

Assam Agri-Business & Rural Transformation Project
(APART)



DEPARTMENT OF FISHERIES : GOVT. OF ASSAM



Goalpara District

DEMONSTRATION OF FRESHWATER PRAWN FARMING WITH CARPS
(2020-2021)

Technical Report by Worldfish

1. Name of Beneficiary	7. Stocking Density :
2. Village	(a) Prawn : 2000
3. ...	(b) Carp : 600
... Got, Madang	8. Total Cost : 62500
: 01/08/2	(a) Project Share : 50000
: 0.25 H	(b) Beneficiary Share: 12500



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Better management practices for polyculture of carps with freshwater prawns: Version 2 (2024)



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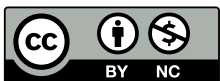
Acknowledgments

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Dr. Sourabh Dubey and Mr. Kalpajit Gogoi.

Introduction

Giant freshwater prawns (*Macrobrachium rosenbergii*), commonly known as “scampi,” are widely distributed in Southeast Asia. In India, they are found in most river systems, including parts of the Brahmaputra River system. They inhabit rivers, canals, estuaries and coastal waters, and they can be cultured in freshwater as well as in slightly brackish water.



Freshwater prawns are highly valued for their high price, large size, rapid growth, good taste and high export demand. Because of the high management cost, lower survival rate and differential growth of prawns under monoculture systems, polyculture of giant freshwater prawns with Indian major carps has become popular among fish farmers in India. It is now widely cultured in the northern parts of Karnataka, Andhra Pradesh, Orissa, West Bengal and Punjab.

The presence of fish in a polyculture system serves as a biological control over the development of zooplankton, phytoplankton and filamentous algae, which can otherwise make the pond ecosystem unstable. In a polyculture system with fish, prawns feed on natural food produced in the pond, leftover fish feed and also fecal matter from fish, so there is no need for separate, high-cost prawn feed.

Inclusion of freshwater prawn in a polyculture system almost has synergistic beneficial effects, including the following:

- more stable dissolved oxygen levels
- fewer predators

- coprophagy (the consumption of fish feces by prawns), which increases the efficiency of feed and improves the pond ecology
- greater pond productivity among all species
- the potential to increase the total value of the crop by including a high-value species.

In the Indian state of Assam, aquaculture systems are characterized by polyculture of Indian major carps, mainly rohu and catla. Freshwater prawn farming is an environment friendly aquaculture system, and Assam’s agroclimatic condition is well suited for its culture.

Adding freshwater prawns with carps in a polyculture system can increase profits and minimize waste in pond. They also have a high market value, good consumer preference and high export potential in the context of Assam.

In this context scientifically validated better management practices (BMPs), covering the full life cycle of the farming operation, are essential. To this end, the Assam Agribusiness and Rural Transformation (APART) project is committed to supporting sustainable intensification of polyculture of carps with freshwater prawn in India and plans to increase incomes from it.

BMPs refer to a set of standardized management guidelines that is developed based on existing practices and associated risks, as determined in consultation with scientists and farming practitioners and relevant industry stakeholders. Developing scalable aquaculture technology packages and BMP interventions is vital to increase aquaculture production in a sustainable manner and thereby narrow the fish demand-supply gap in the country in the future. Such interventions should aim at sustainable intensification of aquaculture without creating adverse socioeconomic and environmental impacts.

The BMP development process considers the technical, environmental, social and economic issues associated with farming and must be location and context specific. New innovations should be routinely incorporated into BMPs to

continuously improve farming practices. BMPs are dynamic and evolving. As such, promoting the implementation of BMPs across the value chain for freshwater prawns in carp polyculture systems would benefit Assam through improved productivity and reduced negative environmental and social consequences. Such BMPs and technical guidelines should cover areas of general husbandry, pond preparation, water quality management, feed management, disease management, recordkeeping, harvest and post-harvest handling.

