



Family farms in Vietnam

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The Mekong Delta lies in the southern part of Vietnam and covers 3.96 million km² (12% of the country area). It brings about 500 billion m³ of water annually through the two major river branches and a cross-network of secondary river canals favorable to aquaculture.

Approximately 80% of farm households in the Mekong Delta region have their own small pond garden and canal for aquaculture. Integrating homelot to garden, pond, and livestock is a traditional approach to family food production in the rural areas since 1960s. This family-managed farming system can be found in a variety of agro-ecological condition, including irrigated lowlands, rainfed uplands and urban areas. Generally 30-60% of the family income is derived from the system.

Farming shrimp with rice

Rice is the major land crop in the Mekong Delta, and culturing fish or shrimp with rice has long been practiced to improve food production and optimize land use and water resources.

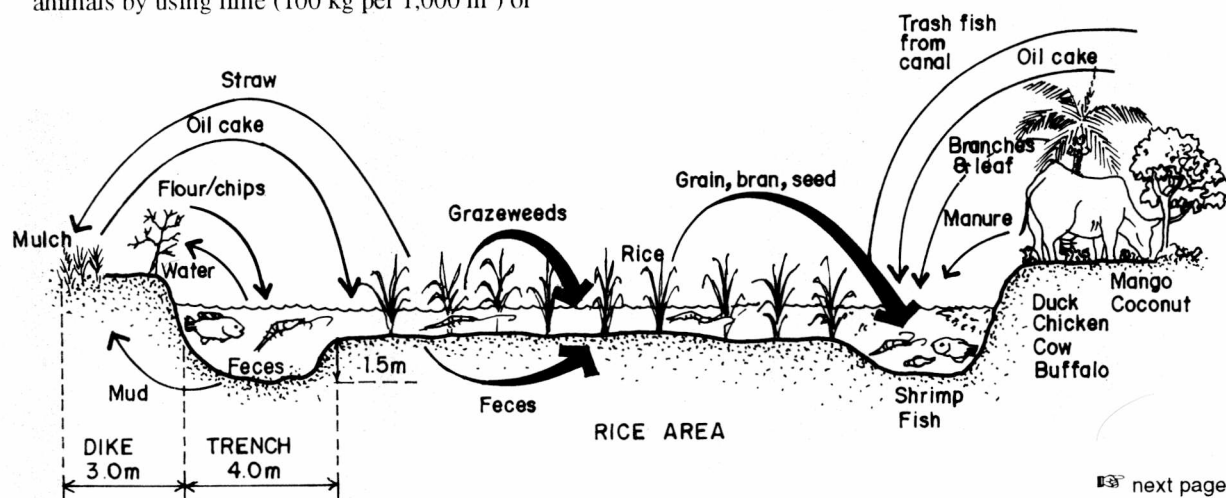
Ricefields have to be modified for shrimp culture. This is done by raising dikes for higher water depth or digging trenches (3-4 m wide and 1-1.5 m deep) along the periphery (see illustration). A flat field close to a freshwater source is ideal.

The field should be thoroughly prepared before stocking shrimp or fish:

- get rid of wild fish, crabs, frogs and other unwanted animals by using lime (100 kg per 1,000 m²) or

Derris root (1-1.5 kg soaked in 10-15 liters of water per 1,000 m²)

- dry the trenches for 3 days, then prepare field for broadcasting or transplanting rice
- choose short-duration or medium maturity modern rice varieties or high-yielding local varieties. Rice varieties must be resistant to pests to minimize, if not eliminate, chemicals.
- stock 10-25 g shrimp juveniles at 70-80 kg per ha 10 days after rice broadcast or 5 days after transplanting (fish may also be stocked with shrimp)
- cover 8-10% of the water surface in the trench with plant branches to discourage poaching
- shrimp are fed twice a day (3-5% of shrimp weight) with cassava, sweet potato, broken rice, milled rice (soaked or cooked), rice bran, crabs, snails, trash fish, copra and combined feeds (50% rice bran, 10-20% cooked broken rice, 20-30% trash fish, 10% oil cake). Put feeds in feeding trays and place at the bottom of the trench.
- manually weed 15 and 35 days after broadcasting or 15 and 30 days after transplanting. Apply herbicide only when necessary.
- organic and inorganic fertilizers can be basally incorporated in the soil 10 days after broadcasting. For modern rice, apply the following per hectare: 200 kg mono-superphosphate + 200 kg urea + 50 kg potash. You can use 100 kg 18-46-0 + 100 kg urea + 50 kg potash for top dressing.



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A rice farm in Vietnam.

cf. IRR1 1995

**Economics of rice-fish farming (in thousand VND per ha; 1 US\$ = 7,000 VND)
(Le Thanh Duong, 1992)**

	Dry season / modern rice		Wet season / modern rice	
	Quantity	Cost / return	Quantity	Cost / return
Gross return:				
Rice	3,875 kg	3,488.0	5,880 kg	6,467.9
Shrimp	98 kg	2100.1	98 kg	2135.9
Cost for rice:				
Hired labor	124 man-days	496.4	143 man-days	574.0
Materials		679.4		503.1
Others		<u>84.0</u>		<u>84.0</u>
		1,259.8		1,161.1
Cost for shrimp:				
Hired labor	34 man-days	134.4	51 man-days	203.9
Materials		<u>638.9</u>		<u>790.6</u>
		773.3		994.5
Net return of rice		2,228.2		5,306.8
Net return of shrimp		1,326.8		1,141.4
Total net return		3,555.0		6,448.2

- check water quality and depth daily (20-100 cm in the trenches). If it is acidic or hot, change the water or add more water into the field.
- shrimp are harvested before harvesting transplanted local rice crop, usually at the start of the dry-season rice crop. Shrimp can also be partially harvested after 4-5 months of growing. Only the larger ones will be taken and the rest are restocked with an additional amount of same-size shrimp.
- rice can be harvested when 80% of the crop is mature. Delay in harvesting can result in serious grain shattering. After threshing, sun-dry and store rice.

