Farmers as Scientists

This is a series anchored by M.C. Nandeesha. It describes farmer-driven innovations and experiences.

Commercialization of Giant Freshwater Prawn culture in India by Farmers

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Research on freshwater prawn breeding and culture has been going on for almost two decades with varying degree of success in different research centers of India. The Central institute for Freshwater Aquaculture (CIFA), the Central Institute of Fisheries Education, some of the Fisheries Colleges under the State Agricultural Universities in the states of Kerala, Andhra Pradesh and Karnataka have long been involved in giant freshwater prawn (Macrobrachium rosenbergii) research and have developed technologies appropriate to local conditions. There are also a number of other organizations like MPEDA (Marine Products Export Development Authority), State Fisheries Departments and private consulting firms, which all have contributed significantly to the promotion of freshwater prawn culture. However, much of the research and developmental efforts of these Institutions remained largely as small-scale demonstrations in different states until recently. With the involvement of farmers from Andhra Pradesh in Nellore district on a large scale, the activity has been expanded widely and the maximum water area is under fresh water prawn culture in this state. The farmers of Andhra Pradesh are known for innovations and entrepreneurial skills and they have successfully demonstrated these qualities in establishing carp culture and shrimp culture. Declining profitability from carp farming and disease problems in shrimp culture encouraged farmers to look for new candidate species for aquaculture. As a result, farmers of this state have explored opportunities in freshwater prawn farming with the support provided by various agencies and individuals. In this article another successful adaptation of freshwater prawn farming by the farmers of Andhra Pradesh and the constraints faced by them at the present are presented.

National Fish Farmers' Day

The Government of India has declared 10th July to be celebrated as the Fish Farmers Day to commemorate the success achieved in induced breeding of carps by Dr. Hiralal Chaudhary on this day in 1957. Fishing Chimes, a widely read and well respected Indian Fisheries Magazine has instituted a Gold Medal in the name of Dr. Hiralal Chaudhury through the "Jayashree Trust" to be given to a progressive farmer who

Mr. Ch. Srikanth receiving Dr. Hiralal Chaudhary Gold Medal and citation from the then Honorable Minister for Agriculture Mr. Nitish Kumar.

makes a significant contributions for the development of aquaculture in India, on an annual basis. This prestigious award for the year 2001 was presented to Mr. Ch. Srikanth for his significant contributions for the promotion of freshwater prawn culture through the active partnerships of farmers in India. His accomplishments are worthy for others to emulate in how commerce, service and science can be coupled together to have the best possible effect. In 1980s, while looking for self-employment opportunities in the field of agriculture, Mr. Srikanth started experimenting with various activities like poultry, agriculture and aquaculture. Among various occupations, he recognized aquaculture as an activity through which maximum profitability can be obtained with less risk based on his maiden experience in carp farming and carp seed production. From carp, he moved into prawn farming and seed production in 1990s. As a producer of prawn seed, to popularize prawn farming, he worked closely with farmers to demonstrate the culture potential of freshwater prawn through innumerable number of demonstrations and various other strategies. Today he owns a group of Maharaja hatcheries known for quality seed production of giant freshwater prawn. Besides Andhra Pradesh, he is now moving the prawn farming activity to several Northern States of India.

Composite culture of carps and prawn

Composite culture of carps with prawns has been proved to be successful in many of the experimental demonstrations in the past. However, the technique has not become popular owing to seed availability and also marketing problems of prawns when such culture is undertaken only by a small number of farmers. Mr. Srikanth banked on these proven results to encourage farmers in Nellore region initially to experiment culture of carps with prawns. Carps are generally stocked at about 5,000 fish / ha and grown for a period of about 8-12 months. Along with carps, farmers were encouraged to stock up to 10,000 juveniles / ha of prawn. While carps were grown through periodic fertilization and regular feeding with de-oiled rice bran, no feed was given to prawns. Farmers were able to obtain 5,000-6,000 kg of fish at the end of culture period and obtain even more than 50% survival of the prawns depending on the size of the stocked seed and other pond water quality conditions. Often the revenue realized from prawn, which would have attained a weight of up even up to 100 g at the end of the year was as good as revenue from carps. The repeated confirmation of results by several farmers on the possibility of growing carps and prawns together and the high income realized from prawn farming stimulated some of the farmers to explore the possibility of monoculture of prawn. The success in the monoculture of prawn has led to the replacement of carp culture almost entirely with prawns. In addition, low saline areas in the coastal belt are also used for prawn culture.

Mr. Srikanth seen with his family and a galaxy of key Indian Fisheries Scientists.

Monoculture of prawns

The technology developed by farmers for monoculture of prawn involves greening of ponds by application of lime (500 kg/ha), organic manure (2,000-3,000 kg cow dung) and inorganic fertilizers like super phosphate (50kg /ha) and urea (20kg/ha) at a low dosage. While some farmers buy the post larvae and nurse them to juvenile stage over a period of 1-2 months, others directly stock post larvae for commercial culture operations. Nursing of post larvae is undertaken by stocking at 100,000 to 200,000 /ha. The larvae are fed daily several times with the supplementary feed at 15% of body weight at the beginning and gradually reduced to 5%. The larval feed containing more than 30% protein is fed to larvae during the nursing period. Coconut fronds are provided as shelter for the larvae to take protection while molting. The larvae would attain a weight of 4-5 g depending on stocking density and other management practices.

