



STUDY ON CURRENT STATUS OF TILAPIA FARMING IN EARTHEN PONDS IN AN GIANG PROVINCE

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ABSTRACT

This study was carried out through interviewing households who were farming tilapia in earthen ponds of An Giang province, based on a prepared checklist to evaluate current status of techniques, product consumption methods, etc., and propose improved techniques to produce materials for export. The study results showed that tilapia farming households have not been trained and mostly based on self-experience and learning from neighbors. The tilapia farming system was a polyculture practice. Most of the households bought tilapia fingerlings from hatcheries where the quality was not guaranteed. Instead of using commercial feed, the households mainly used the home-made one, which led to low efficiency. Most of the farms were small-scale without contracts of consumption with enterprises so the harvested fish was supplied mainly to domestic markets with low price. There was a need for financial policy to give support to the households in increasing investment of their production and shifting to higher intensification and speeding up technique transfer to the tilapia farming households to upgrade their know-hows and increase production efficiency.

1. INTRODUCTION

Tilapia is a common name of a fish group, originated from Africa, belonging to Cichlidae namely *Tilapia*, *Sarotherodon* and *Oreochromis* which are different in reproductive behaviors (Schoenen, 1982; Trewavas, 1983; Beveridge & Mc. Andrew, 2000). Many species of the genus *Oreochromis* have been introduced far outside their native range and are important in aquaculture such as Mozambique tilapia (*O. mossambicus*), Nile tilapia (*O. niloticus*), blue tilapia (*O. aureus*), etc. (Balarin & Haller, 1987); among those, Nile tilapia is the most popular species (El-Sayed, 2006). Mozambique tilapia (*O. mossambicus*) was firstly imported to

Vietnam in 1951 to diversify fish cultured species. However, this species gradually lost its importance due to overcrowding caused by early maturation and high spawning fecundity which leads to slow growth rate and small size at harvest. To develop tilapia culture, a commercial strain of Nile tilapia (*O. niloticus*) was imported from Taiwan to the South of Vietnam in 1973 and then transferred to the North in 1977. Due to high growth rate, low spawning fecundity and large size at harvest, Nile tilapia was quickly accepted to become an important cultured species. In 1991, red tilapia was firstly introduced into Vietnam from Asian Institute of Technology (AIT, Thailand). In

1992, a Taiwanese company brought red tilapia into Binh Duong province of Vietnam for commercial culture trials. Marketable size of red tilapia was then introduced to restaurants in Ho Chi Minh City with the trade name of “dieu hong”. Under the new trade name, the need of consumption of red tilapia has been increased rapidly (Nguyen and Trinh, 1996). Nowadays, red and Nile tilapia are one of the most popular cultured species in Vietnam.

In recent years, tilapia has considered as potential cultured fishes for domestic consumption and exported markets. In 2018, the total tilapia farming area reached 28,000 ha with a total harvest of 232,100 tons and production value of VND 4,9201.5 billion (VASEP, 2019). Exported tilapia was amounted to USD 45 million in 2017 (Source: Seafood Trade Journal, 2019). According to the “Decision to approve the plan of tilapia farming development by 2020, driven by 2030” issued on May, 6th 2016 by the Ministry of Agriculture and Rural Development, Vietnam set the target of tilapia output of 400,000 tons in 2030 for domestic and international markets.

Mekong River Delta (MRD) is the highest potential region of aquaculture development in Vietnam. In the MRD, tilapia culture has been practiced mainly in provinces of An Giang, Kien Giang, Dong Thap, Hau Giang and Can Tho with diversified farming methods such as culturing in ponds, cages, rice fields and being integrated with black tiger shrimp (*Penaeus monodon*) in brackish ponds (Duong *et al.*, 2004). Besides self-farming at small-scale, many tilapia culture households has established linkages with seafood processing and exporter enterprises. However, the sector of tilapia production has been facing many difficulties and challenges such as the lack of markets, low price of raw materials and low product quality, etc. These difficulties and challenges were caused by poor planning and development

orientation of farming areas, unstable quality of fingerlings, high cost of fingerlings and input materials, product quality and safety affected by polluted environment, lack of knowledge on advanced farming techniques of the farmers, etc.

