Expansion of Improved-Extensive Shrimp Culture in the Mekong Delta

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Background

In the Mekong Delta of southern Vietnam, traditional shrimp farming in seasonal brackishwaters is based on the rotation of rice and shrimp. Salt-resistant rice varieties are cultivated during the wet season. In the dry season, ricefields are used to trap wild fish and shrimps. Since the late 1980s, annual profits have been very low due to declining numbers of wild fry, and low market prices of small-sized shrimp. For this reason, a technical support program, based on the so-called "improved-extensive" shrimp culture method was initiated by the Artemia and Shrimp Research and Development Center (ASRDC) in 1992.

Improved-extensive shrimp culture is based on the stocking of hatchery-produced shrimp juveniles (*Penaeus monodon*), appropriate pond construction and management, and supplementary feeding. Investment and operational costs are covered through a credit program. This paper describes the expansion of improved-extensive shrimp farming in the Mekong Delta, emphasizing management decisions, technological constraints and economics.

The area targetted is in Thanh Quoi, Soc Trang Province, where rice farming covers 3,400 ha of which about 600 ha are affected by brackishwater intrusion. After a preliminary survey, and in cooperation with the local peoples' committee, 28 farmers in a pilot area with good conditions for pond water renewal were selected and organized into five groups. These resident, small-scale farmers depend entirely on their farm produce (rice and trapped fish and shrimp). The average income per household member is about US$50/year. For the purchase of farm implements, fertilizer, etc., farmers borrow money from private lenders at high interest rates. The local infrastructure is poorly developed, which particularly affects the supply of drinking water in the dry period.

Extension and Farming Methods

Introduction of improved-extensive shrimp culture techniques is based on training of farmers and very close monitoring. One extensionist stayed in the area throughout the shrimp farming period and was assisted by regular visits of two others. First, a training course for the 28 farmers was held on the site to discuss the aims of the project and to explain the culture techniques. Based on previous experience, no credit was released directly to the farmers. Instead, equipment, shrimp juveniles, and artificial feeds were supplied through the ASRDC. Wet feeds (mainly trash fish) were provided through a local middleman. Modification of the ricefields was organized by the farmers themselves, using mainly family labor. Shrimp farming practices were similar to those described in the previous program (Truong Trong Nghia et al. 1994). After the shrimp harvest, a socioeconomic survey was undertaken to monitor the impact of the project.

Recent Results

In 1994, ponds had to be harvested earlier than foreseen due to heavy rains. This reduced the mean size of shrimp at harvest and the net production as compared to 1993 (Table 1). However, since the 1994 investment costs were much lower (less credit used), the returns on investment were higher.

Compared to the traditional shrimp trapping system, the present system increases profits about 10-fold. All farmers were able to repay their debts to the ASRDC. Surplus funds were used to clear old debts, purchase small household items, etc.

Scope for Improvement

Naturally farmers attempt to increase their yields and profits. In the case of shrimp farming, this can mean intensification; i.e., higher stocking densities. Already, in areas outside the project operations, shrimp farmers stock their ponds with over three juvenile shrimp per m^2. This can be termed semi-intensive. However, most areas of the Mekong Delta are not suitable for such a shift to semi-intensive shrimp culture. The land elevation is low (pond bottoms cannot be dried) and water renewal possibilities are restricted, especially in seasonally brackishwater areas. The carrying capacity of improved-extensive shrimp culture is about 300 kg/ha/crop (stocking density

Table 1. Summary of 1993-94 data (averages) on improved-extensive shrimp (*Penaeus monodon*) culture, Mekong Delta, Vietnam.

Project area	Vinh Chau 1993	Thanh Quoi 1994
No. of farm datasets	14	27
Culture period (days)	121	112
Stocking density (no./m^2)	1.4	1.0
Mean harvest weight (g)	37	30
Survival (%)	45	38
Growth (g/day)	0.31	0.27
Net production (kg/ha/crop)[a]	220	169
Feeds		
Trash fish	53%	63%
Pellets	0%	8%
Others[b]	47%	29%
FCR	5.6	3.0
Total costs (US$/ha/crop)	601	391
Net benefit (US$/ha/crop)	970	825
Return on investment (%)[c]	161	211

[a]One shrimp crop per year.
[b]Include broken rice, rice bran, sweet potato.
[c]Net benefit/ha in per cent of total costs/ha.

1-1.5/m^2). So far average results are in the order of 200 kg/ha/crop. Instead of intensification, higher profits could be made if the pond management was improved.

