Trends in the Farming of the Snakeskin Gourami (*Trichogaster pectoralis*) in Thailand

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Abstract

The production of snakeskin gourami (*Trichogaster pectoralis*) from wild stocks and traditional culture systems has been declining in central Thailand, although they are on the increase in modern culture practices adopted in some provinces. Net yields of *T. pectoralis* in traditional systems are about a third of those in modern systems. The potential of *T. pectoralis* as a candidate for more intensive waste-fed polyculture appears promising if seed supply constraints can be removed.

Introduction

Snakeskin gourami (*Trichogaster pectoralis*) or "sepat siam" as the fish is known in Asia, is an air-breathing swamp fish native to Thailand (Smith 1945) and the first species to be cultured on a large scale. Typically, the fish is harvested as a small adult (80-120 g), dried and salted before sale. An important export trade of this species also exists within Southeast Asia.

Most snakeskin gourami production comes from large converted rice fields in central Thailand with the greatest concentration in Samutprakarn Province (Fig. 1). The Thai Department of Fisheries (DOF) extended *Trichogaster* culture as a type of rice-fish farming in the 1950s. Rice farming had been marginal because of the poor quality of the soil in the converted estuarine swamp area of Chiengrak-Klongdanai district. The viability of fish production soon became apparent and the farmers extended the growing season of fish which resulted in the neglect of rice production. Farmers were encouraged not to plant rice in shallow areas and to cut the wild emergent grasses regularly to be used as green manure (Boonsom 1986).

The modified and managed swamp is a simple culture system with management inputs limited to cutting of grass to produce the 'green manure' every 2-3 weeks, topping up water and the occasional use of livestock manure. Broodfish are stocked rather than the seed. Males produce bubble nests from mucus attached to emergent vegetation to protect the fertilized eggs. Thus spawning, nursing and growout occur in the same system.

A sharp decline in the harvest of wild stocks has been occurring since 1983, while annual production from both traditional and modern culture systems declined by 13% between 1985 and 1992. Although total culture area has remained stable, average yields of traditional culture systems in Samutprakarn and Chachoengsao provinces have dropped by over 25% since 1985. This area is now within a major industrial development zone on Thailand's eastern seaboard.

The decline in yield in these industrially-affected provinces appears to have been compensated for by production from modern culture systems which were developed in Samutsakorn and Suphanburi provinces (Fig. 1). Culture area increased by almost 180% in these provinces between 1987 and 1992.

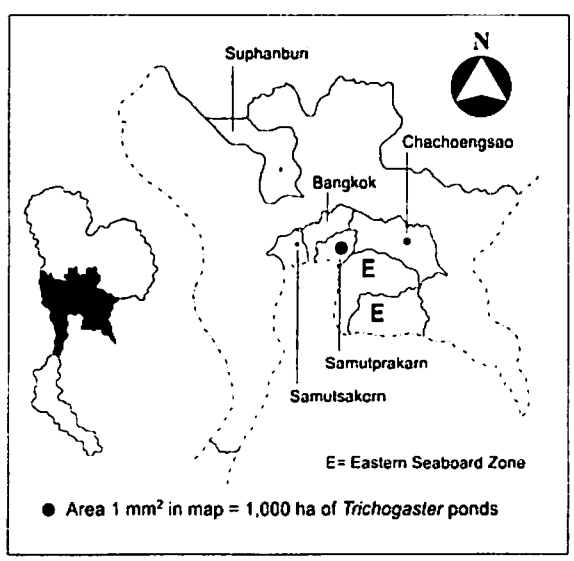

Fig. 1. Map of Thailand showing the central plain with four provinces surveyed for Trichogaster *farming.*

A field survey was undertaken in 1994 to investigate *Trichogaster* farming in four provinces of central Thailand: Samutprakarn, Chachoengsao, Samutsakorn and Suphanburi (Fig. 1), and compare the traditional and modern culture practices. Details of the study are presented here.

Nineteen farms were sampled from a total of 7 districts. Information about their systems was obtained during informal discussions using semi-structured interviews.

A comparison of management practices and outputs between the two areas revealed major differences. Net yields of *T. pectoralis* in traditional systems are a little more than a third of those in modern systems. Although culture area in traditional systems is much larger (9.6 ha vs 3.5 ha), production per farm is similar. The higher yields in the modern systems are achieved using similar stocking rates but more intensive nursing of juveniles. More than double the amount of dried chicken and pig manure is used and supplementary feed is also commonly given in intensive systems. Culture duration is slightly less among farmers in Suphanburi and Samutsakorn. Certain practices such as the growing and cutting of grass are common to both areas and probably essential to provide nesting substrate if broodfish are stocked rather than juveniles.

The decline in yields in Samutprakan and Chachoengsao in recent years is probably due to a combination of factors. Local urbanization and industrialization have caused significant water pollution according to farmers. Discharge of polluted water prevents timely irrigation of ponds and may directly affect fry survival and/or fish growth. Greater opportunities for employment locally have also reduced farmers' interest in *T. pectoralis* farming and many see a limited future in the area for agriculture in general. Rapid increase in land values has also spurred the sale of land and lease back by many farmers, further limiting their interest in maintaining pond conditions and output. A further decline in production is predicted when construction begins on the new Bangkok Airport project. Nearly 500 households currently producing 3 600 tons of fish are expected to be affected.

