SUGPO CAGE FARMING IN FRESH WATER

J. B. Pantastico
Freshwater Fisheries Station
SEAFDEC

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The emerging technology of prawn farming in Laguna Lake has been recently developed at the Freshwater Fisheries Station of SEAFDEC. The efforts complement those at the main station of SEAFDEC at Tigbauan, Iloilo. The outcome has been most rewarding in terms of optimizing the use of inland water resources and the prospect of establishing a new industry in Laguna Lake.

Research Base

The major research findings that catalyzed the development of this new technology are the successful acclimation of postlarvae to fresh water; development of a stable compound feed utilizing indigenous resources; and finding different types of supplemental feeds suitable for prawn under lake conditions. They are described below:

Acclimation of *Penaeus monodon* postlarvae to fresh water

Gradual acclimation of postlarvae to fresh water was conducted in aquaria and marine plywood tanks over a one-day, two-day, and three-day period. Different ages of postlarvae were tested for their hardiness. P_{35} postlarvae gave high percent survival of 98-99 percent while lower values were obtained for P_{20} and P_{90}.

A three-day acclimation period was optimum for all ages of postlarvae. Shorter duration of acclimation produced survival values as low as 20 percent. This stress effect was apparent with P_{20} and P_{90} but not with P_{35} which showed high survival regardless of the duration of acclimation.

Preliminary studies on the development of compounded algal diet for *Penaeus monodon*

SEAFDEC FFS Algae Cake was developed for the lake farming of acclimated *P. monodon* in Laguna de Bay. The formulated feed was prepared in three different forms: wet and dried algae cake, and dried algae pretzel. The dried algae cake was most stable lasting up to 56 and 36 hours under laboratory and lake conditions, respectively. Attractability and acceptability tests were also conducted.

The desirable characteristics of the newly developed feed in the light of establishing a prawn industry in fresh water were also discussed.

Effect of supplemental feeds at varying feeding rates on growth and survival of Penaeus monodon reared in the lake

Acclimated postlarvae (P_{20}-P_{30}) were stocked at 20/m^2 in cages in the lake and given three types of supplemental feeds: (1) Feed 1 - FFS Algae Cake (2) Feed 2 - trash shrimps and clams (1:1) and (3) algae cake + trash shrimps. Feeding rates varied at 5, 10 and 15 percent of the body weight.

The analysis of variance showed significant to highly significant main effects of type of feed and feeding rates. The effect of a given type of feed is the same whether the feeding rate is 15, 10, and 15 percent. Similarly, the effect of a given feeding rate is the same regardless of the type of feed. Peak periods of growth of P. monodon given supplemental feeds were attained during the 3rd and 4th months of culture (April and May, 1978). P. monodon given trash shrimps and algae cake (1:1) grew better compared to those given clams and trash shrimps (1:1) and algae cake alone at the end of the 6th month. Highest survival was attained in lots given clams and trash shrimps.

Initial Packaging

Based on these production-oriented researches and the results of experiments in progress, the research staff of the Station evolved a systematic procedures on "Prawn Cage Farming in Laguna de Bay." This may be considered an initial step towards packaging the new technology. The procedure is described below:

Transport and Handling of Sugpo Fry

Obtain fry from hatcheries or from the wild. Fry should be about 35 days old (P_{35}) or about 30-40 mm long. Put fry in oxygenated polyethylene bags at 1,000 fry in 8 liters brackishwater. Add seaweeds or eel grass as substrate. Place bags in an inverted position in buri baskets for transport to short distances or in styrofoam boxes with ice for long distance transport. Amount of ice to be added should be regulated to maintain the temperature at about 21°C.

Acclimation to Fresh Water

Upon arrival, check the salinity of the water in polyethylene bags. Allow the fry to rest in brackishwater with the same salinity (usually 12 to 18 ppt) for 1 to 2 days in marine plywood tanks. Stock at 20/liter. Aerate moderately and feed once daily with FFS algae cake (50% protein at 10 percent of body weight).

Lake Farming

1. Consider the following major criteria in selecting sites in Laguna Lake for prawn farming:

a) It should not be exposed to strong waves
b) The lake bottom should be silt-loam or clay-loam
c) The depth of water should be at least 2 m
d) The area should be relatively pollution-free

Based on preliminary findings of the eco-monitoring team using the above criteria, the following sites in Laguna Lake may be recommended: Talim Island (Binangonan side), Cardona, Los Baños, Pila, and Pililia.

2. From the acclimation tanks containing one-half lake water and one-half tap water, transfer fry to hapa nets (10 x 10 x 4 1/2 m) in the lake. Stock at $40/m^2$. During the first month, no supplemental feeding is necessary. On the second month, feed with a combination of FFS algae cake (starter feed, 50% protein) and trash shrimp at 5 percent of the body weight. Give one-third of the ration in the morning and two-thirds in the afternoon. Continue feeding for two months. Transfer to B-net cages when juveniles reach 80-120 mm long. At this size and age, post-larvae cannot pass through B-nets (mesh size, 55 mm). Note: Hapa nets should touch the lake bottom for better growth of prawn.

A module is presented as the most efficient way of setting up cages in the lake. This takes into account proper water circulation for all the cages.

3. Transfer fry from hapa nets to B-nets (10 x 10 x 4 1/2 m) as mentioned above. Cover cages for security and install them with the bottom submerged in the muddy substrate.

Reduce stocking density to $30/m^2$. On the fourth month, feed with a combination of FFS algae cake (grower feed, 40% protein) and trash shrimp at 5% of the body weight. During the fifth month, feed with a combination of FFS algae cake (finisher feed, 30% protein) and trash shrimp at the same feeding rate as above.

4. Harvest after five months when prawn attains marketable size which is approximately 40 grams.

Reproducible results were obtained following the above procedure. This lends viability to the new technology. Thus, a proposal has been prepared establishing a one-hectare module/demonstration farm for pilot testing. Should this be implemented, the pilot operations shall be closely monitored to determine the problems in the large-scale application of experimental results.

Research Thrust

While there is enough baseline date for initial implementation, there are still many problems areas that must be worked out to achieve success. These gaps have been identified and given top priority in the research activities of the Station for 1979. Broadly, the areas of investigation involve the more applied aspects of nutrition and fish culture. The identified problems include the following:

1. Improved techniques of transport and handling of postlarvae

2. Modification of the acclimation technique

3. Finding more varied and economical sources of supplemental feeds

4. Determination of the optimum feeding rates as well as the protein requirement at different stages of development

5. Finding suitable management techniques for prawn cage farming, e.g., stocking density, substrate preference

Summary and Conclusion

The new technology on prawn farming in fresh water was evolved through vigorous research at the Freshwater Fisheries Station, SEAFDEC. Pilot testing is proposed as a most important step towards demonstrating the viability of a developing industry. A continuous flow of research to tie the loose ends and strengthen application of the new technology is strongly recommended.