On-farm strategies

The most spectacular success in Indian aquaculture has been the development of carp culture by the farmers of Andhra Pradesh in early 90’s. They successfully used on-farm feed made of rice bran and groundnut cake. Likewise, even prawn farmers have tried farm made diets. But the yield was significantly low when compared to farmers who used commercially available pelleted diets.

III. MATERIALS AND METHODS

The experiment was designed to test the effect of claw-ablation on growth and survival by comparing mean weight; change in the coefficient of variance (CV) of mean weight; biomass and survival of the prawns when they were reared rose communally. To accomplish this, three different experiments were designed to know the effect of claw-ablation, to know the best age for ablation and to standardize the stocking density of ablated animals in growout ponds.

Experiment 1

The experiment was conducted in cement cisterns of 4 m$^2$. Cisterns were provided with 6 inches soil bed and dried for a week. The first experiment was to identify the effect of claw-ablation and hence compared with normal ones for their growth rate. It was conducted with two treatments in five replications in each and carried out for 120 days.

Water was drawn from the nearby reservoir. Prior to filling with water to a depth of 1m initial manuring was done with raw cow dung, urea and single super phosphate at the rate of 500 kg. ha$^{-1}$, 20 kg. ha$^{-1}$, and 40 kg. ha$^{-1}$ respectively. Subsequent manuring was done fortnightly once at a rate of half of the dose of initial manuring. A week later, hatchery born post larva of $M.~rosenbergii$ weighing 0.30±
0.024 g. were randomly selected and stocked @ 4 PL/m². The test group consisted of prawns whose second pair of claws was ablated on the 60th day of culture.

Each of the experimental tanks was provided with four earthen pipes of size 60 cm length, 12 cm in diameter as shelters. Every fortnight, water quality parameters and prawn sampling was carried out. On sampling days, collection and analysis of water was carried out between 0900-1000 h., prior to the addition of fortnightly dose of manure and fertilizers. Every day air and water temperature was also recorded at 0900-1000 h.

**Feeds and feeding**

During first fortnight of the experiment, postlarvae were fed with microencapsulated commercial diet ‘EPIBIOL 500-500 micron granule having crude protein minimum 49%, crude fat minimum 18%, crude fiber maximum 4% and moisture max 10%. Prawns were fed to satiation twice daily. Later, they were fed with laboratory-formulated feed having 32% protein. It was fed initially @ 5% of the body weight, later reduced to 3%. The ingredients used in the formulation of feed were fishmeal, rice bran, groundnut oilcake, tapioca flour, fish oil, vitamin and mineral premix. All the ingredients were purchased from local market ground and sieved to get particles of uniform size. Sieved ingredients were taken in different proportion to achieve 32% protein level and steam cooked and palletized, dried and packed in high density polythene bags and stored in a wooden shelf at room temperature. Daily required feed was fed in two rations i.e., 40% in 0930 h and 60% in 1600 h.

**Water quality**

Water samples were collected from surface and analyzed for dissolved oxygen (DO), free carbon dioxide (CO₂), pH and total alkalinity. Dissolved oxygen was measured by the standard Wrinkler’s method. Free carbon dioxide and alkalinity were estimated according to the American Public Health Association (APHA, 1976) and American Water Works Association (AWWA, 1976b). The pH was measured by
a digital pH meter (pHep, Henna instruments). All water quality parameters were analyzed with in four hours of collection of samples.

**Growth of prawn**

Prawns were sampled every fifteen days. Fifty percent of the prawn population was collected and weight was recorded. To know the effect of treatment on length, morphometric measurements were taken using slide calipers. All the prawns were collected at the end of the experiment by draining the cisterns. Non-parametric tests like Mann-Witney test and Wilcoxon tests were employed for statistical analysis of growth data to understand the effect of different treatments on growth of prawn at 5% confidence level. Prawn survival, total biomass production, net biomass production and specific growth rate were calculated.
Figure 3. Earthen pipes used as shelters

Figure 4. Typical arrangement of shelters in the experimental tanks
Experiment 2

After comparing growth rate of prawns in the experiment 1, it was found that claw-ablation had significant effect on growth and survival. Hence second experiment was carried out to find out the best age for ablation. The four different ages selected as treatments were 60, 75, 90 and 105 days, because at the early age prawns are not aggressive.

**Different Treatments**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Age of ablation</th>
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<tr>
<td>1. T1</td>
<td>60&lt;sup&gt;th&lt;/sup&gt; day</td>
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<tr>
<td>2. T2</td>
<td>75&lt;sup&gt;th&lt;/sup&gt; day</td>
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<tr>
<td>3. T3</td>
<td>90&lt;sup&gt;th&lt;/sup&gt; day</td>
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<tr>
<td>4. T4</td>
<td>105&lt;sup&gt;th&lt;/sup&gt; day</td>
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The cement cisterns were sun dried for a week after draining prior to filling. Initial manuring was done with raw cattle dung, urea and single super phosphate at the rate of 500 kg. ha<sup>-1</sup>, 20 kg. ha<sup>-1</sup>, and 40 kg. ha<sup>-1</sup>, respectively. Subsequent manuring was carried out every fifteen days at the rate of half of the dose of initial manuring. A week later, the substrate was placed in the cisterns vertically in the water column. Next day juveniles of *M. rosenbergii*, weighing 2.694 ± 0.184g. were stocked at 4/m<sup>2</sup>.

