ISSN: 2278-778X
Research Article
www.ijbio.com

# FACTORS AFFECTING THE POST LARVAL PRODUCTION OF *MACROBRACHIUM ROSENBERGII* (DE MAN) BY USING DIFFERENT TYPES OF FEEDS

**Shailender M, Krishna PV, Suresh Babu CH**
Acharya Nagarjuna University, Nagarjuna Nagar, Andhra Pradesh, India

***Corresponding Author:** Dr. M. Shailender, Acharya Nagarjuna University, Andhra Pradesh, India.

**Received for publication:** October 11, 2012; **Accepted**: November 24, 2012.

**Abstract:** In the present study was conducted to know the importance of for the effects of different types of feed on larval survival of *Macrobrachium rosenbergii*. In this experiment total nine tanks are selected and were divided, placed under three experiments (Viz. E1, E2, and E3) each having three replicates. The feshly hatched out larvae (Zoea) were collected and stocked in three different treatment tanks. The larvae were stoked in E1 (*Artemia nauplii* and egg custard), E2 (*Artemia nauplii* only) and E3 (Freeze dried (Cyclop-eeze only). The survival rate of postlarvae found to vary from 5 to 40%. Highest rate of survival was recorded for the treatment of E1 (31.5- 40.2 %) and the lowest survival was recorded in E3 (3.0- 5.2 %). Such variations was occurred due to higher nutritive and growth promoting value of egg custard. The result obtained from the present study indicated that rearing of freshwater prawn larvae by improved management techniques can be considered economically viable and acceptable. So the production of post larvae of prawn was increased significantly by using *Artemia nauplii* and egg custard as larval diet.

**Keywords:** *Macrobrachium rosenbergii*, Types Feeds, Survival

## INTRODUCTION

The giant fresh water prawn, *Macrobrachium rosenbergii* known as "Scampi" is farming in India is turning out to be an unsustainable enterprise. Genetic degradation of stocks (Anon, 2003) and emerging disease outbreak associated with virus (Vijayan et al., 2005) are threatening survival rate in hatcheries and grow out while receding markets for small sizes prawn and the failure of to produce big sized individual for the export market have led to an overall crisis in the industry. This situation calls for a close examination of the economic viability which is of vital concern to the farming presently engaged in fresh water prawn farming and to the potential ones planning entry into the activity, before investing in the line. Proper feed and feeding are the critical factors which dictate the early stages of growth and survival of aqua species during the early part of their rearing. Hence larval nutrition is a key element for seed production and subsequent successful farming. In other words the larval rearing stage is the most critical phase in culture operations where the aqua-hatchery operations to pay maximum attention to get better survival rate with minimal operation cost through better management practices. The culture of freshwater prawn, unlike that of the marine shrimps is carried out on extensive lines in India. In this background it is imperative that the nutritional requirements, feeds and feeding strategies for fresh water prawn are reexamined and suitable systems-specific management protocols are developed. Innovative feed formulation by both commercial as well as farm made feed manufactures as well as improved strategies for larval and grow out feeding can well change the negative image that the fresh water prawn culture industry in India is currently facing. Survival and growth of the larvae of many aquatic organisms is known to be influenced by the availability of suitable type of food in correct or right concentration. Proper management of nursery and rearing ponds involve providing the growing larvae, juveniles and adults with right kind of natural and artificial food in the right time (Krishna, 2008). According to D'Abromo and Sheen, (1994) stated that the feed constitute 40-60% of operational cost in production of freshwater prawn *M.rosenbergii*. Several workers have studied the growth of larvae and adults of freshwater prawns in relation to artificial diets (Balaz and Ross, 1976; Corbin *et al.,* 1983; Sheen and D' Abramo, 1991; Koshio *et al.,* 1992; Tidwell and Coyle, 2004; Krishna, 2008; Nhan *et al.,* 2010) but these studies require further investigation for their standardization specially in case of freshwater prawn economic importance. It is therefore, this investigation is designed for the effects of different types of feed on larval survival of *Macrobrachium rosenbergii*.

## MATERILAS AND METHODS

The present experiment was conducted in nine circular tanks at the hatchery of Department of Zoology and Aquaculture, Acharya Nagarjuna University, Andhra Pradesh, India during March to April, 2011. The tanks were divided and placed under three experiments (*Viz.* $E_1$, $E_2$, *and* $E_3$) each having three replicates. The tanks were connected to bio-filters.

