Tilapia seed production in Ho Chi Minh City, Southern Vietnam

H. P. V. Huy, A. MacNiven, N. V. Tu, Ram C. Bhujel and David C. Little

Climatic conditions in Vietnam vary greatly as the country stretches from the South of China in the North to the Gulf of Thailand in the South. In the north, temperatures sometimes drop below 10ºC during winter, and tilapias need careful over-wintering to survive. In the south of the country temperatures are suitable year-round. In Southern Vietnam especially around Ho Chi Minh (HCM) city, tilapia seed is produced in sewage-fed ponds using methods that have been developed by farmers themselves. The majority of tilapia seed used in the provinces around HCM and on the Mekong Delta are produced in these systems. Tilapia seed production has become a part of diversified suburban agriculture system and appears to have evolved as a byproduct of food-fish production.

Culture of fish in ponds fed with wastes from latrines has been a tradition in Southern Vietnam, especially stocking of Pangasius seed collected from wild. Stocking of hatchery-produced seed is more recent phenomenon that has been driven by the market demand in and around the HCM city where aquaculture is increasingly commercial in nature; 40% of the fish farmers say that aquaculture is their main source of income1. Although Chinese and Indian carps, silver barb, gouramies and hybrid catfish are cultured in Southern Vietnam, the most preferred species are tilapia and the common carp. Hatchery techniques and infrastructures for all of these species are now well developed. Specialized nursing and trading activities have become well established. Both wholesalers and retailers are important players in the trading of fish seed in Southern Vietnam. While this has improved the supply of fish seed to farmers, it has led to a lack of contact and reduced information flow between hatchery operators and food fish farmers. For example food fish farmers understand little about the source of broodfish or method of seed production. Perceptions of seed quality vary with grow-out farmers, traders and nursers. Inconsistent tilapia seed quality was perceived to be a problem by the traders in Southern Vietnam, especially those distributing seed to the Mekong Delta that involves longer transportation times. Farmers were also of the opinion that the poor seed quality is a main factor causing poor fish productivity. The causes of the perceived poor quality could be due to poor pond management, lack of technical know-how, long distance transportation, poor handling and/or poor broodstock quality. Therefore, tilapia fry were collected for an on-station research at the University of Agriculture and Forestry to compare the quality and to identify the associated factors. A survey was also conducted to provide supplementary information to the research trial. It was felt that this information on it's own would be useful for those who are involved in planning, research and education in Vietnam and other parts of the world.