The rise of *T. pectoralis* culture in Suphanburi and Samutsakorn in its modern modified form appears to be linked to a strong demand for the fish by processors and a decline in production from traditional areas. In both Suphanburi and Samutsakorn, aquaculture is well developed and it appears that farmers have adapted existing aquaculture practices to the culture of *T. pectoralis*. In particular, the wastes from production of livestock and carnivorous fish such as snakehead (*Channa striata*) appear to be used in nearby *T. pectoralis* ponds. Farmers have only recently adopted *T. pectoralis* culture in these areas (<4 years) compared to the traditional areas where experience is intergenerational.

Wild fish are an important part of both traditional and modern systems. Major species include walking catfish (*Clarias macrocephalus*), snakehead (*C. striata*) and climbing perch (*Anabas testudineus*). Farmers encourage the entry of wild fish and even stock these species as they contribute a significant part of the returns. Intensification actually increased the proportion and absolute biomass of harvested wild fish in the modern systems indicating a shift

Table 1. **T. pectoralis** ***production in four provinces of Thailand.***

District	Traditional[1] Muang, Bangprakong and Bangbo	Modern[2] Muang, Banpaew, Bangplama and Sriprachan
	Mean Values (S.E.)	
Culture System		
Cultured area per farm (ha)	9.6a	3.5b
	(1.06)	(0.40)
Duration of culture (months)	9.7a	8.6b
	(0.15)	(0.18)
Farmer's experience (years)	18.0a	3.9b
	(1.37)	(0.48)
% Cultured area rented	60.0	44.4
Rental (US$/ha/yr)	192.3a	186.3a
	(15.20)	(18.03)
Organic fertilizer (kg/ha)	666.7a	1338.0b
	(384.91)	(145.20)
Estimated water used (m^3/kg of net *T. pectoralis* yield)[3]	16.1	9.5
Gourami Broodfish biomass (kg/ha)	118.0a	140.0a
	(19.07)	(12.53)
Yield		
Total harvested fish yield (kg/ha/crop)	647.6a	1698.3b
	(34.76)	(51.94)
Wild fish yield (kg/ha/crop)	64.1a	249.3b
	(5.71)	(26.82)
Net Gourami yield (kg/ha/crop)	465.5a	1309.0b
	(23.13)	(69.55)

[1] Samutprakarn and Chachoengsao provinces.

[2] Samutsakorn and Suphanburi provinces. Mean with the same letters in the same row indicate no significant (P>0.05) differences.

[3] Assuming typical trench, dike configuration of ponds; monthly topping up of water at an evaporation rate of 12 cm/month.

towards a value-added polyculture of stocked and wild fish among new adopters.

A constraint to the wider adoption of *T. pectoralis* farming may be the lack of a hatchery system that could supply juveniles. The logistics of moving large numbers of broodfish to stock growout systems may have deterred the spread of *T. pectoralis* culture. The necessity of grass production and cutting, although providing both spawning substrate and a source of food in extensive systems, may also inhibit intensification. Increased yields of both stocked *T. pectoralis* and wild fish appear to be linked to higher inputs of manure and feed. Water use is far more efficient in modern than in traditional systems. The water required to produce 1 kg of *T. pectoralis* is nearly double in extensive as compared to intensive systems. The potential of the *T. pectoralis* as a candidate for more intensive, waste-fed polyculture appears promising if seed supply constraints can be overcome.

References

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Stocking of Eggs versus Hatchlings in Rice Fields: A Comparison of Survival and Growth of Common Carp *(Cyprinus carpio)* Fingerlings

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Abstract

The study assesses the relative profitability of stocking eggs versus hatchlings of common carp in the rice-fish system in Bangladesh. Results showed that although stocking egg-covered water hyacinths directly into rice fields is a simple low cost option, the yields and profits are much higher from incubating eggs in cloth *hapas* and nursing hatchlings before stocking them into rice fields.

Introduction

As in other parts of Asia, studies undertaken in Bangladesh have indicated the viability of integrating agriculture and aquaculture in rice-fish systems (Rahman et al. 1995; Gupta et al. 1996). The ODA (now Department for International Development)/UK-funded Northwest Fisheries Extension Project (NFEP) and CARE-Bangladesh projects have been actively promoting rice-fish farming in northwest Bangladesh since 1991. In this region it is possible for rice farmers to integrate fish with rice during the rain fed (*amon*) and irrigated dry seasons (*boro*), with fish culture strategies differing with seasons. In the *amon* season when water depth is greater, farmers usually stock fingerlings (>50 mm in length) during July-August, and harvest small-size table fish in October-November. Low water level in *boro* season is not congenial for growing fingerlings to table size; therefore using rice fields as nurseries for raising fingerling could be a better option.

In the northwestern region of Bangladesh, common carp (*Cyprinus carpio*) spawn naturally from December through February. Farmers can exploit this behavior to collect cheap or even free fish seed to stock in their irrigated rice