Aeration was provided in the tanks with the help of air compressor and air blower.

### Larval rearing tanks:

A circular conical bottomed tank was used as the larval rearing tank with 200 L of water capacity. The larval rearing tanks were placed on the cement drum which is slightly more height than the biofilter. A whole 2.0 cm diameter was done 10.0 cm below the upper edge of the larval rearing tank. A short PVC pipe of 2.0 cm dia was closed the hole at 45° angle and the other end of the pipe was connected to the biofilter. The larval rearing tanks were filled with treated saline water of 12 ppt up to the mark (mouth of the PVC inlet). By a 100 micron mesh screen was used to close the out let, through which only water passed out not larvae.

### Water recirculation:

For proper aeration, air blower of 2.0 HP air compressors was used to operate the hatchery for produce post larvae. 2.0 HP capacity stand-by diesel generator was ready to work during electricity breakdown occur. The accumulated water was pushed up from the false bottom by the air pressure through the PVC pipe and fall in the larval rearing tank. The excess water was passed through the outlet and fell in the bio-filter. This filter water was again entered into the rearing tank through the PVC pipe by the air pressure. By this way desirable quantity of saline water could re-use through filtration and recirculation into closed system of freshwater prawn hatchery.

### Water treatment:

Sea water of 35 ppt was stored at over head tank which is directly imported from Machilipatnam coast line. The saline water was kept in the stored tank up to one weak for settlement. The suspended water was passed through the rapid sand filter, UV filter and stored again in the over head storage tank. Finally, the sea water was treated with bleaching powder (50% chlorine content) at a dose of 15 ppm for killing the harmful organisms. Then the water was aerated for two days to eliminate the smell of chlorine. After day2, water was again treated with sodium Thiosulphate at a dose of 10 ppm to neutralize the access chlorine. Again this water was vigorously aerated for 2-3 days and to keep stable for one day to settle down the suspended particles if present. Then this water was transferred into mixing tank to prepare desired (12 ppt) salinity water by the mixing of treated fresh water. During the rearing period siphoning pipe, bowl, water exchanging pipes, nets and others were washed two times gentle hot water prior to use of the siphoning and cleaning.

### Larval rearing management:

The berried females which contain brown colored egg containing were collected from cultured ponds and disinfected for 20 min with 20 ppm formalin. The disinfected brooders were then kept in broodstock tanks having 8 ppt saline water. The brooders were hatched after two days after stocking in broodstock tanks. The brooders were fed with fresh cow liver or rice bran twice in a day at the rate of 12% of their body weight. After complete hatching, non-brooders were removed from the brood stock tanks, and cleaned the bottom of the tanks and sides of the tanks carefully. 80% of the water was removed from the tank and added disinfected 12 ppt saline water. Hatchlings were reared up to two days in the same tank. Newly hatched larvae were not fed for the first two days. After second day, the larvae were disinfected for 20 min with 20 ppm of formalin or 1 ppm oxytetracycline antibiotic. Then larvae were stocked in nine rearing tanks each containing 200 L of 12 ppt water. The larvae were stocked at a density of 60 nos /L for rearing.

The larvae of nine tanks were under three experiments namely $E_1$ (*Artemia nauplii* and egg custard), $E_2$ (*Artemia nauplii* only) and $E_3$ (Freeze dried *Cyclop-eez* only). In $E_1$ the larvae were fed with *Artemia nauplii* twice a day at 07.00 am and 18.00 pm for the first 10days maintaining the density of 2-4 *Artemia nauplii* per L. And after 10$^{th}$ day the larvae were fed with prepared feed, egg custard (egg and milk powder = 1: 1.5) twice a day along with *Artemia nauplii* at the rate of 40% of the body weight. In the case of $E_2$, the larvae were fed with *Artemia nauplii* only twice a day at 07.00 am and 18.00 pm from day third to post larvae. In $E_3$, the larvae were fed with only *cyclop-eez* (Freez-dried zooplankton powder) at the same time of $E_1$ and $E_2$ at the rate of 30% of the body weight from the third day to post larvae. The uneaten feed, moulted shell and other wastes were siphoned out prior to every feeding time. Water quality parameters of rearing water like temperature, salinity, dissolved oxygen; pH and Ammonia were measured daily. The data were statistically analyzed following the principle of Randomized block design, Duncan's New Multiple range test were then done for experimental comparison