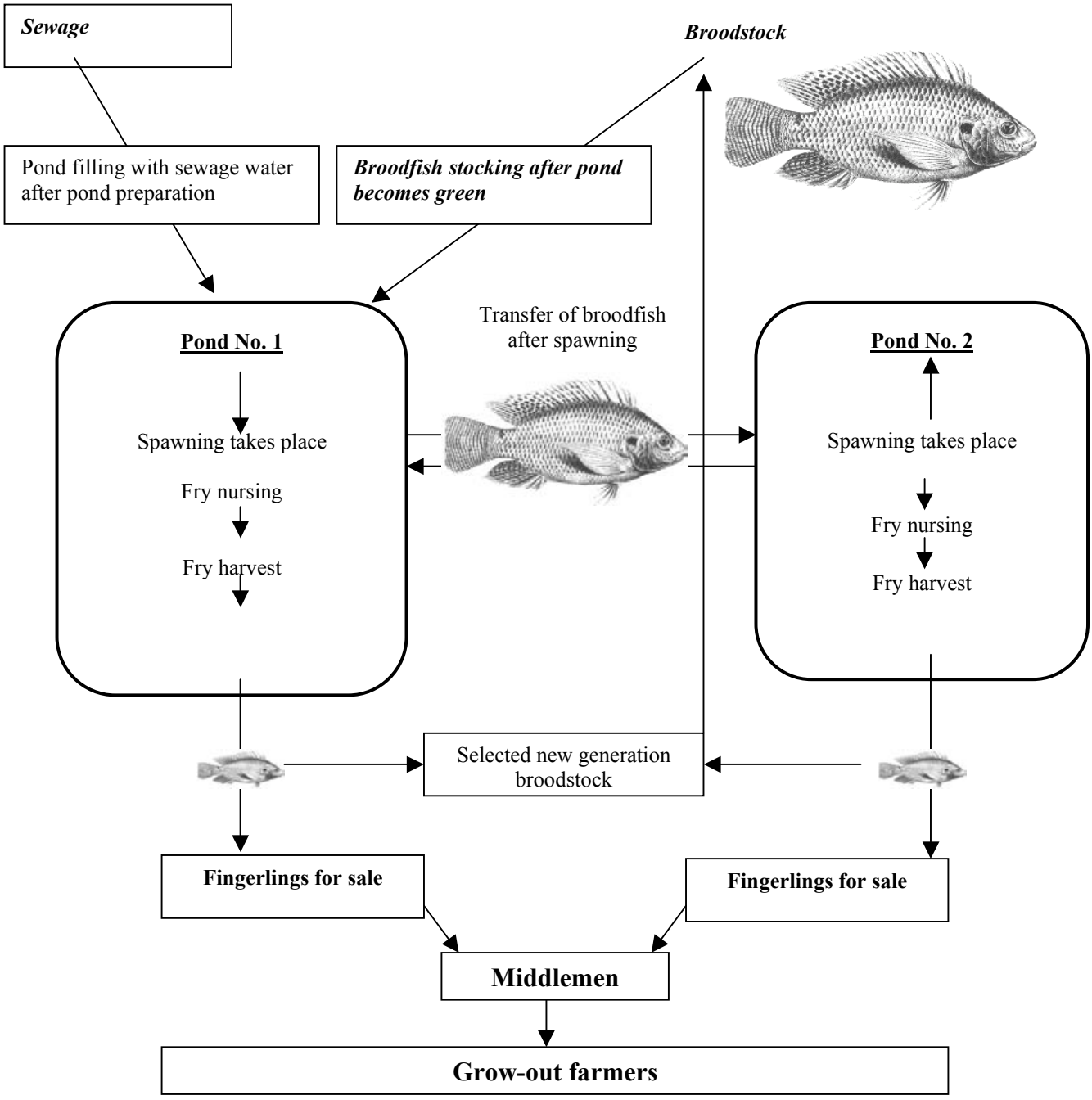
Survey method

A questionnaire survey was conducted with 20 fry producers who provided seed that were used in an on-station nursery trial. These farmers represented a sample of about 10% of the hatchery operators in District no. 8 of Ho Chi Minh City A brief face-to-face interview was carried out with each hatchery operator to gather information on the source of seed, broodstock and nursery management. The survey covered both socio-economic and technical issues relating to the quality of fish seed.

Production system and the practices

Observation during the survey revealed that most farmers use at least two ponds that are filled with water from the municipal sewage canals, which pass through the district. Before filling the ponds, farmers drain and dry them, and use pesticides to kill predators. Some farmers also use quick lime (@7-10 kg/100m2). The average pond size ranges from 1,000 to 2,000 m2. As sewage water is rich in nutrients, growth of natural food or plankton occurs within a week or so. Sewage varies in strength seasonally. As it is stronger in the dry season, it needs settlement before use. After the appearance of sufficient natural food, tilapia brooders are stocked into the pond i.e. Pond 1 (Figure 1). Normally fry are observed after about three weeks of broodfish stocking. After spawning the broodstock are transferred to the other pond i.e. Pond 2 leaving the fry behind in the Pond 1. Some farmers claim that if broodfish are seined by 4-5 persons early in the morning when the fish are surfacing because of low dissolved oxygen, 90% of the broodfish can be removed. All the fingerlings are harvested after about 10-30 days by seining and draining of the pond. The seed are graded at harvest into 5 sizes (mean individual weights 6, 8, 10, 12 and 14 g) and the ratio of seed size harvested depends on the nursing period. The duration of cycles varies with demand. If the demand is low the operator tends to lengthen the nursing period resulting in larger seed. The first pond is again prepared over a 10-day period for the next breeding cycle to stock the same broodfish kept in the second pond or the new breeders. The new breeders are the fingerlings produced in these ponds and nursed separately in other ponds. In this way the cycle of tilapia seed production continues. The majority of seed producers use 3-4

Figure 1. Steps involved in tilapia seed production in HCM City, Southern Vietnam



cycles per year; however, some of them can produce up to 8 cycles a year. The majority of farmers change the water either continuously or at least 2-3 times per culture cycle.