An Giang province is the second largest tra catfish producer after Dong Thap in the MRD. In addition to tra catfish, An Giang has also planned to develop high economic value species farming namely giant freshwater prawn, Nile tilapia, snakeskin gouramy and frog. In An Giang, tilapia have been cultured by small-scale households for a long time by farmers with their self-experiences leading to low production efficiency, frequent disease outbreak, etc. Therefore, it is necessary to conduct a study to evaluate the efficiency of farming, consumption methods and economic profit as well as advantages and difficulties of tilapia production in earthen ponds. Based on findings of the study, improved techniques will be proposed aiming at export.

2. METHODOLOGY

The study was carried out from January to March of 2018 through interviewing 30 households in districts of Chau Thanh, Chau Phu and Thoai Son based on a checklist on farming methods (pond construction, fingerling stocking, feeds and feeding, pond and disease management, etc.), product consumption (domestic or export), and advantages and difficulties of tilapia culture.

The obtained data on farming practice, economic efficiency, product consumption, advantages and difficulties of tilapia production were analysed with Excel and SPSS (version 16.0) programs followed the method of statistic descriptive analysis. Solutions based on the findings of the study to improve the tilapia production in An Giang province were also proposed.

3. RESULTS AND DISCUSSION

Experience and knowledge source of tilapia culture

Tilapia farming experience

The experience of tilapia culture farmers in An Giang province was expressed by the time of fish farming as shown in Figure 1.

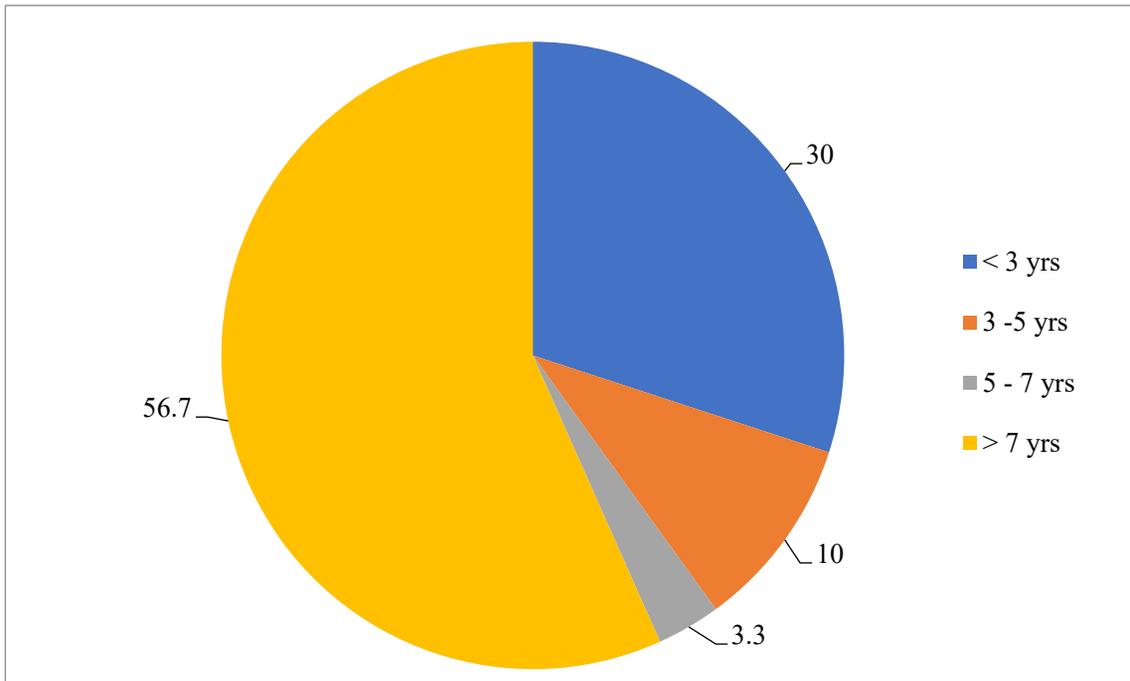


Figure 1. Ratio (%) of the experience of tilapia culture farmers (n = 30)

Most of farmers (56,7%) had the experiences of tilapia farming for more than 7 years; however, those with less than 3 year-experiences were quite high (30%). A high ratio of experienced farmers in the study area was useful to develop innovation for tilapia production practices such as good environmental management, early detection of diseases, etc.

