

# Technology Verification and Extension Program of SEAFDEC AQD

**Dan Baliao**

Southeast Asian Fisheries Development Center  
Aquaculture Department  
5021 Tigbauan, Iloilo, Philippines

Realizing the urgent need to package technologies generated through the years of R&D, the SEAFDEC Aquaculture Department through the Technology Verification and Extension Section (TVES) launched in June 1996, a technology transfer and commercialization program to test aquaculture technologies in actual production systems. On-site trials were implemented to verify sustainability, social-equitability, and profitability of aquaculture technologies. Going into real-life situations using aquaculture farms, TVES collaborated with fishfarmers and other institutions in bringing technology to the end-users to enhance widespread interest in aquaculture. This way, TVES can hasten adoption of these technologies and intensify information dissemination to the rest of the aquaculture industry. Once found viable and profitable, extension manuals derived from verification studies are published, with the hope that AQD can contribute to the country's concern for increasing livelihood opportunities and food production from the aquaculture sector.

## Objectives

1. To intensify technology verification activities by field-testing specific culture systems in selected farm sites and determine their economic and commercial viabilities;
2. To package technology that are found to enhance productivity and/or profitability;
3. To prepare extension materials for dissemination to SEAFDEC Member Countries and the Philippine government through the Department of Agriculture, Bureau of Fisheries and Aquatic Resources (BFAR); and
4. To network with other related local and international research/educational institutions and fish farmers association.

The TVES continued to verify, package and extend aquaculture technologies. The following activities have been accomplished as of 1999:

## Technology Verification

### *Igang Marine Substation (IMSS)*

Cage culture of economically important marine fishes such as red snapper (*Lutjanus argentimaculatus*), grouper (*Epinephelus* spp.), siganids (*Siganus* spp.), scat (*Scatophagus argus*), and tilapia (*Oreochromis* spp.) is ongoing at IMSS. Additional validation tests will be undertaken in cages to determine the optimum stocking density, growth performance, and acceptability of formulated commercial grouper feeds.

**Grouper.** Grouper broodstock development is also being undertaken with 32 broodstock being

maintained in three cages. These fish are fed trash fish at 5% of the total biomass every other day. These will be cannulated to determine their sex and stage of gonad development.

**Red snapper.** One hundred fifty six of cage cultured red snapper with an average weight of 300 g are ready for harvest. Two other batches having 200 g and 10 g average body weight, respectively, are being cultured in two separate cages. Four red snapper weighing 1.5-25 kg are also being maintained for broodstock development.

**Scat (“kikiro”).** Eighty scat with weights ranging from 180 to 200 g are being grown in a cage. A separate stock of forty fish weighing about 2.2 g is being grown in another cage. Both stocks are fed daily fish pellets and *lumut* (filamentous green algae) at a rate of 5% of the total biomass.

**Siganid.** In a similar activity, siganids of three different size-groups (450 pieces, 36g; 377 pieces, 95g; and 413 pieces, 15g) are being cultured in three cages. The fish are fed daily commercial pellets at 5% of the total biomass. Growth measurements are taken regularly. Siganids are also used to check or minimize fouling in cages where other species are cultured.

**Tilapia.** High-saline tilapia (1600 pieces) with an initial average weight of 20 g are also being grown in a 4x4x3m cage at a density of 33.3 pieces per m<sup>3</sup>. Mortalities that may be due to transport and post-stocking stress were observed occasionally during the first two weeks of culture.

**Seaweeds.** The bi-culture of grouper and seaweeds (*Eucheuma* spp.) using the hanging method in cages was discontinued due to poor growth of the seaweeds. This may have been caused by heavy freshwater run-off during the rainy season.

**Shrimp :** The larval rearing of shrimp and other commercially important fishes was discontinued due to power supply problem at IMSS. Hatchery operation will be resumed as soon as reliable power supply is restored.

### **Dumangas Brackishwater Station (DBS)**

Pond rehabilitation at the Dumangas Brackishwater Station (DBS) is ongoing for high density culture of milkfish and grouper, red snappers, and verification of the use of environment-friendly schemes in shrimp farming.

**High-density milkfish culture.** The initial result of the high-density milkfish culture in ponds was encouraging. One pond stocked 1.5 milkfish per cm<sup>2</sup> had a survival rate of 90% after 37 days of culture. The culture is still ongoing.

**Grouper culture in brackishwater ponds.** Groupers stocked at 9 per m<sup>2</sup> had a survival rate of 85% after 120 days of culture with average body weight of 144.3 g. In another pond, grouper stocked at 9 per m<sup>2</sup> had a survival rate of 90% with average body weight of 76.5 g after 92 days of culture. The groupers fed on tilapia fry with trash fish as supplemental feeds. Paddle wheels were installed to provide additional aeration and PVC pipes to serve as hiding places.

