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**Research Article**

# SUPPLEMENTATION OF *ARTEMIA NAUPLII* WITH ARTIFICIAL DIET FOR LARVAL REARING OF FRESH WATER PRAWN *MACHROBRACHIUM MALCOMSONI*

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**ABSTRACT**

The present investigation was aimed at to partial replacement of *Artemia nauplii* with artificial diet for larval rearing of *M.malsomsoni*. In the present study one artificial diet was prepared and used for partial replacement of *Arimemia nauplii*. Three feeding trial experiments have been done. In first experiment ($E_1$) Larvae were fed with *Artemia nauplii*, Second experiment ($E_2$) and third experiments ($E_3$) *Artemia nauplii* was replaced with artificial diet 25% and 50% respectively. After experimental period water quality parameters and survival rate of larvae were determined. Maximum survival rate (43%) was recorded with $E_3$.

**Keywords:** *Artemia nauplii*, Experiments, Artificial, Larvae.

## INTRODUCTION

Fresh water prawn culture has great potential for rural aquaculture, generating considerable employment and income thereby bringing prosperity to rural poor. Fresh water prawn farming is environmentally sustainable; since it is practiced at lower grow out density new, 1995). A majority of seed used in grow out farming of *M.malcomsoni* comes from hatcheries. (Murthy *et.al.* 2004; Phuong *et.al.*2006).Existing hatcheries in the country at however not producing up to their installed capacity due to various constraints.

*Artemeanauplii* are the preferred live food source used in the larvae culture of many crustaceans of commercial value. Several authors demonstrated that *Artemia nauplii* sufficient to produce *M.malcomsoni* post larvae (Devrasse *et.al.*1990); Lavaus *et.al.*,2000). However, others showed that *Artemia nauplii* do not completely fulfill the nutritional requirements of larvae during the last larval stages and therefore recommended the use of supplemental diets (New, 1995; Valenti and Daniels, 2000). By mind keeping the above literature, in the present study an attempt was made to partially replace the *Artemia nauplii* with Artificial diet and used for *M.malconsoni* larval rearing.

## MATERIALS AND METHODS

The present experiment was conducted in nine circular tanks at the hatchery located in Kavali, SPSR Nellore District. Andhra praesh. India during March to April 2021. The tanks were connected to bio-filters. Aeration was provided in the tanks with help of air compressor and air blower. The tanks were divided and placed under three experiments (viz $E_1$, $E_2$ and $E_3$) each having three replicates.

### 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 of slightly more height than the biofilter. A 2.0 cm diameter hole was done 10.0 cm below the upper edge of the rearing tank. A short PVC pipe of 2.0 cm diameter closed the hole at $45^0$angles and the other end of the pipe was connected to the bio filter. The larval rearing tanks were filled with treated saline water of 12 ppt up to the mark (mouth of the

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PVC Inlet). By a 100 micron mesh screen was used to close the out let, though 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.

**Preparation of Artificial Diet**

The ingredients (Table 1) were weighed and blended. The resulting mixture was plead in a pan and cooked in a water bath to pudding consistency. After cooling, it was cut into small pieces, individually wrapped with poly ethylene film and kept in a freezer for use the next 1-2 weeks. Before being fed to the larvae, the pieces were made into smaller particles, which were than sieved with different mesh screens to obtain three size clans of 250-500, 500-750 and 750-1000 µm for feeding based on the larval stages IV-VI, VII-IX, X-XII respectively.

