

# Polyculture of Freshwater Prawn and *Mola* in Bangladesh

A Solution for Income Generation and Household Nutrition in Rural Communities

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*“BAU researchers have demonstrated ‘Prawn-Mola’ culture technology in my farm. I can now regularly feed my family with mola-curry and sell prawn in the market.”*

— Prawn farmer Israfil



*Seining a Mola-Prawn pond in Fulpur, Bangladesh.*

Bangladesh is a land rich in inland water resources that are suitable for the culture of many aquatic species, including the giant freshwater prawn, *Macrobrachium rosenbergii*. In response to the high export potential of this species, the government of Bangladesh has launched an initiative to increase prawn production to 60,000 mt in 80,000 ha of low-lying floodplains and homestead ponds over the next 10 years. A recent survey showed that annual prawn yields are in the range of 300-600 kg/ha, which is relatively low; however this production can be increased through improved management and diversification of technologies. All-male prawn culture may be one of the options for increasing production, however this needs clarification through on-station and on-farm trials comparing it with mixed- sex and all-female production.

The country also faces the dual challenges of feeding its own people and increasing export earnings through the development of new products. Culturing freshwater prawns for the export market together with the nutrient-dense small fish mola (*Amblypharyngodon mola*) for household consumption may be an innovative option. If mola and prawns can be cultured together, farmers will

have the option of harvesting mola throughout the year for family consumption without affecting the production of the giant prawn cash crop. Mola, which grow to 15 cm in length and reproduce on their own, have been found to contain vitamin a and other essential micro-nutrients in concentrations up to 50 times higher than most fishes consumed by Bangladeshis. Mola are omnivorous surface feeders, a characteristic that can improve the culture environment for prawns through grazing on phytoplankton blooms and thus reducing oxygen deficiency problems. Moreover, mola feces are rich in bacteria and may serve as a good food source for prawns scavenging for detritus.

A collaborative project between Bangladesh Agriculture University (BAU) and the AquaFish CRSP was planned to develop a new sustainable polyculture technology for all-male freshwater prawns and mola to increase the average productivity of high-value prawns for export as well as to provide mola for household consumption. The project idea was conceived by the late Dr. Yang Yi during his last visit to Bangladesh, when he observed that prawns were being cultured as a monoculture in small-scale household systems, yet families were being deprived of fish for household consumption throughout the prawn culture period. Technical support for the new project was provided by Professor Jim Diana of the University of Michigan. The project was set out to address the following objectives:



- To compare growth and production performance of all-male and all-female freshwater prawn in pond culture systems; laden
- To evaluate the potential of addition of mola at different densities including the effects on pond ecology, production of freshwater prawns, and total production of both species in polyculture; and
- To understand the benefit of selective harvesting of prawn and partial harvesting of mola on production of cash crop and impact on family nutrition.

These objectives were addressed through a series of studies carried out at the Fisheries Field Laboratory of BAU. In addition, another polyculture technology including prawns, mola, and two carp species was tested at BAU and validated in rural farms in Fulpur Sub District, Mymensingh.

In these experiments, the production performances of all-male and all-female freshwater prawn in monoculture were evaluated simultaneously with the addition of mola stocked at different densities into polyculture with freshwater prawn. The addition of mola at different densities had no effect on survival, gain in weight, or production performance of freshwater prawn while providing a valuable additional product for home consumption. Therefore, mola may be stocked as an additional species with freshwater prawn that would give higher total production, provide family nutrition, and generate additional income.



*Nutrient-rich Mola harvested from a pond.*

In order to more fully utilize the production potential of the polyculture ponds, the effects of adding silver carp (*Hypophthalmichthys molitrix*) and catla (*Catla catla*) to the mola-prawn polyculture system were also evaluated. Net production of prawns was significantly higher with silver carp and with silver carp-catla, but not with only mola or mola-catla.



*Giant freshwater prawns harvested from a polyculture pond.*

In a third set of experiments, the effects of selective harvesting (at the appearance of blue claw) and claw ablation of blue-clawed prawns in the all-male prawn-finfish polyculture system were evaluated. In ponds stocked with all-male prawn, silver carp, catla, and mola, selective harvesting of prawns resulted in higher net production of freshwater prawns than either claw ablation or simple polyculture of these species. The combined net production of prawns plus fish was also higher when selective harvesting was done.

Polyculture of prawn with mola and small numbers of filter feeding carps like silver carp and catla may result in an ecologically balanced pond culture system, where synergisms take place that result in higher production of both prawn and fishes. Selectively harvesting from

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all-male prawn populations results in higher production than culturing all-female populations or practicing other management options. Mola should be regularly partially harvested using a lift net or small seine net to keep their population under control and provide family nutrition year round. Prawn can sold at a higher price as export item to provide family income and thus serves as a cash crop.

Through this series of experiments, Bangladesh has developed an all-male prawn production technology and established that selective harvesting is a better management technique for increased prawn production. Through partial harvesting of mola, production and household consumption increase to improve family nutrition.

Freshwater prawn and mola culture technology has been widely accepted by extension agencies like DoF, WorldFish Center, and Winrock International for large scale dissemination using their countrywide networks. The technology has spilled over to West Bengal and Nepal and is in the process of expansion there. Through the efforts of BAU, the University of Michigan, and the AquaFish CRSP research team, the management of prawn culture in Bangladesh has progressed from one focused only on export sales to one including production for home consumption that is ready for large-scale dissemination to small-scale farmers. The new approach still provides a comparable income for farmers, yet provides household food as well. A training and extension manual in Bangla language has been prepared by the WorldFish Center with the technical assistance of the BAU research team for country-wide dissemination of the prawn-mola culture technology.



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