**Environment-friendly schemes in prawn farming.** Reservoir ponds are also maintained at DBS to verify the use of tilapia, siganids, scat, mollusks and seaweeds as bio-manipulators and bio-filters. Siganids stocked in a pond at 66 per m<sup>2</sup> gave a survival rate of 80% with average body weight of 707 g after 70 days of culture.

In another pond, tilapias stocked at 1.8 per m<sup>2</sup> gave a survival rate of 85% with 80.5 g average body weight after 70 days of culture. Water analysis was regularly done to determine the levels of luminous bacteria. The ponds serve as reservoir of quality water for the shrimp grow out culture. On the other hand, one pond was stocked 3,000 tilapia to act as bio-manipulator. The pond has a sludge collector at the center to prevent shrimps from getting in contact with pond sludge. After water has attained a desired quality, the pond was stocked with 130,000 shrimp fry at 20 per m<sup>2</sup>. Another pond filled with quality water was stocked 170,000 shrimps at 20 per m<sup>2</sup>. Luminous bacterial analysis in the two grow-out shrimp ponds and reservoirs is done regularly.

**Aquasilviculture in Aklan, (northern Panay Island, west central Philippines).** Shrimp culture in coastal tidal flats with existing mangroves showed very low survival and low growth for shrimps stocked at 5 and 15 per m<sup>2</sup>. Shrimps stocked at 15 per m<sup>2</sup> attained an average body weight of 19.16 g and a survival rate of 1.7%. Shrimps at 5 per m<sup>2</sup> had an average body weight of 14.61 g and a survival rate of 9.1%. For crabs, the growth and survival rates were affected by the high influx of freshwater into the culture site.

**Tilapia culture in small freshwater reservoirs or SFRs (Bingawan, Iloilo).** Hybrid tilapia in net cages experienced slow growth due mainly to pollution from run-offs from rice fields near the reservoir and also from domestic discharge, making the culture water turbid during the rainy days.

**Environment friendly schemes in prawn farming (Sum-ag, Bacolod City, Negros Occidental).** Shrimps were cultured using schemes such as probiotics as bio-manipulators, installation of sludge collector at the center of the pond to prevent shrimps from getting in contact with pond sludge, stocking of milkfish, tilapia and oysters in reservoir ponds to act as bio-filters, and installation of long-arm paddle wheels for cleaning the pond bottom and improving aeration. The shrimps, after 157 days of culture, had an average body weight of 33 g. Part of the study was intended to verify the SEAFDEC-formulated feeds. Formulated feed enhanced growth of cultured shrimps, but feed stability in ponds needs to be improved.

## Technology Extension

### ***Panay Gulf Development Program (PGDP)***

SEAFDEC/AQD together with government agencies such as the Department of Environment and Natural Resources, Department of Agriculture, Department of Science and Technology, Department of Labor and Employment, the University of the Philippines in the Visayas, and the Land Bank of the Philippines agreed to assist the PGDP in its effort to develop the marine resources and protect marine life in Panay Gulf. PGDP, spearheaded by the Iloilo's first district representative, is intended to benefit the communities of the First District of Iloilo where the Tigbauan Main Station of SEAFDEC/AQD is located. The program makes use of idle or unproductive brackishwater ponds, small freshwater impoundments, and protected coastal waters. The technologies suitable in these coastal areas are: grouper culture in ponds, culture of all-male genetically improved farmed tilapia (GIFT) in small freshwater reservoirs, cage culture of grouper, siganids or milkfish, and improvement of the indigenous methods of fish traps, and fry and fingerling collection. The program also intends to implement a rehabilitation project for the *Placuna placenta* industry in the coastal towns of Oton, Tigbauan, Guimbal, Miag-ao, and San Joaquin.

### ***Seed production of Placuna placenta (lampirong)***

About 1200 *lampirong* (window-pane oyster) broodstock obtained from the island of Negros

have been made to mature and spawn at the laboratory of SEAFDEC/AQD in Tigbauan and in the sandy beach in front of the Tigbauan Main Station. Seedlings produced in the laboratory were also stocked along the area to enhance existing stocks. Breeding sites included Barangay Trapiche in Oton, Barangay Namocon in Tigbauan, and Barangay Nalundan in Guimbal.

### ***Tilapia culture in small freshwater reservoirs***

Some 3000 all-male GIFT tilapia were distributed to villages with potential SFRs in Miag-ao and Tubungan in Iloilo. In addition, 250 SEAFDEC-strain of a fast-growing tilapia broodstock were also stocked in a Miag-ao SFR for breeding in order to insure sustainability of the project.