Every fortnight, water quality parameters and prawn sampling was carried out. Collection and analysis was carried out between 0900-1000 h., prior to the addition of subsequent dose of manure and fertilizers. Every day air and water temperature was also recorded between 0900 and 1000 h.
Feeds and feeding

First fifteen days of the experiment, postlarvae were fed with microencapsulated commercial diet ‘EPIBIOL 500’-500 micron granule having crude protein minimum 49%, crude fat minimum 18%, crude fiber maximum 4% and moisture max 10%. Prawns were fed to satiation twice daily. For another three fortnights, postlarvae were fed with crumbled formulated pelleted feed at the rate 10% of the body weight. Then juvenile prawn were stocked and they were fed with laboratory formulated pelleted feed having 32% protein. The animals were fed initially at the rate of 5% of the body weight, later reduced to 3%. Daily ration was fed in two rations i.e., 40% at 0930 h and 60% at 1600 h.

Water quality

Water samples were collected from surface and analyzed for dissolved oxygen (DO), free carbon dioxide (CO₂), pH and total alkalinity. Dissolved oxygen was measured by the standard Wrinkler’s method. Free carbon dioxide and alkalinity were estimated following the method of American Public Health Association (APHA, 1976) and American Water Works Association (AWWA, 1976 b). The pH was measured by a digital pH meter (pHep, Henna instruments). All water quality parameters were analyzed with in four hours of collection of samples.

Growth of prawn

Fifty percent of the prawn population was taken from each tank every fifteen days and the average growth rate was recorded. All the surviving prawns were collected at the end of the experiment by draining the cisterns. Analysis of Variance (Snedecor and Cochran, 1967) was employed to find out significant difference in growth rate among different treatments. In all the cases, significance was tested at 5% confidence level.
Figure 5. Juveniles of *Macrobrachium rosenbergii* after 45 day (left) and 60 day old (right), used for second experiment.

Figure 6. Advanced juvenile of *Macrobrachium rosenbergii* after rearing for 75 days of nursing.
Experiment 3

After identifying the right age for claw-ablation from the results of the experiment 2. The experiment was carried out in new set of tanks with different stocking densities as treatments. The four stocking densities were evaluated as treatments i.e., 4, 8, 12 & 16 /m$^2$. To minimize the experimental errors, the experiment was carried out in randomized block design, consisting of four treatments and five replicated groups in cement in cement cisterns of size 4 m$^2$.

Different Treatments

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Stocking Density</th>
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<tbody>
<tr>
<td>1. $T_1$</td>
<td>$(4/m^2)$</td>
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<tr>
<td>2. $T_2$</td>
<td>$(8/m^2)$</td>
</tr>
<tr>
<td>3. $T_3$</td>
<td>$(12/m^2)$</td>
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<tr>
<td>4. $T_4$</td>
<td>$(16/m^2)$</td>
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The soil bed of the cement cisterns used in the first experiment was sun dried for a week after draining of the cement cisterns. Prior to filling with water to a depth of 1m. Initial manuring was carried out with raw cattle dung, urea and single super phosphate at the rate of 500 kg. ha$^{-1}$, 20 kg. ha$^{-1}$, and 40 kg. ha$^{-1}$ respectively. Subsequent manuring was done fifteen days once at a rate of half of the dose of initial manuring. A week later, substrate was placed in the cistern vertically in the water column. Next day juveniles of *M. rosenbergii* weighing 4.8 ± 0.24 g. were stocked at the stocking densities indicated above.

Every fifteen days, water quality parameters and prawn sampling was carried out. Collection and analysis was carried out between 0900 - 1000 h., prior to the addition of regular dose of manure and fertilizers. Every day between above said hours, air and water temperature was also recorded.
Feeds and feeding

First fortnight of the experiment, postlarvae were fed with microencapsulated commercial diet ‘EPIBIOL 500’-500 micron granule having crude protein minimum 49%, crude fat minimum 18%, crude fiber maximum 4% and moisture max 10%. Prawns were fed to satiation twice daily. For another four fortights, postlarvae were fed with crumbled formulated pelleted feed @ 10% of the body weight. Then 75 days old advanced juveniles were taken to experiment and throughout the experimental period they were fed with own formulated pelleted feed having 32% protein. It is fed initially @ 5% of the body weight, later reduced to 3%. Daily required feed is fed in two rations i.e., 40% in 0930 h and 60% in 1600 h.

Water quality

Water samples were collected from surface and analyzed for dissolved oxygen (DO), free carbon dioxide (CO₂), pH and total alkalinity. Dissolved oxygen was measured by the standard Wrinkler’s method. Free carbon dioxide and alkalinity were estimated according to the American Public Health Association (APHA, 1976) and American Water Works Association (AWWA, 1976). pH was measured by a digital pH meter (pHep, Henna instruments). All water quality parameters were analyzed with in four hours of collection of samples.

Growth of prawn

Fortnightly once prawns were sampled. About 30% of the population was taken from each tank and the average growth rate was noted. The prawns were collected at the end of the experiment by draining the cisterns. Analysis of Variance (Snedecor and Cochran, 1967) was employed to find out whether there was any significant difference in growth rate of prawns in different treatments. In all the cases, significance was tested at 5% confidence level.
Figure 7. Taking morphometric measurements and weights of prawns during sampling days