Socio-technical information

The survey results showed that the majority (60%) of the tilapia fry producers have considerable experience (mean of 12 years (range 5-24 yrs). Almost all (95%) of the hatchery operators produce tilapia seed as their main occupation, utilizing mostly family labor. However, at least one-third of the total producers have some alternative source of income such as sale of fruits from the trees grown on the dikes or from family members who are employed off-farm. Most of the fry producers (85%) feel they lack technical information. The majority (75%) of the seed producers learned the techniques from their neighbors and none has had any training even on general fish culture. A small percentage (15%) of the seed producers interviewed learnt by themselves suggesting that the techniques employed are relatively easy to adopt. Most of the seed producers (90%) recognise Nile tilapia, and 60% use a pure strain initially imported and distributed by AIT Aquaculture Outreach in 1993. About 40% produce hybrids, but 75% wanted to try to produce pure Nile tilapia. A minority of producers (20%) were aware of all-male tilapia production techniques. Only a few seed producers (15%) are planning to expand their operations while the majority (70%) were satisfied with their current level of business and said that they would continue rather than selling off their land, which is a common practice in such suburban farming areas.

Table 1: Characteristics of tilapia seed production system in Ho Chi Minh City, Vietnam

Parameters	Special features
1. Stocking density	ranged from 0.7 to 1.1 kg (average = 0.9 fish/m^2)
2. Sex ratio male:female (at stocking)	1:2 - 8 with an average of 1:5
3. Broodfish weight	male = 99.5 g and female = 101.5 g
4. Broodstock feeding	rice-bran (80%) only @1.5 mt/ha/cycle or with duckweed (20%)
5. Fry feeding	rice bran only
6. Fingerling holding system	hapas in tank to hold the over-produced seed but they don't feed them anything during this holding period
7. Annual fingerling production	400 – 5,500 kg (i.e. 0.2 – 3.3 million fingerlings)/per family)
8. Fingerling sale	Most of the hatchery operators (90%) sell their fry to middlemen in the local district market i.e. Trong Vuaong
9. Fingerling price	1 US$/kg (~ 0.17 cent/fingerling)

Most of the respondents hadn't received any complaints against the quality of fry they sell. Their customers are mainly fingerling traders. Out of 20 fry producers interviewed 19 have maintained or increased their level of fry production over the last five years. Only one producer has decreased the production. The main constraints to further increasing production are time availability, and the cost of feed and broodstock. Feed (90% of the respondents) and broodstock quality (65% of the respondents) were considered the most important factors in improving productivity. Various technical features of the system practiced by the farmers are presented in Table 1 and Figure 1.

Implications

As the system used by these peri-urban Vietnamese farmers is, largely, self-sustaining, almost all of the seed producers have adopted it as their main business. Seed quality was not an issue for these hatchery operators; any feedback they received gave them no cause to change their practices. On the other hand, there might be some problems but complaints come up to the middle-men level only since they have no direct contact with the end-users or the small farmers, and they only deal with middlemen who transport the seed throughout the region. These farmers had not been trained or supported with appropriate knowledge and skills. We can see, however, that a successful farmer can have an important impact on neighboring farmers through the existing diffusion mechanism, or network for innovation. However, the perception of the hatchery customers on the Mekong Delta is different from those in the provinces around HCM city. On the Mekong Delta, farmers perceived the quality of tilapia seed to be poor whereas this was not so strong closer to their site of production. An earlier report1 concluded that the poor quality of the seed produced in the same system was related to poor transportation and handling conditions of seed rather than genetics per se. Nevertheless, inconsistent supply of quality seed has led commercial cage operators on the Delta to regularly import high quality mono-sex fry from Thailand. The continuance of this sewage-based hatchery system is likely given current prices and input costs but a market for seed of higher quality has emerged for which alternatives are required. Use of sewage requires frequent sediment removal from ponds if productivity is to be maintained which is labor intensive but is currently a cost effective method to both produce a value-added crop and, in the process, treat human waste. Open pond-based systems make production of pure, improved stocks difficult because of contamination with feral fish. Moreover hormone treatment of fish removed from such systems produces very inconsistent results. Poorer access to sewage as municipal sanitation projects come on stream is also likely to impact on the system.

Realizing the benefits of tilapia as a source of protein and income for the rural poor, and as a potentially lucrative export commodity, the Vietnamese government is now actively promoting tilapia production through activities under their Fisheries Master Plan. The sewage based system produces an estimated 200 million of fry annually in a single district (no. 8) in Ho Chi Minh city and provide employment to about 200 families; the practice also occurs in other areas of the peri-urban zone. However, to fulfill the potential demand for high quality tilapia fry, a larger scaling up in the capacity of hatcheries will be needed to produce and supply seed to meet such ambitious government targets. The existing system will require improvement to remain competitive with other hatchery systems in the future and to contribute to the increase in production planned. This will require active support for current and new sewage hatcheries from government agencies responsible for both aquaculture development and urban sanitation.

Aknowledgements

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