



# Integrated farming is profitable

By **MB Surtida**

Growing fish with rice while maximizing land use can bring advantages to both crops as production is intensified. "The most common forms of integration are those where there is direct and simple link between activities such as the use of animal or crop waste as fish feed or fertilizer or use of irrigation structures to raise fish" say Little and Muir in their book titled *Integrated Warm Water Aquaculture*. The diagram below shows the basic structure and lists the advantages and disadvantages of rice-fish culture.

kangkong (water cabbage), squash, and rice with tilapia (*Oreochromis mossambicus*) stocked in peripheral canals. Livestock are chicken, swine, and turkey.

In 1990, Mrs. Demerin's farm was chosen as the Most Outstanding Farm by the Department of Agriculture (DA) for Region 6.

"It has always been a little of everything for our domestic consumption," said Mrs. Demerin of her modest farm. She had grown rice in three compartments but got

## ADVANTAGES

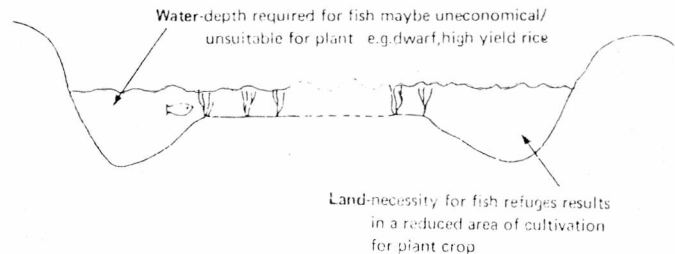


- Weed control by herbivorous fish*
- Feed inputs for fish also act to improve fertility for rice production via feed residues and wastes*
- Minimum extra labor required*
- If plant is long maturing, simultaneous fish culture may provide an earlier financial return*
- Efficient production of high carbohydrate (rice) and high protein (fish) food from the same area of land*
- Higher level of water management for fish may improve conditions for plant crop*

This method of farming varies according to the climate, water availability, fish species, plant variety, and traditional custom. In some places, agricultural crops other than rice are integrated with fish farming.

Such is the integrated farm of Mrs. Sabina Demerin of Culasi, Antique (west central Philippines). Self-sufficiency is Mrs. Demerin's motto. She has a 2-hectare farm planted to coconut, cacao, coffee, cayenne and bell peppers, gabi, string beans, banana, rambutan, Davao pomelo,

## DISADVANTAGES



- Damage to plant crop by herbivorous fish*
- Fertilizer demand may be increased in order to stimulate natural food production for fish*
- Labor demands may be too high especially where plant crop production is very mechanized*
- Timely and efficient use of pesticides may be difficult without risk to fish*

interested in stocking tilapia when she learned of the tilapia seed dispersal project of the DA. Thus in 1994, she started her rice, fish, vegetable production by making peripheral canals in her rice compartments (30 x 25 m<sup>2</sup>) and stocking tilapia (the GIFT variety, genetically improved tilapia) fingerlings at 3:1 ratio. Upon harvest of rice, the tilapia had grown to 200-250 grams. She could sell them at P 40 per kilo but when the fish were left in the fields after the rice harvest, they grew much bigger. The bigger ones could





The Demerin (above) and the Garin integrated farms in west central Philippines

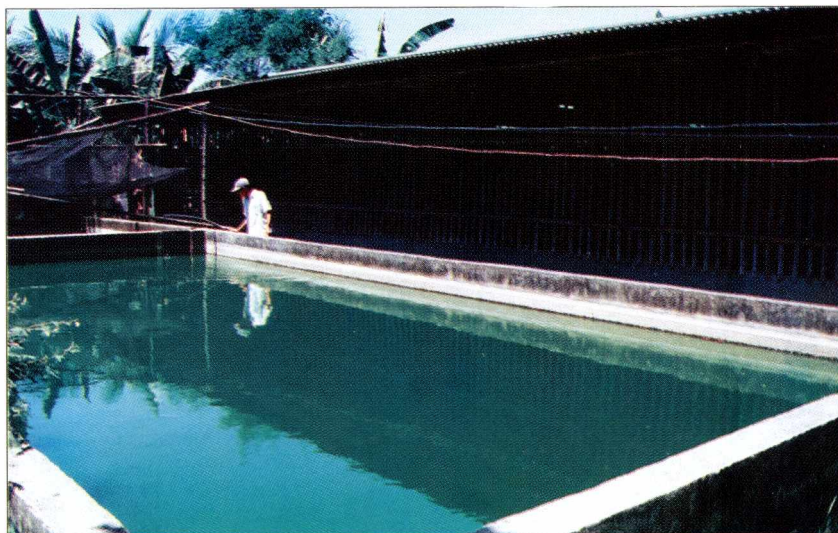
be sold at P 70 per kilo. The kangkong grown in the peripheral canals also supplied domestic consumption and the local market. Vegetables (squash, okra, string beans) were also planted on the dikes that surrounded the rice field.