## RESULTS

Water quality parameters such as temperature, salinity, dissolved oxygen; pH and ammonia of larval tanks were shown in Table 1. During the period of study no apparent variation in temperature of rearing media under different experiments was found. The water temperature as recorded was between 27.0- 30.0°C the range of salinity of culture media under three experiments was the same (12 ppt). Dissolved oxygen content of rearing media of different experiments ranged between 5.8- 6.1 ppm. The pH value was ranged between 7.8- 8.1 in all the rearing tanks of the experiments. Ammonia content of rearing tanks as recorded was varied between 0.03 to 0.08 ppm.

Highest value was recorded in E3 (0.08 ppm) and lowest value was in E1 (0.03) the values of different parameters except ammonia of the present study were comparatively low by Islam *et al.,* (2000). Ammonia was lower in the present study compared with the value described by Ling (1962). The average production and survival of post-larvae is presented in Table 2 and Fig. 1. The survival rate of postlarvae found to vary from 5 to 40%. Highest rate of survival was recorded for the treatment of $E_1$ (31.5- 40.2 %) and the lowest survival was recorded in $E_3$ (3.0- 5.2 %). Such variations was occurred due to higher nutritive and growth promoting value of egg custard. In $E_1$ the larvae fed with *Artemia nauplii* and egg-custard but in $E_3$, the larvae were fed with Cyclop-eeze, which was not so nutritive like egg custard and *Artemia*. In $E_3$, the level of ammonia was also higher than the other experiments. Mass mortality observed in $E_3$ and $E_2$ while the larvae attain to metamorphosis to PL stage which might possibly due to the lack of nutrition. The rate of survival obtained from $E_1$ in the present experiment was higher than the earlier production of 11.93 PL/L (Islam and Khan, 1990), 10.22 PL/L (Adisukresno *et al.,* 1982), 9.5 PL/L (Lee, 1982) and 30.0 PL/l (Islam *et al,* 2000). It was observed that larvae became very active during the age of 15-20 days and started jumping and clung to the wall of the rearing tanks and become mortal. This problem is over come by strong aeration. This type of observation is also reported by Islam *et al.,* (1983). The variations in the rate of survival observed under different experiments were found statistically significant. Comparison of mean survival between the different experiments using Duncan's New Multiple Range test showed that the mean survival under $E_3$ was significantly lower than that of $E_1$ and $E_2$. The result obtained from the present study indicated that rearing of freshwater prawn larvae by improved management techniques can be considered economically viable and acceptable. So the production of post larvae of prawn could be increased significantly by using *Artemia nauplii* and egg custard as larval diet.

**Table No-1:** Mean values +/- SD with range of physico-chemical parameters of the rearing media under different experiments

| Water Quality parameter | Exp-1 | Exp-2 | Exp-3 |
|---|---|---|---|
| Salinity (ppt) | 12 | 12 | 12 |
| | 12.0 ± 0.5 | 12.0 ± 0.5 | 12.0 ± 0.5 |
| pH | 7.8 | 7.9 | 8.1 |
| | 7.8±1.5 | 7.8 ± 0.5 | 7.9 ± 2.5 |
| Temperature (°C) | 30 | 29.5 | 29 |
| | 30 ±1.5 | 29.5 ± 0.5 | 29 ± 1.5 |
| D.O (ppm) | 6.1 | 5.8 | 5.1 |
| | 6.0 ± 0.5 | 5.5 ± 0.06 | 5.1 ± 0.5 |
| Ammonia (ppm) | 0.03 ± 0.01 | 0.05 ± 0.01 | 0.08 ± 0.01 |

**Table No-2:** Survival rate (%) and production of *M. rosenbergii* under different experiments

| Sl. No | Date of stocking | No. of larvae stocked | Stocking density no/L | Rearing period (days) | Average survival (%) | Total no of PL Produced |
|---|---|---|---|---|---|---|
| E1 | 01.03.09 | 1,20,000 | 60 | 25.0 | 40 | 48000 |
| E2 | 01.03.09 | 1,20,000 | 60 | 28.0 | 32 | 38400 |
| E3 | 01.03.09 | 1,20,000 | 60 | 32.00 | 5 | 6000 |