From the experience in Thanh Quoi, water management and feeding are of crucial importance.

All the farmers participating in the project had access to a water pump, but only a few used it. As a result, low pond water levels caused benthic algal blooms and proliferation of weeds. Decaying plant matter and stagnant water created anaerobic conditions at the pond bottom, with negative effects on shrimp growth and survival. Shrimp yields depended to a great extent on natural feeds. The poor FCRs signify underfeeding of the shrimp. Fig. 1 illustrates the reduction in growth during the second half of the culture period. Besides water quality problems, this is thought to have been caused by insufficient feeding, in terms of quantity and quality. Farmers fed a lot of low protein feedstuffs (broken rice and rice bran) as well as trash fish.

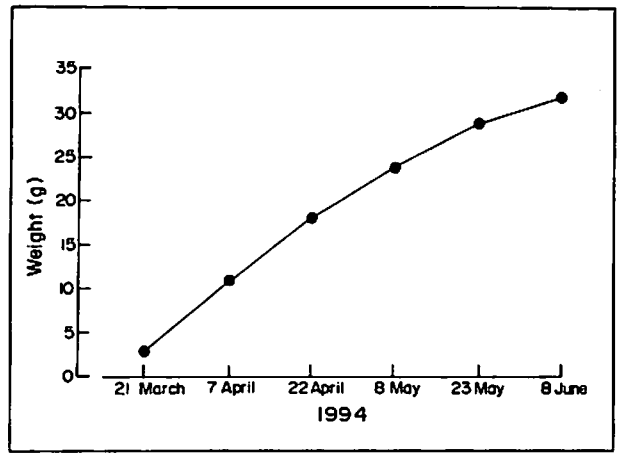

Fig. 1. ***Average growth rate of shrimp (Penaeus monodon) in ricefields in the Mekong Delta. Plotted points are means of 27 values of average shrimp weight as obtained from the individual farmers during field sampling. The average growth rate for shrimp from all farmers over the whole culture period was 0.27 ± 0.03 g/day.***

Despite very close technical support, the farmers did not implement all new management procedures. The novelty of the operation made them reluctant to invest more money on fuel and feed, after the relatively high expenses for shrimp juveniles.

The Future

Next year's program will continue with the same group of farmers. Besides improving on the above discussed constraints, a polyculture system of rice and freshwater prawn (*Macrobrachium rosenbergii*) during the rainy season will be promoted.

After two years of pilot programs, the potential of this improved-extensive shrimp culture technique has been sufficiently proven. Now the questions are how to spread this information to a broad group of farmers, and how to finance it. Shrimp farmers in the pilot areas gained access to bank loans which were previously unavailable to them. Although this can provide secure financing of the required inputs, proper extension of the farming techniques is also essential. We believe that expansion of improved extensive shrimp farming has to be organized at district or provincial levels. Unfortunately, the District Agriculture Extension Group and the Provincial Agriculture Extension Center are understaffed and have a wide range of responsibilities. Consequently, their extension activities are limited to planning, advising the Agriculture Development Bank, and distributing booklets. Our results have illustrated the importance of effective extension methods (field training, close monitoring, socioeconomic studies, etc.) as a key factor towards success. Specific training courses for government extension workers will have to be organized. By standardization of the extension techniques, the ratio of extensionists to farmers (1:10 in the pilot project) could be reduced to more practical levels. Also, the cooperation of research centers and extension agencies needs to be better structured. Such a program could be financed through the Agriculture Development Bank, their incentive being a higher rate of loan repayment.

Apart from the need to strengthen extension methods, another constraint for further expansion of improved-extensive shrimp culture is the recent occurrence of shrimp diseases in the Mekong Delta. Losses of up to 90% have been reported for the second half of 1994 in areas other than Thanh Quoi. Although several hypotheses, such as toxic substances in surface water, have been put forward, the real causes remain unclear. A survey by the ASRDC in Vinh Chau District revealed a strong correlation between pond water exchange and disease outbreaks. Farmers who avoided water renewal had poor shrimp growth, but seem to have avoided a sudden disease outbreak. Whatever may be the cause—viral or biological pathogens, or chemical toxicity or combinations of such factors—the uncontrolled expansion of many small-scale shrimp ponds may be the primary cause. Most of these ponds have been built without consideration for adequate water intake and outlet channels, making proper water management impossible. Future planning of specific shrimp farming areas with appropriate water supply and drainage channels has to be organized at district or provincial levels. This will both improve water management for the individual farmer and will permit water quality control on a larger scale.

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