Tilapia farming knowledge

Fish culture in ponds in general and tilapia culture in particular in the MRD have been a long history. As a result, up to 60% of the

farmers possessed the knowledge of tilapia farming from their own experiences while 40% of them learned from their neighbors (Table 1). However, to be succeed in tilapia production, particularly with intensive practice, the farmers need higher knowledge on evaluation of fingerlings quality, managment of feeding, environment, and disease, etc. The study findings showed that the knowledge and skills of the farmers in tilapia culture were limited. This was an obstacle to develop tilapia production in the province aiming at export.

Table 1. Sources of tilapia farming knowledge of the farmers (n = 30)

Knowledge sources	n	ratio (%)
Education	0	0,0
Self-experience	18	60,0
From neighbours	12	40,0
Others (training, radio, television,...)	0	0,0

Farming practices

Pond areas

All interviewed farmers were practicing tilapia culture in ponds with an average area of pond of 2.237 m² and water surface of 1.880 m² (Table 2). It indicated that most tilapia farms

were small-scale in general. The water level was maintained at an average depth of 2,09 m. Some ponds in Chau Phu district reached a depth up to 5 m. However, the deep ponds made difficulties in environmental management and fish harvest.

Table 2. Information about ponds

Parameters	N	M	SD	Min	Max
Pond area (m ²)	30	2.237	1.496	700	7.000
Water surface area (m ²)	30	1.880	1.332	500	6.200
Water depth (m)	30	2,09	0,90	1,30	5,00

Farming systems

The study results showed that 100% of interviewed households practiced polyculture of tilapia with other fish species such as tambaqui, Indian major carps, silver barb, snakehead fish, etc. to maximize pond space and feeds, enhance water quality and reduce production cost. Cropping period was quite long for one crop per year, two crops for three years and even one crop for two years depending on the households. Tilapia harvested from these system was difficult to fullfil exported requirements due to small volumes and uneven sizes of marketable fish.

Water source

Water source is a key factor in aquaculture in general and fish culture in particular. The source of water supply has a direct effect on

pond water quality, environment management practice and production efficiency. According to the survey results, 100% of the households used water surface sources to supply to their ponds without any treatment, of which 66.7% from rivers and 33.3 from small canals (33,3%). The common management practice of pond environment was water exchange, in which 60% of the households did not discharge water during the culture process and only added water to ponds to compensate for water evaporation. The low ratio (40%) of the households practicing frequent water exchange was explained by the apply of polyculture system to utilise natural feed. Moreover, this system was less polluted caused by over feed supply. Discharged water from the fish ponds was pumped directly into rice fields (91.7%) and rivers (8.3%) without any treatments (Table 3).

Table 3. Water sources and pond water management of the households (n = 30)

Parameters	n	ratio (%)
Water source		
Rivers	20	66,7
Canals	10	33,3
Water exchange		
No	18	60,0
Yes	12	40,0
Destination of discharged pond water		
Rivers	1	8,3
Rice fields	11	91,7

Pond preparation and fingerling stocking

Pond preparation

Most of the households practicing pond preparation at the beginning of a new crop. Pond cleaning was applied after fish harvest by

removing pond bottom mud (36.7%), liming (86.7%) and pond drying (63.3%). There was only 13.3% of the households practicing pond cleaning with lime (75%) and BKC (25%) to remove undesirable aquatic animals and pathogens before stocking fingerlings (Table 4).

