VERIFICATION AND REFINEMENT OF INTENSIVE SHRIMP CULTURE TECHNIQUES: PHILIPPINES

Environment-Friendly Schemes in Intensive Shrimp Farming

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Project Sites: AQD's Dumangas Brackishwater Station, Iloilo, Philippines
BFAR Demonstration and Training Centers in Butong, Taal, Batangas; Bentig, Calape, Bohol; and Pacita, Lala, Lanao del Norte
Ponds owned by private sector in nearby Iloilo towns

BACKGROUND/RATIONALE

International environmental pressure groups call for shrimp importing countries to impose a trade embargo against farmed shrimps produced in a manner considered deleterious to the environment. In fact, Europe had banned in 2000 the importation of shrimps from some Asian countries. The subject of such protest actions included: (1) discharge of substances potentially harmful to marine organisms (chemicals used during pond preparation and therapeutants used during culture period); (2) discharge of excessive organic load during regular water change and harvests; and (3) chemical residues in shrimps harvested and marketed.

In the Philippines, a mandate from the national government was given to SEAFDEC in 1996 to rehabilitate the shrimp industry, which almost reached the brink of virtual collapse due to diseases brought about by some environmentally destructive practices. Mangrove-friendly aquaculture or what is sometimes referred to as the environment-friendly aquaculture was launched by AQD as a five-year program starting in 1998. The focus was later changed to shrimp culture and made part of the ASEAN-SEAFDEC Fisheries Consultative Group (FCG) collaborative project with AQD as Lead Department for technology development and verification, and Thailand as Lead Country for promoting the technology within the Southeast Asian region.

OBJECTIVES

AQD's overriding objective is to develop a sustainable shrimp culture technology packages that are friendly to mangroves and the environment. Specifically, the activity aims to:

1. Develop and verify these environment-friendly features or packages;
2. Disseminate the technology packages among the SEAFDEC member countries through actual demonstration and training; and
3. Prepare extension manuals/publications that can be used to encourage the adoption of sustained shrimp culture techniques.

PROJECT ACTIVITIES

Verification in SEAFDEC ponds in Dumangas, Iloilo and in BFAR Demonstration and Training Center Pond Facilities nationwide located in different climatic conditions has been conducted from 1998 to the present. Pilot Demonstration in farms of the private sector nationwide has been promoted from 2001 to the present.

Skills Development Sessions were conducted from 2001 to 2002 nationwide to disseminate the environment-friendly technology to growers and prospective investors. Starting in 1999, annual regular hands-on training sessions have been implemented for graduating fishery students and private sector technicians to build a pool of trained manpower for future demand of the industry.

In 1998, AQD acquired its own brackishwater ponds in Dumangas, Iloilo for an intensified verification and demonstration of grow-out pond culture techniques and hands-on training for growers' technicians and fisheries students. This pond system is now being used as one of the sites for the pilot demonstration and verification activity of the Project.

Two schemes are being used in the Project's activity: (1) Low/Partial-Discharge System and (2) Closed-Recirculating System. In the Low/Partial-Discharge System where a small amount of the water is discharged from the grow-out pond and released to the sea after passing through the settling pond. Water is pumped only once, i.e., from the head reservoir to the grow-out pond.

Under the Closed-Recirculating System, effluents from the grow-out pond is reused or recycled after passing through the settling pond. Water is fully recirculated by pumping it twice, first from the head reservoir to the grow-out pond and second from the settling pond to the grow-out pond.

The activity has two components:

Phase I – (2000-2001): Techno-demo and verification in AQD and BFAR facilities

Phase II – (2002-present): On-Farm Techno-Transfer to the industry (private sector)

Phase I: Techno-demo and Verification

Phase I involves techno-demo and transfer strategy using SEAFDEC pond facilities in Dumangas, Iloilo and the BFAR-Demo Training Center facilities in Batangas (Luzon), Bohol (Visayas) and Lanao (Mindanao). The activities verify and demonstrate the low/partial-discharge and closed-recirculating systems for environment-friendly shrimp farming in different climatic and environmental conditions. This was complemented by four nationwide skills development sessions (SDS).

Phase II: On-Farm Techno-Transfer

Started in 2002, this strategy was in response to requests aired by growers during the nationwide SDS. This strategy gained popular acceptance in the Philippines because of its effect of accelerating the transfer of the technology to the end users.

The pilot demonstration results (from three ponds of BFAR, two ponds of AQD, and three ponds of the private sector) indicated an average harvest of 4500-5000 kg/ha/crop. The economic analysis showed that profit margin is highest at modified extensive with stocking density of 5 pc/m^2 at P274/kg, resulting in bigger size shrimp, higher price and minimal expense although

ENVIRONMENT-FRIENDLY SCHEMES IN SHRIMP FARMING

The following schemes have been verified through the Project's activity, and are now being disseminated in the other SEAFDEC Member Countries.

1. **Crop rotation**

   As a sanitary practice, this involves shifting the shrimp ponds to finfish culture in about 1-2 cropping.

2. **Head Reservoir**

   A Head Reservoir is used as a source of quality water with good plankton profile. Sediments and other suspended organic solids are settled for about a week in the Head Reservoir before using the water. It comprises at least 50 % of the total grow-out pond area.

Head Reservoir

3. **Tail Reservoir**

   Serves as treatment pond with biofilters (seaweeds, oyster, finfishes, etc.) and sedimentation pond with baffle system to lengthen the flow of water and allow sediments to settle before the water is drained-out or recirculated back to the grow-out pond.

Tail Reservoir

4. **Filter Box**

   A Filter Box is used as mechanical filtration to ensure that hosts and carriers of pathogens like crustaceans are reduced if not eliminated.

Filter Box

5. **Salinity Reduction**

   Seawater introduced into the culture ponds should be adjusted to desired salinity in the reservoir by adding freshwater.

   Shrimps grow faster at lower salinity since lower salinity also decreases the potency of luminous bacteria.

6. **Long-arm Paddlewheel**

   Diesel or electric motor driven, the paddlewheel is used to sufficiently aerate and circulate pond water thus creating a wider clean feeding area.

Long-arm Paddlewheel

7. Biomanipulators

Adult/juveniles tilapia and/or milkfish are stocked in the reservoir with standing biomass of 1.5-2.5 t/ha and 0.5-1 t/ha inside the sludge collectors.

Mucus secreted by the fish is found to suppress the proliferation of luminous bacteria.

Tilapia (above) and milkfish (below) as biomanipulators

8. High Quality Feeds

Feeds should be palatable and stable with high protein content and good attractant. Less storage duration of the feeds ensure freshness of ingredients. Feeds should translate to FCR of 1.1-1.4, thus reducing waste accumulation in the pond as well as the cost of production.

9. Sludge Collector

For collecting sludge, sediments, dirt, uneaten feeds, etc. at the center and corner with the aid of adequate water circulation. The fishes inside these sludge collectors convert most of these wastes into fish flesh.

Center sludge collector – comprises 3-5% of the total grow-out pond area.
Corner sludge collector – comprises 2% of the total grow-out pond area.

Center Sludge Collector

Corner Sludge Collector

10. Substrates

Substrates made of PE net and fine mesh net are installed in the pond, to increase the surface area for attachment of natural food organisms thereby increasing the growth rate of fry during the first 1.5 months of culture. The substrates should be removed after 45 days of culture.

Substrates

11. Bioaugmentation or Microbial Inoculants

These factors accelerate degradation of decomposing organic matter in the pond bottom, and prevent the proliferation of pathogenic bacteria particularly the luminous bacteria through competitive exclusion. These inoculants are able to reduce the luminous bacteria count in the pond environment.