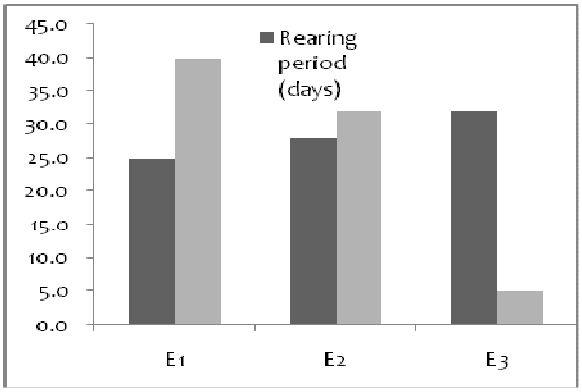


**Figure No-1:** Survival rate (%) and production of *M. rosenbergii* under different experiments

## REFERENCES


1. Adisukresno S, Escritor GL, Mintardjo K. Mass production of Macrobrachium post larvae in the Brackishwater Aquaculture Development Center (BADC), Japara, Indonesia. In Giant prawn Farming Developments in Aquaculture and Fisheries Science. Elsevier Scientific Publishing, Amsterdam, 1982, 10, 143-156.
2. Balazs GH, Ross E. Effects of protein source and level on growth and performance of the captive freshwater prawns, *Macrobrachium rosenbergii*. Aquaculture, 1976, 7, 299-313.
3. Corbin JS, Fujimoto MM, Iwai TYJ. Feeding practices and nutritional considerations for *Macrobrachium rosenbergii* culture in Hawaii in CRC handbook of mariculture, eds. J.P. McVey & J.R. Moore, CRC Press, Boca Raton, 1983, 391–442.
4. D'Abramo LR, Sheen SS. Polyunsaturated fatty acid nutrition in juvenile freshwater prawn *Macrobrachium rosenbergii*. Aquaculture, 1993,115, 63–86.
5. Islam KS, Khan, YSA. Mass production of post larvae of *Macrobrachium rosenbergii* (de Man) at the Prawn Hatchery and Research Centre, Cox's Bazar, Bangladesh, Bangladesh. J. Zool., 1990, 18, 53-59.
6. Islam KS, Bhuiyan AL, Kar PR. Factor effecting seed culture of *Macrobrachium rosenbergii* (de Man) with special reference to salinity tolerance. Chittagong University Studies, 1983, part II, 7, 85-89.
7. Islam MS, Khan MSA, Ahmed SU. Observations on the larval rearing of *Macrobrachium rosenbergii* (De Man) by using different types of feed in Bangladesh coastal environment. Pakistan Journal of Biological Sciences, 2000, 3 (10), 1790–1792.
8. Koshio S, Kanazawa A, Teshima SI. Nutritional evalution of Dietary soyaean for Juvenile Freshwater Prawn *Macrobrachium rosenbergii*. Nippon Suisan Gakkaishi, 1992, 58(5), 965-970.

9. Krishna, P. V. 2008. Effect of three different protein sources in supplementary feeds on survival and growth performance of *Macrobrachium rosenbergii* in nursery. The Ekologia 8(1-2): 115-122.

10. Nhan DT, Wille M, Hung Le T, Sorgeloos P. Effect of larval stocking densities and feeding regime on larval rearing of giant freshwater prawn (*Macrobrachium rosenbergii*). Aquaculture 2000, 300, 80-86.

11. Sheen SS, D'Abramo LR. Response of juvenile freshwater prawn, *Macrobrachium rosenbergii*, to different feeding levels of a cod liver oil/corn oil mixture in a semi-purified diet. Aquaculture, 1991, 93, 121– 34.

12. Tidwell JH, Coyle S. Fresh water prawn feed management. Global Aquaculture Adocate, 2004: 58-59.

13. Vijayan KK, Stalin raj V, Alavandi SV, Thillai sekhar V, Santiago TC. Incidence of white muscle disease, a viral like disease associated with mortalities in hatchery-reared post larvae of the giant freshwater prawn, *Macrobrachium rosenbergii* (De Man) from the south-east cost of India. Aquaculture Research, 2005, 36: 311-316.

**Source of support:** Nil
**Conflict of interest:** None Declared