Table 4. Pond preparation of the households (n = 30)

Parameters	n	ratio (%)
Bottom mud removal	11	36,7
Liming	26	86,7
Pond bottom drying	19	63,3
Black soils removal	11	36,7
Pond cleaning		
No	26	86,7
Yes	4	13,3
Chemicals for pond cleaning		
Lime	3	75,0
BKC	1	25,0

Sources, quality criteria and transportation of fingerlings

Obtaining high quality fingerlings for stocking is an important factor since it affects fish growth, disease outbreak and yield. There was 80% of the households obtaining tilapia

fingerlings from hatcheries and the rest (20%) using their own fingerlings recruited from previous crop.

The quality criteria for selecting the fingerlings from hatcheries were typical appearance and color, active swimming and schooling, and size

even; in which, the first two criteria were commonly used. The average size of the fingerlings purchased from hatcheries was 8 gram per fish. This size was smaller than that of the red tilapia fingerlings stocked in cages (30 - 35 gr/fish) (Phan, 2015).

The fingerlings from hatcheries were packed in oxygenated plastic bags and mostly transported during morning time (75%). This was a very common transport method since it did not require high technique but effective (Figure 2).

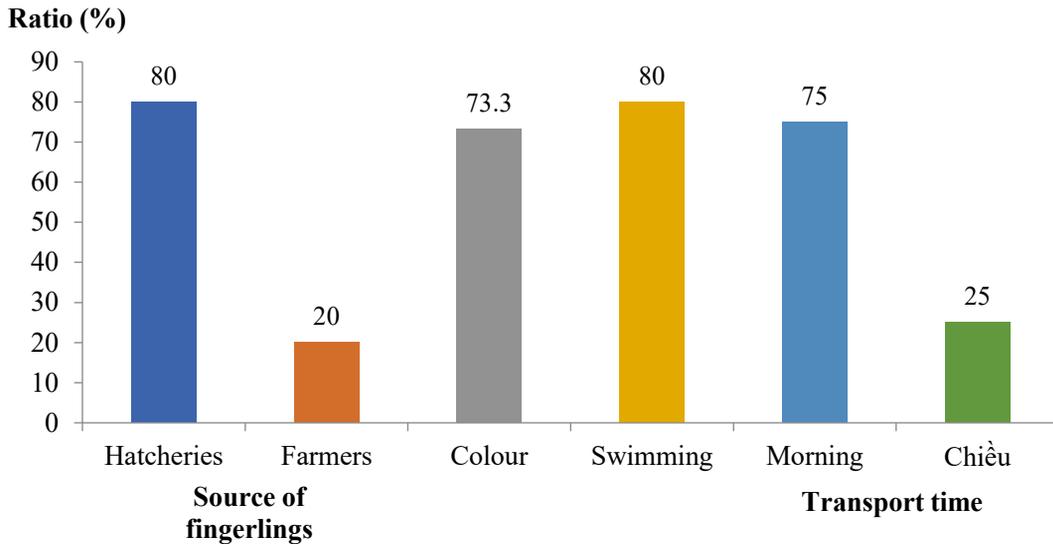


Figure 2. Source, quality criteria and transportation time of fingerlings

Fingerling treatment before stocking

A majority of the households (62,5%) did not apply any fingerling treatment before stocking because they considered that the fingerlings had been treated by hatcheries before being sold

out. Among the households applying treatment, all of them used salt bathing and 11,1% used tetracyclin. The treatment before stocking made the fingerlings well adapted to culture environment and resistant to diseases.