The post larvae / juveniles are stocked at the rate of 25,000 to 40,000 / ha in ponds that are greened by following the procedure of application of lime, organic manure and inorganic fertilizers. To regulate plankton bloom, surface feeding fish like catla (*Catla catla*) are stocked at about 500/ha. Unlike carp ponds wherein manure loading is high, prawn ponds are maintained to have only adequate levels of green condition through water exchange. After the initial fertilization, the green condition of water is generally maintained by the unused feed and fecal matter contribution of prawn and other organisms. Prawns are fed at 5% of the body weight in the beginning by splitting the quantity in to 3-4 meals by broadcasting feed in to the pond. With the increase in size, feeding rate is gradually reduced to 1-1.5%. While feeds supplied by major feed manufacturing companies have major share in the market, several of the farmers produce their owns feed by procuring various ingredients, processing and preparing feed pellets using the industries set up to provide such services at cost. The cost of such prepared feeds is much less than the

Water evaporation and seepage loss is maintained by pumping ground water in many cases.

company feeds with experimentation and experience of farmers is helping them to become independent on this feed component, which is the largest cost in cultivation. The food conversion ratio of feeds vary widely from 1.5 to 5 depending on the management strategies adopted by farmers, although with experience, most farmers are able to get a conversion of 1.5 to 2.5. The protein level of feed is maintained around 25-30% for growing market size prawns.

Harvesting begins after 3-4 months of stocking and bigger individuals are culled and marketed. Several farmers adopt the strategy of harvesting bigger size prawns at fortnightly / monthly intervals until the end of culture period, which can extend up to 8-12 months period. Harvested prawns are kept in fresh condition using ice at 1:1 ratio until it is reached to the processing units. Partial processing is also carried out in farm by removing head and legs. The recovery rate of prawns varies depending on the size of larvae stocked and other management practices adopted and can be as high as 90%. There would also be a small percentage (5-10%) of stunted prawns, which are called "runners" which are grown by stocking them separately. These runners compensate growth in about 1-2 months and grow up to be sold as "winners". Evaporation seepage loss and partial replenishment of water are other important criteria that determine the growth and productivity. Several farmers have been using ground water for replenishment and partial exchange of water. Shelters for prawns are not generally provided in culture ponds, particularly when they resort to continuous harvesting strategy since such placement of shelters create problems for regular harvesting. Production of prawn varies depending on the management strategies adopted from 600 to 3,000 kg/ha/year, though on an average most farmers obtain about 1,000 kg/ha/year.

Small farmers derive benefits: Some examples

A number of small farmers have gotten involved in prawn farming activity through seeing the successful demonstrations of large farmers. These small farmers are deriving the benefit of prawn farming and have been able to improve their livelihood through aquaculture. Mr. Ismail Sheik is one such small farmer who hired a pond of 1.5 acres on a lease basis for Rs.15,000/- year. He prepared the pond by applying 200 kg lime and filled the pond with canal water. The pond was stocked directly with the 25,000 post larvae and they were fed with the commercial feed at 5% body weight by splitting the quantity of food to be given 3-4 times a day. After four months of culture, harvesting resulted in 1,150 larger-sized prawns and thereafter throughout the culture period of one year, larger prawns were harvested at monthly / fortnightly intervals. Lime was applied at the rate 50 kg/acre after every harvest as a sanitation measure to maintain good water quality. For the whole culture period about 1600 kg feed was used. Altogether 16,000 prawns with an average count of 40 prawns /kg were harvested. The farmer spent Rs. 22,000 for seed and Rs.40,000/- for feed and incurred another Rs. 6,000 towards the cost of lime, geolite and harvesting expenses. Selling of prawns yielded

Pellets are broadcast in to ponds

Rs.170,000 and after deducting the expenses a net profit of Rs.87,000/- was made. Most of the activities were managed with the family labor, excepting harvesting by hired labor. For a small farmer like Mr. Sheik, this has been very risky business involving huge expenditure. However, in the end the risk has been worth since profit realized was more than 100% on the investment, though the production obtained was not impressive. With the encouragement derived from this beginning, he has converted his own paddy land into fish pond and is continuing prawn culture in both the leased pond as well as his own pond.

Mr. Venku Reddy is another farmer involved in prawn farming, but his scale of operation is slightly larger. He has taken on lease four ponds totaling about 3.75 ha. Mr. Reddy purchased about 140,000 post larvae and nursed them for about 2 months in a 0.8 ha pond. The pond was prepared by applying lime at 500 kg and about two tones of cow dung followed by the application of super phosphate and urea to give an adequate green color of water. Larvae were fed at 15% body weight in the beginning and the rate was reduced to 5% with the increasing larval size. During two months rearing, the seed attained a weight of about 4g. These juveniles were grown to marketable size by stocking them at about 30,000 /ha in grow out ponds. Prior to stocking rearing ponds were also prepared in the same fashion by applying lime, followed by cow dung and inorganic fertilizers.

