CIFE, Mumbai for the constant support and encouragement for the research work.

References

Cohen, D., Ra'anan, Z. and Brody, T. 1981. Population profile development and morphotype differentiation in giant freshwater prawn *Macrobrachium rosenbergii. J. World Maric. Soc.*, 12: 231-243.

Lin, C. K. and Boonyaratpalin, M. 1988. An analysis of biological characteristics of *Macrobrachium rosenbergii* (de Man) in relation to pond production and marketing in Thailand. *Aquaculture*, 74: 205-215.

New, M. B. and Singholka, S. 1985. Freshwater prawn farming. A manual for the culture of *Macrobrachium rosenbergii. FAO Fisheries Technical Paper 225*, FAO Rome, p. 4-10.

New, M. B. 1994. Freshwater prawn farming: A review of current research, global status, opportunities and constraints. In: Thakur, N. K., Tewari, R. and Mohan Joseph, M. (Eds.), *Proceedings of the Workshop on Freshwater Prawn Farming in India*, Cochin, India, p. 1-24.

Ra'anan, Z., Sagi, A., Wax, Y., Karplus, I., Hulata, G. and Kuris, A. 1991. Growth, size rank and maturation of the freshwater prawn *Macrobrachium rosenbergii,* Analysis of marked prawns in an experimental population. *Biol. Bull.,* 181: 379-386.

Sandifer, P. A. and Smith, T. I. J. 1985. Freshwater prawns. In: Huner, J. V. and Brown, E. E (Eds.), *Crustacean and mollusc aquaculture in the United States,* AVI Publishing, Westport, CT, USA, p. 63-125.

Smith, T. J., Waltz, W. and Sandifer, P. A. 1980. Processing yields for Malaysian prawns and the implications. *Proc. World, Maricult. Soc.,* 11: 557-569.

Suresh Babu, P. P., Razvi, S. S. H., Nimmy, J., Charan, R. and Srinivasa Rao, P. 2015. Morphometric characteristics, somatic yield and market value of claw ablated males and females of giant freshwater prawn, *Macrobrachium rosenbergii. Aquac. Res.,* 46: 1518-1521.

Suresh Babu, P. P., Venugopal, G. and Reddy, A. K. 2009. Production potential of early segregated all male population of *Macrobrachium rosenbergii* (de Man) in tropical earthen pond condition. *Indian J. Fish.,* 56: 195-198.

Date of Receipt : 27.08.2016
Date of Acceptance : 16.11.2017