Mrs. Demerin's integrated farm is helped a lot by the DA's tilapia seed dispersal program. Russel Carian, Mrs. Demerin's son-in-law, is a cooperatocaretaker of the said program. He allowed his 0.4 ha portion (part of Mrs. Demerin's) to be developed into a tilapia nursery-hatchery by the DA. Now, he has a steady supply of tilapia seed for his farm and for others who have need for them.

The Garin integrated farm at Barangay Igcocolo, Guimbal, Iloilo has a different style of raising tilapia with agricultural crops and livestock. The 7-hectare farm is planted to rice or corn (4 ha), and formerly to citrus (3 ha). Poultry with 10,000 layers and 5,000 broilers are housed just above the rice fields. Adjacent to the poultry are two tanks (approximately 10 x 8 x 1.5 m each) stocked with tilapia and fertilized by chicken manure. Water continuously flows through the tanks and down to the rice fields. Thus, waste from poultry goes through the tilapia tanks and then to the rice plants. Mr. Narciso Tadifa, DA agricultural technologist and nursery-in-charge, says that the tilapia grows to as big as a man's palm and is marketed live at a beach resort (P12 per 100 g). Sometimes, excess production is sold to other business establishments in Iloilo City. The farm also grows sheep and cattle.

Although both farms claim profitability, some rice-fish students from the University of the Philippines at Los Baños

and the Central Luzon State University say that yield of tilapia in rice-fish culture is very low because of low recovery and poor growth rate. In their studies, absolute growth rate was 0.10 g per day per fish making only 26.7 g after 85 culture days. The study attributed the poor growth of tilapia to the unfavorable water condition at the later stage of the growing period. Partial decomposition of the rice straw and leaves which changed the appearance of water from clear to dark color could have led to fish kills due to lack of oxygen. Other students mention the problem of decreased rice yield mainly because of the unplanted areas given over to fish refuges within the field.



### AQD's innovation of integrated farming

AQD has its own version of integrated farming. Veering from its focus on knowledge generation to research utilization, the Technology Verification Project of the Training and Information Division is evaluating the economic feasibility and profitability of farming mudcrab in tidal flats with existing mangroves.

A part of the 70-ha area planted to mangroves (*Rhizophora*) in 1990 and 1995 was chosen as the site for the mudcrab project in New Busuang, Kalibo, Aklan. The Kalibo Save the Mangrove Association (KASAMA) Cooperative spearheads the planting, monitoring and maintaining the mangroves with funding from the Department of Environment and Natural Resources and USWAG Foun-

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dation. About 10% of the area is covered by canals 80 cm deep for the retention of water at lowest tide. The height of the enclosure is 30 cm higher than the highest high tide.

The study tests the stocking density (0.5 or 1 per m<sup>2</sup>) and feed (fish by-catch or mixed diet of 75% brown mussel flesh and 25% fish by catch) of mudcrab stocked in the 200 m<sup>2</sup> pens.

Two months from stocking (initial body weight, 16-25 g; carapace length, 3-4 cm), the mudcrab have attained a body weight of 65-106 g and carapace length of 5-6 cm.

The site is favorable to the study because of an enlightened population. The vast area (70 ha) planted to mangrove testifies to the successful cooperation between people, the government and a non-government organization (NGO). Mr. Frank Sotuniel, President of KASAMA, says that since the mangrove have been planted, people from other towns gather mudcrab, rabbitfish, oysters, blood clam, gobies, etc.

"It is a major source of livelihood," Mr. Sotuniel says. The people have learned to monitor and maintain the mangrove. They watch for cows that feed on the young planted trees, dead wood, plastic, and other debris that would disturb the site. He also said that the young mangroves are attacked by what they call *tusok* worms. When asked why there is an increase of fish, clams, and crabs in the planted mangrove areas, he said "I don't know. Perhaps because they have found a shelter."

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rary occupation land (TOL) license to occupy a portion of the mine pool, costing about M\$ 100 per 0.4 ha though this varies according to state regulation. The duration of the lease is between 33-99 years subject to extension. Ahmad and Khalid say that the government provides technical and financial assistance.

Two to three families enclose a portion of the mine pool where they stock tilapia and bighead, common and grass carps. Tan and Khoo (1980) recommended the following stocking densities: 250:500:250 for bighead, grass and common carps, respectively. The polyculture can give a high recovery rate of 70-100% after 9-10 months.

For livestock, 10,000-20,000 chickens and ducks are raised. A number of huts provides shelter. Water hyacinth may be grown in the lake to serve as duck feed. Trees and vegetables are also grown within the perimeter fence, with animal compost as fertilizer.

Fish-livestock integration is advantageous to farmers in many ways. Clonts (1989) noted that animal wastes are utilized as organic fertilizer for land crops, and can fertilize the fish "pond" if not eaten directly by fish. Ducks can even be the "biological

aerators" in the ponds. These inputs do not cost the farmers anything.

The produce of the farm is sufficient for the family's food requirement. The sale from extra produce can be used for the family's other needs.

Mine pools are potential ecotourism sites, with floating restaurants built along the coast. Ahmad and Khalid say that this business is lucrative.

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AQD's mudcrab-mangrove farm site in Kalibo, Aklan.