In larger ponds, simple floating devices are used for movement and broadcasting feed. Rope tied from one end to another will serve as support structure for movement and broad casting of feed all over the pond.

Ponds were also stocked with surface feeding fish like catla at 300 fish /ha. Partial harvesting commenced after 120 days: Larger prawns were harvested and sold at fortnightly intervals. The quantity of feed given to prawns was adjusted based on the number of prawns harvested and the probable number remaining in pond. The farmer was able to harvest more than 90% of the stocked prawns and on an average obtained a production of more than 1,400 kg/ha yield in ten-month culture operation. After all the expenses, he was still able to earn good net profit.

Harvesting of market size prawns is undertaken on fortnight / monthly basis

Conclusion

The area under freshwater prawn cultivation has been expanding rapidly with the simultaneous growth of support industries. It is estimated that at present about 22,000 ha of ponds are under prawn culture in Nellore district of Andhra Pradesh alone To cater for the various inputs to this large area, a network of other industries like hatcheries, feed processing units, feed supply companies, chemical stores and prawn processing factories have been established. In addition there are supply channels that organize various inputs and collect harvested prawns to processing units.

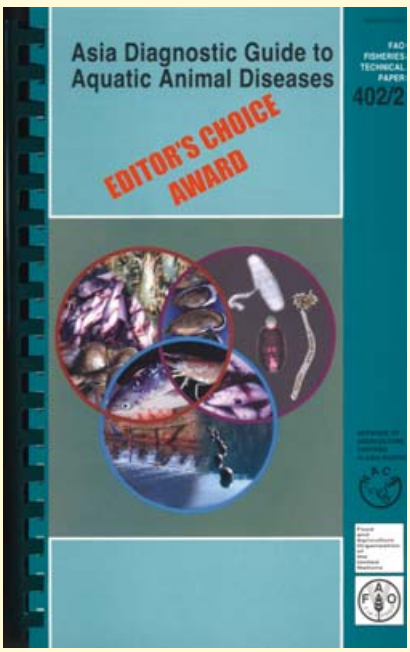
There are a good number of private hatcheries that have been established to cater for the seed requirements of farmers. However, there are major problems confronted by farmers in regard to seed quality. Many of the quality problems in regard to growth and disease problems have been attributed to importation of poor quality seeds. Some of hatcheries like that of Srikanth's are now sourcing natural wild breeders to overcome certain of these problems and establish quality broodstock banks.

Only bigger size prawns, known as "winners" are harvested "runners" are released back for further growth.

Beheading and removal of legs s undertaken immediately after harvest. Ice is commonly used at !:1 ratio to preserve the quality of prawn

Diseases have become a major problem both in the hatchery and grow out system. Similar to the problem of white spot in shrimp, another virus disease is reported to be becoming a major threat to fresh water prawn industry.

The drought and disease problems are reported to have already affected the industry and a number of farmers have given up the activity since the input costs are too heavy and they will not be able to bear the heavy losses. Freshwater prawn farming is gradually picking up even in other parts of the country based on the proven experience of farmers and technology promotion efforts made by fisheries development agencies. While farmers have been able to demonstrate that it is possible to commercially produce prawn, active research support is needed at this stage in terms of improving genetic quality of stock, disease prevention strategies and treatment of various diseases. While addressing the existing technical problems, there is also a necessity to promote environmentally-friendly aquaculture and avoid high intensification activities. Commercial culture potential of *Macrobrachium malcolmsonii*, which also grows well and has good market value need to be explored. It is reported that China is making good progress with this species. Timely intervention is required by the scientific community to help farmers to sustain this activity by reducing risk factors.



Asia Diagnostic Guide to Aquatic Animal Diseases

The Asia Diagnostic Guide is a comprehensive, up-datable diagnostic guide for the pathogens and diseases listed in the NACA/FAO and OIE Quarterly Aquatic Animal Disease (QAAD) Reporting System including a number of other diseases which are significant in the Asia region. It jointly published by FAO and NACA under the Asia-Pacific Regional Programme on Aquatic Health Management.

This 240 page volume contains a general introduction on health and aquatic animals and the roles and levels of diagnostics. Section 2 to 4 cover Finfish Diseases, Molluscan Diseases and Crustacean Diseases. Each host section commences with a chapter on "General techniques" which covers essential starting points that will enable prompt and effective response(s) to disease situations in aquatic animal production. These chapters are not disease specific and emphasize the importance of gross observations and how and when they should be made, including information on environmental parameters worth recording, general procedures for sampling and fixation and the importance of record-keeping. The guide is illustrated with more than 160 colour photos. Limited hard copies and a CD version are available for cost of postage. A free electronic (PDF) version is available from the NACA website (http://www.enaca.org/Publications.htm).