### ***Orientation and training of wild fry gatherers***

An orientation and training of gatherers of wild fish fry was conducted at Tigbauan. Wild fry gatherers were trained on the identification and the methods of catching fry of groupers, siganids and other economically important fish. The three-part training series was attended by about 200 fry gatherers from Oton to San Joaquin in Iloilo.

### ***Philippine Reef and Rainforest Conservation Foundation, Inc. (PRRCFI)***

The Southern Negros Coastal Development Program of the PRRCFI sought the assistance of SEAFDEC/AQD in their efforts to provide alternative livelihood to local fisherfolk cooperatives in five coastal communities of Negros Occidental extending from Cauayan to Sipalay. Mangrove-friendly aquaculture and fish cage culture projects in potential sites have already been started.

### ***Concepcion Polytechnic College (CPC)***

A joint technology demonstration and extension project is being implemented by BFAR, SEAFDEC/AQD, and CPC at the school's pond facilities. The project aims to demonstrate in commercial scale, the technical and economic viability of grouper culture and pond culture of milkfish using hatchery-bred fry. The project also intends to provide CPC students in fisheries and aquaculture hands-on training on SEAFDEC-generated technologies and to update the technical know-how of its faculty.

### ***Central Panay Economic Unification, Inc. (CPEU)***

SEAFDEC/AQD has collaborated with BFAR to provide technical assistance to CPEU on the culture and seed production of tilapia in a 24 ha dam in San Julian. Some 25,000 fast-growing and 580 SEAFDEC strain tilapias have been stocked in 14 floating cages. The rebel returnees of Capiz also maintain separate cages of tilapia in the same dam under the supervision of a TVES technician.

### ***Philippine Business for Social Progress (PBSP)***

AQD is collaborating with PBSP Technology Management Program in assessing mariculture-based livelihood projects for coastal beneficiaries in Western Samar, Quezon, and the Davao Gulf area. Four units of floating net cages have been installed by PBSP in Maqueda Bay, Western Samar and stocked with grouper collected from the wild. AQD researchers also provided technical assistance to PBSP coordinators of Western Samar, especially in the breeding and grow-out culture of grouper. TVES is also supervising the construction of four units of grouper cages in Samal Island in Davao.

### ***Food and Agriculture Organization-United Nations Development Programme (FAO-UNDP)***

AQD is providing technical assistance to the FAO-UNDP aimed at providing alternative livelihood to Moro National Liberation Front (MNLF) regulars and rebel returnees in Mindanao. Ten units of floating cages for grouper culture have been constructed in identified sites in Basilan and Jolo provinces, southern Philippines.

### ***Western Visayas Technology Promotion Center (WVTPC)***

The Land Bank of the Philippines (LBP) initiated the establishment of the WVTPC with members from SEAFDEC/AQD, University of the Philippines in the Visayas, and the Iloilo State College of Fisheries in response to the government's thrust on food security and poverty alleviation. The Center will fast track countryside development, including the adoption of sustainable fishery technologies. The WVTPC's initial activities include the validation and assessment of environment-friendly, sustainable and profitable aquaculture technologies by LBP for commercial (collateralized) and livelihood (non-collateralized) loaning programs. A hands-on aquaculture training at AQD has been envisioned as a prerequisite for the granting of loans by LBP. Aquaculture technologies being considered by LBP for funding are grouper culture in ponds and cages, pen culture of mud crab in mangroves and in ponds, and high-density milkfish culture in ponds.

### ***Region IV (Palawan and Batangas)***

Shell Philippines, the Provincial Governments of Palawan and Batangas, and the Center for Renewable Resources and Energy Efficiency (CREE) have sought the technical assistance of SEAFDEC/AQD in the implementation of their aquaculture projects in Palawan and Batangas, two provinces in Region IV. Through the Shell Foundation, Shell Philippines has exerted efforts to provide livelihood options to displaced residents of Batangas City where Shell has put up an oil refinery. In Palawan, a fish sanctuary has been set up in Malampaya Sound in Coron Island where Shell Foundation is also committed to provide alternative livelihood to fisherfolk in the island. CREE has also started a grouper cage culture project and has planned to implement a mud crab project in Coron and Busuanga, Palawan. Shell Foundation and CREE are seeking the technical assistance of SEAFDEC/AQD in this province-wide joint aquaculture venture and hope to formalize the collaboration for the development of Palawan and Batangas.

### ***The Local Government of Tigbauan, Iloilo***

SEAFDEC/AQD has committed itself to provide technical assistance to the Municipality of Tigbauan, the host of the Tigbauan Main Station. Suitable aquaculture sites are currently being identified by barangay captains and local government officials. After the site suitability study, appropriate livelihood projects will be established to showcase viable SEAFDEC-developed aquaculture technologies for the benefit of the the municipality.