This second version of BMPs for carp-freshwater prawn polyculture complements the Package of Practice initially developed by the College of Fisheries, Assam Agricultural University, Assam under the APART project. The purpose of revising the BMP guidelines is to increase the potential and enhance the capacity of carp farmers, extension service providers and other value chain actors for carp-freshwater prawn polyculture in Assam.

This guide, provided by WorldFish, is an evolving document and will be updated considering the observations, results and experiences of the past few years of demonstrations of carp-freshwater prawn polyculture under the ongoing APART project.

1. Pond preparation

- Drain the pond and disinfect it with calcium oxide lime, then remove sludge from the bottom and let it dry completely until the soil cracks.



- Keep the pond dikes clear of bushes so that predators have nowhere to hide.
- Repair the dikes as necessary to control water seepage.
- Repair inlet and outlet pipes.
- Insert bamboo or other substrates into the pond. These help periphyton colonize the pond and help protect fish from poachers.

- Apply lime, distributing evenly over the pond surface at the recommended rate.
- Consider fencing the sides of the pond using a nylon net, bamboo or any other locally available materials or bio-fencing using plants like the Assam lemon, chitranaalla.



Key considerations:

- Drain and dry the pond annually or once every 2 years, depending on the need.
- Lime the pond if the pH of the soil drops below 6.5.
- Use cost-effective materials for fencing or provide bio-fencing.

2. Filling and fertilizing the pond

- Fill the pond with water, maintaining a depth of 1.5–2 m. If using a natural source, filter the water with double-lined nylon nets.
- Avoid using inorganic or organic fertilizers.
- Instead use a homemade fermented fertilizer. To make it, combine presoaked GOC (120 kg), semi-cooked rice bran (10 kg), jaggery (10 kg) and baker's yeast (1–1.5 kg) in 100 L of water for 48–72 hours. Mix frequently. This is enough for 1 acre (4000 m²).
- For the follow-up dose, remove the GOC and keep the rest of the fertilizers using same preparation method.
- After 48–72 hours, filter the fertilizer using a meshed cloth/net and then apply it in the pond.
- This helps maintain the carbon–nitrogen ratio. The initial dose of GOC helps develop zooplankton while follow-up doses help maintain healthy algal bloom and water color.
- Continue applying the fertilizer at least twice a week or once as required throughout the culture cycle until harvesting.

Key considerations:

- Install a measuring pole marked at 1 m, 1.5 m and 2 m to check the water level.
- As freshwater prawns are territorial, they require a place to hide during their molting phase. This is how shellfish grow.
- During this phase, prawns become weak and exposed with soft muscle. To prevent them from cannibalism, place plastic pipes, hollow bamboo, betelnuts leaves, coconut leaves, old tires, tree branches, etc., into the pond.
- Monitor plankton turbidity using a Secchi disk, maintaining adequate greenness of around 30 cm visibility, and adjust the subsequent fertilization rate. Clear water indicates low levels of natural food, while very green is a sign of high plankton density.

3. Stocking

- Stock the pond once the water turns yellowish green. This indicates that it is rich in plankton, which is natural food for fish as well as freshwater prawn juveniles.
- Acquire fish fingerlings from nurseries of the fisheries department or from a private seed bank (where available).
- Get fast-growing fingerlings of jayanti rohu and improved catla.
- Procure fingerlings approximately 10 cm long for stocking.
- Stock freshwater prawn juveniles 4–6 cm long, and maintain a stocking density of 7500/ha, as recommended.



- Treat the seeds with potassium permanganate at 1–3 ppm (mg/L) or sodium chloride at 4% before stocking.
- Maintain a stocking density of fish 2500–3500/ha, as recommended.
- Maintain a stocking ratio of 5:5 (surface feeder: column feeder).

Key considerations:

- Avoid stocking fish seeds by weight. Instead, stock recommended species at the recommended ratio and density.
- Adjust the stocking density based on the harvesting strategy, depending on whether you are harvesting “table-size fish” or growing them to more than 1 kg.