**Water treatment**

Sea water of 35 ppt was stored at overhead tank which is directly imported Ramyapatnam costline. The saline water was kept in the stored tanks up to one week for settlement. The suspended water was passed through the rapid sand filter. U.V filters and stored again in the overhead storage tank. Finally, the seawater was treated with bleaching powder (50% chlorine content) qt a dose of 15ppm for killing the harmful organisms. Then the water was aerated for two days to eliminate the smell of chlorine. After day 2, water was again treated with Sodium thiosulphate at a dose of 10ppm to neutralize the access chlorine. Again this water was vigorously aerated for 2-3 day 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 exchange pipes, nets and other 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 ppm formalin. The disinfected brooders were then kept in brood stock tanks having 8 ppt saline water. The brooders were hatched after two days after stocking in brood stock tanks. The brooders were fed with fresh cow liver or rice bran twice in a day at the rate of 12% of the 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 tanks and added disinfected 12 ppt saline water. Hatchings 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 larvaes were disinfected for 20 minutes with 1 ppm Oxytetracyclin 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 $E_1$ (*Artimea nauplii* only), $E_2$ (75% *Artemia nauplii* + 25% Artficial Diet) and $E_3$ (50% *Artemia nauplii* + 50% Artificial Diet). In $E_1$ the larvae were fed with *Artemia nauplii* twice a day at 7.00 hrs and 18.00 hrs. In the case of $E_2$ the larvae were fed with 75% *Artemia nauplii* + 25% artificial diet twice a day at 7.00 hrs and 18.00 hrs from day third to post larvae. In $E_3$, the larvae were fed with 50% *Artemia nauplii* + 50% Artificial Diet 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 mounted shell and other waste 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 statically analyzed following the principle of Randomized block design, Duncan's New Multiple range test were then done for experimental comparison.

**RESULTS AND DISCUSSION**

Water Quality Paameters Such as Temperature, Salinity, Dissolved Oxygen, pH and Ammonia of larval tanks were determined. During the period of study no apparent variations in temperature of rearing media under different experiments was found. The water temperature as recorded was between $27^0$ C-$30^0$C.The range of salinity of culture media under three experiments was the same (12ppt). Dissolved oxygen content off 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 0.03-0.08 ppm.

Highest value was recorded in $E_3$ (0.008ppm) and lowest value was in $E_1$ (0.003ppm) 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. The survival rate of post larvae found to vary from 29% to 43% Highest rate of survival was recorded for the in $E_3$ (43%) and the lowest survival was recorded in $E_1$ (29%). Such variation was occurred due to higher nutritive and growth promoting value of Artificial diet. In $E_1$ the larvae fed with *Artemia nauplii* only but in $E_3$, The larvae were fed with enriched

*Artemia nauplii*(50% Artificial Diet). Which was highly nutritive.

**Table 1**. Composition of Artificial Diet.

| Ingredient | % |
|---|---|
| Milk powder | 53.8 |
| Chicken egg yolk | 41.7 |
| Fish oil | 3.0 |
| Lecithin | 1.5 |
| Vitamin C | 200 mg $kg^{-1}$ |
| Proximate analysis of Diet | |
| Protein | 48.6 ±1.2 |
| Lipid | 25.5 ±0.7 |
| Ash | 5.8 ±0.1 |
| Minerals | 6.5 ± 0.1 |
| Fiber | 0.3 ± 1.1 |
| Moisture | 57.7 ± 2.5 |

**Table 2**. Survival rate (%) and Production of *M. malcomsoni* fed with three different diets.

| S.No | Date of stocking | No. of larvae Stocked | Stocking Density No/L | Rearing period (days) | Average Survival (%) | Total no. of PL produced |
|---|---|---|---|---|---|---|
| $E_1$ | 01-03-2021 | 1,00,000 | 60 | 25.0 | 29 | 29000 |
| $E_2$ | 01-03-2021 | 1,00,000 | 60 | 28.0 | 40 | 40000 |
| $E_3$ | 01-03-2021 | 1,00,000 | 60 | 32.0 | 43 | 43000 |

## CONCLUSION

Mass mortality observed in $E_1$ 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 11.93PL/L (Islam and Khan, 1990), 10.22 PL/L (Adisukresno *et al.*, 1982), 9.5PL/L (Lee, 1982) and 30.0PL/L (Islam *et al*, 2000). It was observed that larvae became 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 overcome by strong aeration. This type of observations 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 higher than that of $E_1$ and $E_2$. The result obtained from the present study indicated that rearing of marine water 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 partial replacement of *Artemia nauplii* with artificial diet.

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