The table on this page shows the economics of shrimp culture integrated in two rice crops. Shrimp contributed significantly to net income of rice farmers.

Meanwhile, Cantho University's Mekong Delta Farming Systems R&D (southern Vietnam) is collaborating with the (Belgian) University of Leuven's Laboratory of Aquatic Ecology and Aquaculture and the Laboratory of Soil Fertility and Social Biology to further develop a technology package on rice-fish integrated farming. A suitable rice-fish model is expected in 1999.

REFERENCES

Le Thanh Duong. 1992. IIRR-ICLARM Technology Information Kit. A workshop to produce an information kit on farmer-proven integrated agriculture-aquaculture technologies, 2-15 February 1992. Silang, Cavite, Philippines.

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Choudhury PC. 1995. Integrated rice-fish culture in Asia with special reference to deepwater. FAO Aquaculture Newsletter. August 1995.

Le Thanh Duong and Arjo Rotherius. Rice-fish culture in the Mekong Delta, Vietnam. WES Newsletter, January-April 1997.



Shrimp-mangrove farming systems

Like in other countries, Vietnam's mangrove cover is seriously threatened by shrimp culture development. The southern district of Ngoc Hien alone lost about 37,500 ha or 48% of its mangroves to shrimp ponds. It used to have the largest mangrove cover in the country.

To protect the remaining mangroves, the government developed -- through the State Forestry Fisheries Enterprises (SFFE) -- an integrated farming system which promotes shrimp culture alongside mangrove protection.

In 1997, Binh et al. investigated a total of 161 shrimp-mangrove farms in the east and west coasts of Ngoc Hien. The study showed that soil pH, water alkalinity, pond age and mangrove density, and flooding level in the dry and rainy seasons significantly affect pond yields.

Mangroves can help maintain pond yields and bring higher economic returns. Binh et al. reported that farms with mangroves covering 30-50% of the pond area gave the highest economic returns each year. Mangroves also accelerate the formation of mudflats, expanding the delta toward the sea.

Binh et al. identified about 46 species of mangroves in Ngoc Hien -- *Rhizophoraceae*, *Sonneratiaceae* and *Verbennaceae* -- and 29 valuable shrimp species -- *Penaeus indicus*, *merguiensis* and *monodon*, and *Metapenaeus ensis*. The two spawning seasons of penaeid shrimp in the Mekong Delta is from February to May and June to September.

Like other extensive systems, shrimp-mangrove farming relies on the wild seed trapped during high tide. Little or no supplementary feeding is provided. Water exchange takes place during spring tides. The larger shrimp following the water current are harvested by a bagnet installed at the pond gate. Harvest can last 3-4 days over each spring tide every month and continues throughout the culture period.

Binh et al. noted that in areas cleared of mangroves, acidic ponds result in low pond yields. Excessive ditch construction not only reduces the flooding area but also exposes potential acid sulfate soils.

In shrimp-mangrove ponds, a decline in shrimp yield is often observed as the mangroves grow. Although it is not clear whether mangrove area, age or density cause the decline, Binh suggested that high mangrove density has a negative effect on shrimp yield. Dense mangroves reduce space and limit sunlight penetration. Thus, a thinning scheme is recommended.

Average shrimp pond yields are as follows: 204 kg per ha per year and 324 kg per ha per year, corresponding to systems having a mangrove area of 10 and 40% of the pond area.

When mangroves are first cleared, decomposition of mangrovia materials provides nutrients to the ponds over the first few years of production until nutrients decrease and declining pond yield is reported. Additional stocking of collected wild seed can not improve shrimp production in excessively cleared mangrove ponds.

Binh et al. noted a positive relationship between flooding level of mudflat and shrimp production. Maintaining pond water to a maximum depth can minimize acidity problems. In addition, the gate width determines tidal water exchange, and can affect pond yield. A wider gate or more gates can help flush out decayed leaves more efficiently, improve water quality, and allow more shrimp seed into the ponds.

Other studies in 1993 reportedly gave an average net profit of US\$ 362 per ha per year (for shrimp-mangrove culture in the Mekong Delta). SFFE on the same year reported US\$320 per ha per year, and Binh et al. US\$ 109-412 per ha per year.

Ponds with 31-50% mangrove cover give the highest net profit (US\$ 314-412 per ha) and return of investment. Ponds totally cleared of mangroves give the lowest (US\$ 109-159 per ha). These results show the importance of maintaining appropriate mangrove cover to improve pond yields and bring higher economic returns from aquaculture.

Binh et al. also recommended: (1) appropriate density and proper thinning scheme for trees older than 5 years; (2) good water exchange; and (3) stocking quality shrimp seeds and proper feeding.

REFERENCE

- Binh C.T. MJ Philipps and H Demaine. 1997. Integrated shrimp-mangrove farming systems in the Mekong Delta of Vietnam. *Aquaculture Research* 28: 599-610.