Rice-Fish Culture Demonstration in Surin Province, Thailand

KRIANGSAK MANG-UMPAN
ARAPHIN JINTASATAPORN
JOHN SOLLOWS
Northeast Fisheries Project, CIDA/DOF, Thailand
National Inland Fisheries Institute
Kasetsart University, P.O. Box 1034
Bangkhen, Bangkok, Thailand 10900

Introduction

In 1985, a Memorandum of Understanding was signed between the Royal Thai Government and the Canadian International Development Agency (CIDA) to provide financial and technical support to a 4-year Northeast Fishery Project. The project set out to improve the nutrition and income of poor farmers in Northeast Thailand by means of aquaculture. This paper presents information on rice-fish culture in Surin Province: one of the project's Demonstration and Extension activities.

It is difficult to say exactly when rice-fish culture began in Surin Province. However, the decreasing availability of wild fish stocks (aggravated in recent years by a contagious fish disease) and an increasing population, are making the practice increasingly popular. Farmers have been digging trap ponds in their rice fields to hold wild fish for many years. The introduction of cultured fish, excavation of fish trenches and other modifications are now attracting more interest.

In 1983, 165 farmers were reportedly culturing fish in rice fields modified by peripheral trenches. These fields had a total area of 214.6 ha. (Tangwacharapoul 1983). There was wide variation in culture methods. The farmers could not normally define stocking rates, stocking sizes, and production figures precisely. Stocking rates, for instance, ranged from several hundred to several thousand fish per hectare.

Objectives

The objectives of the CIDA project were to demonstrate and promote fish culture in rice fields; to study the effect of stocking rate and stocking size on production; and, ultimately, to increase protein consumption by and income for rural people.

Methods

Rice-fish culture trials involving 60 farmers were performed in Surin Province, Northeast Thailand. Most of the farmers had no previous experience in rice-fish culture. They were divided into four groups of 15 according to the sizes and stocking rates of fish seed used (Table 1). Three species were used: common carp *(Cyprinus carpio)*, silver barb *(Puntius gonionotus)*, and Nile tilapia *(Oreochromis niloticus)* at a ratio of 2:1:1. When the fish were harvested at the end of March, 1988, they had been in the rice fields from 151 to 159 days. Each rice field was approximately 5 rai (0.8 ha) in area. To help keep water a little longer, trenches (1.5 m wide and 1 m deep) were dug on two adjacent sides of each field. A catch basin of 4 x 4 x 1.5 m deep was dug at the lowest corner. The farms served as rice-fish culture demonstration sites for extension purposes.

Table 1. Sizes and rates of stocking of common carp *(Cyprinus carpio)*, silver barb *(Puntius gonionotus)* and Nile tilapia *(Oreochromis niloticus)* (2:1:1 ratio) in rice-fish culture demonstrations with four different groups of farmers in Surin Province, Thailand.

Group	Stocking size Total length (cm)	Stocking rate (Number/ha)
1	2.0-3.0	3,125
2	3.1-5.0	3,125
3	2.0-3.0	5,000
4	3.1-5.0	5,000

Results and Discussion

The results from fish harvests are summarized in Table 2. Statistical analyses indicated no significant effect of stocking rates nor of stocking sizes on fish production. Other factors, notably low

Table 2. Average recovery rate, daily growth rate, and fish production for rice-fish culture (151-159 days) in Surin Province, Thailand. For explanation of farmers' Groups 1-4, see stocking details (Table 1 and text).

Group	Common carp		Silver barb		Nile tilapia		Stocked fish (kg/ha)	Wild fish[a] (kg/ha)	Total fish (kg/ha)
	Recovery rate (%)	Growth rate (g/day)	Recovery rate (%)	Growth rate (g/day)	Recovery rate (%)	Growth rate (g/day)			
1	14	1.5	37	0.5	18	0.8	109	34	143
2	14	1.0	35	0.7	14	0.7	79	30	109
3	14	0.7	22	0.6	6	0.6	108	27	135
4	9	1.2	19	0.6	13	0.5	56	40	96

[a] *Clarias batrachus* and *Channa striata*.

rainfall and flooding, had stronger effects on production and confounded the effects of the controlled variables. The higher recovery rates for silver barb could imply they were able to avoid predation better than the other species. The factors contributing to the low overall recovery rates were a flood soon after stocking and extremely low water levels just before the harvest. All the fields had low fish production ranging 56 to 109 kg/ha. The best growth rate (1.5 g/day) was for the common carp probably because of its omnivorous habits. Table 3 summarizes the economic data. The total net returns ranged from US$43.1 to 88.0/ha.