4. Crop calendar

- Follow the crop calendar provided in order to plan fish production to reach the market during the ban period in Assam, which runs from April to June, when demand and prices for fish are high.
- Stock fish during July–August so that they grow to marketable size by March.

Key considerations:

- Fingerlings of different fish species should be available for stocking by August.
- Advanced nursing on-farm reduces seed cost substantially and enables the availability of required seed for stocking.
- Early season stocking allows farmers to harvest fish in April to June, when the fish supply in markets is low and fetch better prices.
- Follow a short production cycle (March–May) to produce large fish in areas prone to flood damage.
- Follow the crop calendar as recommended (where possible).

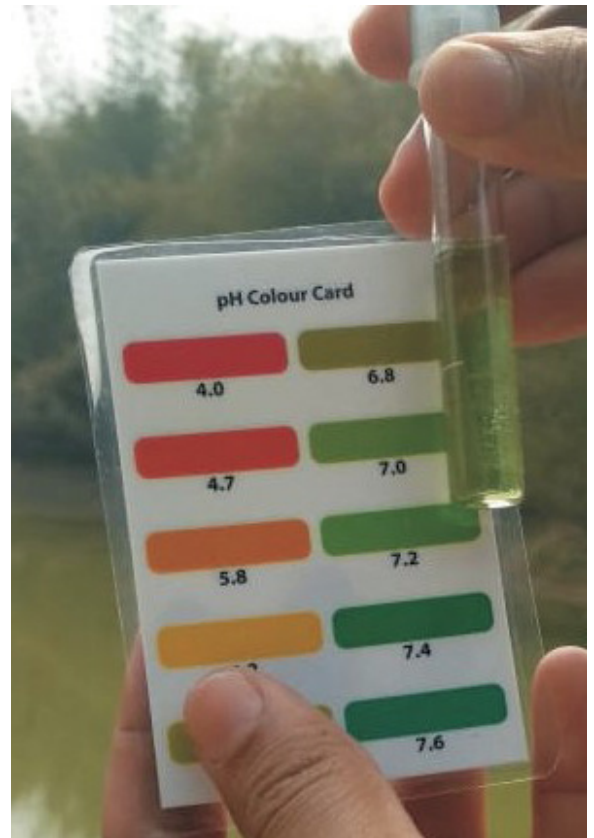
CALENDAR	
Month	Activities
July	Preparation
August	Stocking
September	Growing
October	
November	
December	
January	
February	
March	Harvesting
April	
May	
June	

5. Water quality management

- Monitor the pond regularly, in both the early morning and late afternoon or evening.
- Dissolved oxygen is low if (1) the pond turns dark green with a Secchi disk visibility under 15 cm or (2) the water becomes dark or black and smells foul, such as from hydrogen sulfide.
- Check the water pH after heavy rainfall and apply lime if the pH drops below 6.5.

Key considerations:

- Symptoms of low dissolved oxygen levels include fish gasping for air on the pond's surface, or sometimes even death. If such symptoms are noticed, replace part of the water or sprinkle water over the pond to increase dissolved oxygen levels.
- Mechanical aerators are for large farms; for small ponds, fish farmers can pump water or create a fountain over the pond.
- If the pond turns dark or black, drain some of the water from the bottom and top up with new water.



6. Feeding

Follow feeding options, depending on the availability and cost of the feed:

- sinking pellets
- farm-made feed
- combination of commercial formulated feed and farm-made feed.

Adjust the feeding rate as recommended.



