

Tilapia Breeding and Seed Production for Brackish water Culture in the Philippines

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Abstract

Tilapias are important foodfishes in the Philippines second only to milkfish. While farming of tilapias in freshwater ponds and cages is already established, there is a need for wider application of the available technologies for brackishwater culture. This paper presents the tilapia species used for brackishwater farming and the commercial methods applied for their hatchery/nursery rearing.

Introduction

Tilapias are important foodfishes in the Philippines. In 1991, the country produced 76,570 metric tons of tilapias cultured in ponds and cages representing 11% of the total production from aquaculture. For the same year, 14,072 metric tons of Mozambique or Java tilapia (*Oreochromis mossambicus*) were harvested from brackishwater ponds.

Unlike the culture of milkfish (*Chanos chanos*) and tiger shrimp (*Penaeus monodon*), the farming of tilapias in brackishwater is not widely practiced in the Philippines due to lack of information on culture techniques and non-availability of quality seed. With over 200,000 ha of brackishwater ponds used mainly for fish and shrimp production (BFAR 1992), there is need for wider application of the breeding and seed production techniques of tilapias for brackishwater culture.

This paper presents the tilapia species cultured in brackishwater ponds and their commercial breeding and seed production techniques in the Philippines.

Tilapia Species Used for Brackishwater Culture

Two species and two hybrids of tilapias are cultured in ponds, tanks, and cages in the Philippines (Table 1). These are the Mozambique tilapia (*O. mossambicus*), Nile tilapia (*O. niloticus*), *O. niloticus* x *O. mossambicus* hybrid, and the red tilapia hybrid. Salinity tolerance studies of tilapia species and hybrids have shown that *O. mossambicus* and hybrids are highly tolerant (Dureza 1983, Fortes 1987). On the other hand, *O. niloticus* has the lowest salinity tolerance (Dureza 1979, Villegas 1992).

Table 1. Tilapia species used for brackishwater culture in the Philippines.

Species	Culture System	Salinity Tolerance (ppt)	Reference
<i>O. mossambicus</i>	Pond	31.9-43.2	Fortes (1987)
	Tank		Villegas (1990)
<i>O. niloticus</i>	Pond	15-30	Dureza (1983)
	Tank	19.5	Villegas (1990)
<i>O. niloticus</i> x <i>O. mossambicus</i>	Pond	33-55	Dureza (1992)
	Tank	32	Villegas (1990)
	Cage (river)	28	Dureza (pers. comm.)
Red tilapia (hybrid)	Pond	36-38.7	Fortes (1987)

Tilapia Breeding

Tilapias are commercially bred in earthen ponds, concrete tanks and net enclosures (hapas) in the Philippines (Table 2). *O. niloticus* and *O. niloticus* x *O. mossambicus* broodfish (40-250 g) are stocked in freshwater earthen ponds measuring 20 x 30 m to 40 x 10 m with water depth of 0.6 - 0.8 m, at densities of 2-4/m² and at a sex ratio of one male to three females. The fish are fed twice a day with a supplemental diet (e.g. fine rice bran) at 3-5% of body weight (BW). Fry are collected daily by dipnetting them at the surface along the dikes 2-4 weeks from stocking of the breeders. After 4-5 weeks, the breeders are harvested and separated by sex for conditioning in holding units (e.g. net enclosures) for 1-2 weeks by feeding twice daily with a formulated diet (25% crude protein) at 3% BW. This breeding system produced 4-11 fry/m²/day (Guerrero pers. comm., Cornejo pers. comm.)

O. niloticus breeders (40-250 g) are stocked in concrete tanks measuring 2 x 2 m to 20 x 5 m with fresh water depth of 0.8-1.0 m at a density of 2-4/m² and male to female ratio of 1:3. The fish are fed twice daily with a formulated diet at 2-2.5% BW. The fry are collected daily 2-3 weeks from stocking and the breeders gathered for conditioning as in ponds after 3-4 weeks. This breeding system has a production of 18 fry/m²/day (Guerrero 1987).

Table 2. Tilapia fry production in the Philippines.

System	Species	Production (fry/m ² /day)	Reference
Earthen Pond	<i>O. niloticus</i>	11	Guerrero (pers. comm.)
	<i>O. niloticus</i> x	4	
	<i>O. mossambicus</i>		Cornejo (pers. comm.)
Concrete tank	<i>O. niloticus</i>	18	Guerrero (1987)
Net enclosure	<i>O. niloticus</i>	12	Guerrero and Garcia (1983)

Net enclosures or hapas (fine-mesh netting) with sizes of 1.5 x 1 x 1 m deep to 12 x 4 x 2.5 m deep are placed in earthen ponds or concrete tanks with freshwater depth of 0.8-1 m. The hapas are installed by attaching them to poles staked to the bottom in earthen ponds or moored to the sides of the concrete tanks. *O. niloticus* breeders (40-200 g) are stocked at 2-4/m² with a sex ratio of 1:3. The fish are fed twice daily with a formulated diet at 2-2.5% BW. Fry (2 fry/m²/day (Guerrero and Garcia 1983) are gathered daily 2-3 weeks from stocking and the breeders are separated for conditioning after 3-4 weeks.

Tilapia Seed Production

Tilapia fry to fingerlings are commercially reared in net enclosures, concrete tanks and earthen ponds under freshwater conditions in the Philippines.

Net enclosures (hapas) measuring 1.5 x 1 x 1 m deep to 2 x 2 x 1 m deep in ponds or tanks are stocked at 250-1,000/m² with fry or post-fry for 3-4 weeks. The fish are fed with a formulated diet (30% crude protein) at 10-30% BW. At this stage, the fry and post-fry are given sex reversal treatment for production of phenotypically all-male tilapia by incorporating a synthetic male hormone in the diet. Weekly size-grading and transfer of the fry to clean hapas are necessary to obtain survival of 80-90%.

Concrete tanks with dimensions of 2 x 2 x 1 m to 5 x 2 x 1.2 m and water depth of 0.8-1 m are stocked at 100-500/m² with fry and post-fry for 3-4 weeks. The fry and post-fry are fed formulated diet at 10-20% BW. Survival of 70-80% is obtained with weekly grading and good water management.

Earthen ponds with sizes of 200-400 m² and water depth of 0.5-0.8 m are stocked with fry or post-fry at 50-200 m². Daily supplemental feeding is done with fine rice bran at 5-10% BW given in 2-4 feedings. The ponds are fertilized with dry chicken manure at 1 kg/10 m² every two weeks alone or in combination with feeding. Fingerling survival of 60-70% after 4-6 weeks is attained with effective predator control and water management.

Fingerling Acclimation to Brackishwater

From the freshwater nursery, tilapia fingerlings need to be properly acclimated to brackishwater prior to stocking in growout ponds and cages to ensure good survival. The recommended acclimation rate is 2.5-5.0 ppt per day (Dureza 1983; Fortes 1987). Bigger fingerlings acclimate faster than smaller ones (Villegas 1990). The critical salinity level for acclimation is above 15 ppt (Dureza 1992).

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