Field trials with farmer cooperators cannot be closely controlled. Factors affecting fish recovery can only be guessed. Predation and losses through floods and drought are obvious factors but there may be many others. Further studies are needed to clarify socio-economic and cultural factors. Periodic fish removal by farmers, which is widely practiced, was unaccounted for here. Wide variation in the rice field environment makes adequate replication of the field trials very difficult. Such problems make it difficult for field demonstrations, such as these, to focus on a particular set of issues that meet the farmers' interests.

Table 3. Simple operating costs and returns per hectare from rice-fish culture in Surin Province, Thailand by four groups of farmers. All entries are in US$. For explanation of farmers' Groups 1-4, see stocking details (Table 1 and text).

Group	Income	Costs	Returns from stocked fish	Returns from wild fish	Total net returns
1	65.4	25.0	40.4	47.6	88.0
2	47.6	37.5	10.1	42.0	52.1
3	64.3	32.5	31.8	37.8	69.6
4	33.6	46.5	-12.9	56.0	43.1

Notes: Average fish price = US$0.60/kg.
Wild fish price = US$1.40/kg.
Tractor digger oil = US$12.50/kg.
2.0-3.0 cm fingerlings = US$0.40/kg.
3.0-5.0 cm fingerlings = US$0.80/100 fish.
No feeding was applied.

Present indications are that the demonstrations have generated a positive interest in rice-fish culture. Considering that the average annual income of farmers in Northeast Thailand is US$415 (Pongsuwan and Sitthimong 1989), rice-fish culture appears to have the potential of increasing this significantly.

Wild fish have traditionally been an important paddy resource, and were an important component of the total benefits derived in these demonstrations. Wild fish are actually preferred both in villages and on the market. Susceptibility to disease and low production potential in extensive systems are their drawbacks. Rice-fish systems in which wild and cultured species can co-exist deserve further research.

References

Pongsuwan, A. and A. Sitthimong. 1989. Manual of aquaculture practices in northeast Thailand. Department of Fisheries-Northeast Fisheries Project. Bangkok. 388 p.

Tangwacharapoul, N. 1983. Seminar Report. Rainfed rice-fish farming in southern northeast Thailand. Appropriate Technology Association. Bangkok. 20 p.

The Network of Tropical Aquaculture Scientists: Information Exchange among Tropical Aquaculture Scientists*

MARY ANN P. BIMBAO
ROGER S.V. PULLIN
ICLARM
MC P.O. Box 1501
Makati, Metro Manila, Philippines

Rationale

Aquaculture scientists in tropical developing countries often lack critical information for their research activities. They tend to work in isolation using outdated research methods and approaches. They are not well informed on the status of aquaculture development, ongoing research by fellow scientists and recent publications and results. This lack of awareness reflects the high costs of communication and information, particularly books and technical reports. Tropical aquaculture scientists therefore need a mechanism to exchange information, results and ideas, a need that can be best served by a network.

Objectives

This critical need for information of aquaculture scientists in developing countries led ICLARM to establish the Network of Tropical Aquaculture Scientists (NTAS) in 1987. The NTAS aims to help put scientists in touch with each other and to provide them with information sources needed in their tropical aquaculture research. The specific objectives of the NTAS are: to enhance communication between tropical aquaculture scientists; to facilitate output by these scientists by assisting them in database searches, research methods, data analysis and interpretation; and to publish a newsletter at regular intervals.

Scope

As aquaculture is a large, diverse field of study, the research themes of the NTAS follow those of ICLARM's

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