Key considerations:

- Use grow-out feed with a 30% crude protein content.
- Broadcast feed over the pond from the surrounding dikes.
- Place feed in feeding trays (made of locally available materials) submerged in the pond.
- Put feed in perforated bags and submerge them just below the surface so that the fish can browse the feed and ensure minimal feed loss.
- Another option is to give feed in check trays placed 2–3 m away from the dike for better feed management.
- Adjust feeding based on the fish biomass (feeding table to be provided to the farmer).
- Cook farm-made feed to make it more palatable.
- The daily feeding rate ranges from as high as 5% of total fish biomass for fry and fingerlings down to 1% for large fish.
- Adjust the feeding rate based on feed quality, plankton richness, etc.
- Avoid feeding around midday, when the temperature is high and during the cloudy or rainy days.

7. Regular sampling

Do sampling every 15–30 days to assess the growth and health of the cultured fish and prawns. Be sure to monitor the length and weight of the different fish species stocked, as well as the cultured prawns. Use the information to adjust the feeding rates for the fish. Check for external parasites on the body, fins, gills, etc., and look for any lesions or wounds.



8. Disease management

There are a few preventive measures farmers can use to reduce the risk of diseases and parasitic infection:

- Stock the pond with healthy, disease-free seed.
- Disinfect all tools used in fish culture operations.



- Avoid overcrowding.
- Follow proper feeding, fertilization and water quality management practices.
- Conduct routine screening for any sign of disease or stress.
- Record all clinical signs, take photos of clinical signs and record the number of dead fish.
- Remove all moribund and dead fish, and bury them far away from the pond.
- Bring any unusual mortalities to the attention of the responsible authorities and help them collect samples for laboratory testing.
- Follow the suggestions of the responsible authority for disease management.

9. Harvesting

Follow a harvesting strategy based on the type of culture system used, generally single stocking or multiple harvesting:

- Harvest fish when they reach 800 g–1 kg.
- Harvest prawns when they weigh more than 50 g. Condition the fish before sending them to live fish markets.



Key considerations:

- The harvesting strategy largely depends on the purpose, market preference, grow-out system, etc.
- Harvest fish 1 day before transporting them to market, and put them in a nylon hapa. Stop feeding at least 24 hours beforehand.
- Harvest prawns weighing over 50 g using a seine net of a suitable mesh size after 4 months of culture. After that, harvest once every 3–4 weeks for the next 3–4 months. Harvest prawns after 8 months of culture by complete dewatering.

10. Marketing

- Transport fish to markets either early in the morning or late in the afternoon.
- Preferably, transport fish alive to markets to get a better price.

Key consideration:

- Avoid transporting fish when the temperature is high, during midday to early afternoon.
- When transporting live fish, maintain a biomass based on the volume of water to avoid mortalities.



11. Environmental care

Make sure that fish farming activities do not harm the surrounding aquatic and terrestrial environment.

Key considerations:

- Avoid draining pond water and sludge directly into nearby water bodies.
- Properly dispose of dead fish (they should be removed immediately from the pond and buried properly).
- Properly dispose of the feed bags, fertilizer bags, used bottles and containers.



12. Recordkeeping

- Maintain records of all farm activities, stocking details, inputs, sampling details, harvest details, sales and consumption.
- Use record books provided by the project.
- Make sure that records are updated periodically by the project staff or department officials during their visit to the farm.

A large, stylized graphic of a fish's tail, rendered in various shades of blue, occupies the right side of the page. The tail is curved and has several distinct rays, creating a sense of movement and depth. The background is a solid, dark blue color.

About WorldFish

WorldFish is a leading international research organization working to transform aquatic food systems to reduce hunger, malnutrition and poverty. It collaborates with international, regional and national partners to co-develop and deliver scientific innovations, evidence for policy, and knowledge to enable equitable and inclusive impact for millions who depend on fish for their livelihoods. As a member of CGIAR, WorldFish contributes to building a food- and nutrition-secure future and restoring natural resources. Headquartered in Penang, Malaysia, with country offices across Africa, Asia and the Pacific, WorldFish strives to create resilient and inclusive food systems for shared prosperity.

For more information, please visit www.worldfishcenter.org