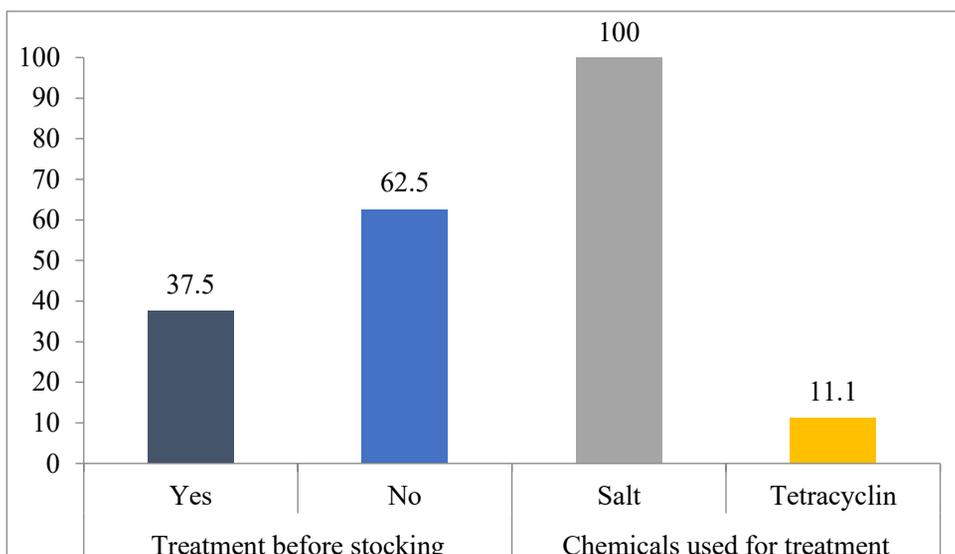


Figure 3. Fingerling treatment before stocking

Feed and feeding

Feed used in tilapia polyculture was homemade one. There were a few households using pelleted feed. Feeding ration was based on farmer experiences without quantification.

Harvest and consumption

Overall, the yield of tilapia in polyculture systems was not high. The highest production of tilapia reached 500 kg per household. The size of harvested fish was not even with an average weight of 300 - 400 gram per fish, ranging from 100 to 800 gram. The harvest practice was carried out by pumping two thirds of water out of the pond then netting. In

general, the average weight of tilapia harvested from ponds was lower than that of red tilapia from cages (500 - 600 gram) (Phan, 2015).

Due to small-scale culture, there was no contract of product consumption between households and enterprises. The households sold harvested fish mainly through small traders or by themselves at local markets (Table 5) with low prices. The price of tilapia was depended on the availability of natural fish. The price of tilapia was high, ranged from VND 12,000 to 14,000 per kg, during dry season but greatly reduced (from VND 5,000 to 8,000 per kg) during flooding season with abundance of natural fish.

Table 5. Mode of harvested fish consumption

Parameters	N	ratio (%)
With a contract of consumption		
Yes	0	0,0
No	30	100
Mode of consumption		
Through enterprises	0	0,0
Through small traders	21	70,0
By themselves (at local markets)	9	30,0

Advantages and disadvantages of tilapia production

Advantages

Tilapia culture in ponds is a traditional occupation of farmers in An Giang, an upstream province in the MRD with abundance of resources for aquaculture development such as water source, water bodies, natural feed, and availability of ponds. The households in An Giang have taken full advantage of these resources to develop tilapia farming in polyculture systems. These practices well-utilised pond space and natural feed, reduced investment costs and increased economic efficiency.

Disadvantages

Lack of capital is the biggest difficulty of the tilapia farming households to intensify their production systems. Lack of advanced knowledge of farming is another difficulty to develop tilapia production. Low quality of obtained tilapia fingerlings leading to low fish growth, disease outbreak, high mortality, low yield and high investment is another obstacle of the production. Finally, all harvested fish is mainly for domestic consumption with low selling prices resulted in low economic efficiency.

4. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The model of polyculture of tilapia with other fish species was applied by most of the households in the survey area. The majority of them bought tilapia fingerlings in hatcheries without quality guarantee. The water source was mainly from rivers. No treatment was applied for supply and discharge water that could negatively affect the surrounding environment. The used feed was mainly homemade one leading to the low productivity. The tilapia production was developed without planning and contract of purchase, and mainly at small-scale levels resulted in difficulty of product consumption and low selling prices. Most of the farmers obtained the know-hows of tilapia culture from their own experiences and neighbours without any training.

Reccomendations

There is a need of credit support policy to assist the households who want to increase investment of their production. The local government should encourage the households to use good quality and monosex tilapia fingerlings, and shift to intensive farming. More training courses to transfer technology of tilapia farming to the farmers should be offered to upgrade their knowledge and production. Pond water treatment before discharging into the surrounding environment should be promoted.

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