

## A COMPARATIVE STUDY ON THE CAGE CULTURE OF *TILAPIA NILOTICA* AND *TILAPIA NILOTICA* x *TILAPIA AUREA* HYBRID IN LAGUNA DE BAY\*

Rafael D. Guerrero III

National Team Leader for Aquaculture, Fisheries Research Division, PCARRD  
Los Baños, Laguna, Philippines

### ABSTRACT

Fingerlings of purebred *Tilapia nilotica* and hybrid male *T. nilotica* x female *T. aurea* were stocked in net cages at 25/m<sup>2</sup> and cultured for 16 weeks, without supplemental feeding, in the Los Baños area of Laguna de Bay from November to March. The mean weights, survival rates and sex ratios of the fishes were evaluated. Results showed that the hybrid grew faster than the purebred. Survival rate and percentage male of the hybrid were also higher than those of the purebred.

### Introduction

The cage culture of tilapia has developed into a major industry in Laguna de Bay, the largest lake in the Philippines. In 1981, an estimated 1,000 hectares of small pens and cages were devoted to tilapia culture in the Lake (Pullin, 1981). The species of tilapia commonly cultured in cages is the Nile tilapia (*Tilapia nilotica*). There are reports of stunted fish growth, attributed to inbreeding depression in some cage farms (Anon., 1982).

Bautista *et al.* (1981) conducted a study on the cage culture of the hybrid male *T. aurea* x female *T. nilotica* and the reciprocal cross in Laguna de Bay. They found the hybrid of male *T. nilotica* and female *T. aurea* to have grown significantly faster than the hybrid of the reciprocal cross. The former hybrid was 94% male while the latter was 73% male.

In Central Luzon pond experiments, Abella (1982) found the hybrid of male *T. aurea* and female *T. nilotica* superior to the pureline of *T. nilotica* in terms of growth performance. Male percentages of the male *T. aurea* x female *T. nilotica* and male *T. nilotica* x female *T. aurea* hybrids were 66% and 80%, respectively.

This study was conducted at the Los Baños area of Laguna de Bay to compare the growth, survival and percentage male of *Tilapia nilotica* and the male *T. nilotica* x female *T. aurea* hybrid in cages. The study was done from November, 1982 to March, 1983.

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Table 1. Mean weight, percent survival and percent male of *Tilapia nilotica* and *Tilapia nilotica* x *Tilapia aurea* hybrid cultured in cages for 16 weeks.

<i>Species</i>	<i>Mean Wt. (g)</i>	<i>% Survival</i>	<i>% Male</i>
<i>Tilapia nilotica</i>	25.4	83	54
<i>Tilapia nilotica</i> x <i>Tilapia aurea</i>	30.8	98	66

Note: Figures are means of three replicates.

### Materials and Methods

Six net cages, each with dimensions of 2 x 2 x 2.5 m, suspended from bamboo rafts were used in the study. Mesh size of the cage net was 6 mm. The net cages were covered to prevent fish escape. When installed, the cages were about a meter above the lake substratum.

Fingerlings of *T. nilotica* and the hybrid, with mean weights of 2.0 g and 2.7 g respectively, were obtained from private hatcheries in Laguna de Bay. Each cage was stocked with 100 fingerlings (25/m<sup>2</sup>). Three cages (replicates) were stocked with *T. nilotica* and the other three with the hybrid. No supplemental feeds were given to the fishes. Sampling of fish in each cage was done every two weeks to measure mean weights. After 16 weeks of culture, survival rates and sex ratios of the fishes were determined.

### Results and Discussion

The results of the study (Table 1) showed that the hybrid tilapia had better growth than *T. nilotica*. Survival rate and percentage male of the hybrid were also higher than those of the purebred.

The superior growth of tilapia hybrids over the parent stocks has been reported by several workers. Hickling (1968) noted that all-male offspring of female *T. mossambica* and male *T. hornorum* grew faster than either parent. The growth rate of the hybrid female *T. mossambica* x male *T. nilotica* was found by Kuo (1969) to be better than that of the reciprocal hybrid. Pruginin (1967) reported that the all-male hybrid produced by crossing female *T. nilotica* and male *T. hornorum* grew 30% faster than *T. nilotica* and 40% faster than *T. hornorum*.

The faster growth of tilapia hybrids over their parent stocks may be partly explained by the higher percentage of male in the former. In most tilapia species, the male grows faster than the female. This phenomenon is believed to be genetically controlled (Fryer and Iles, 1972).

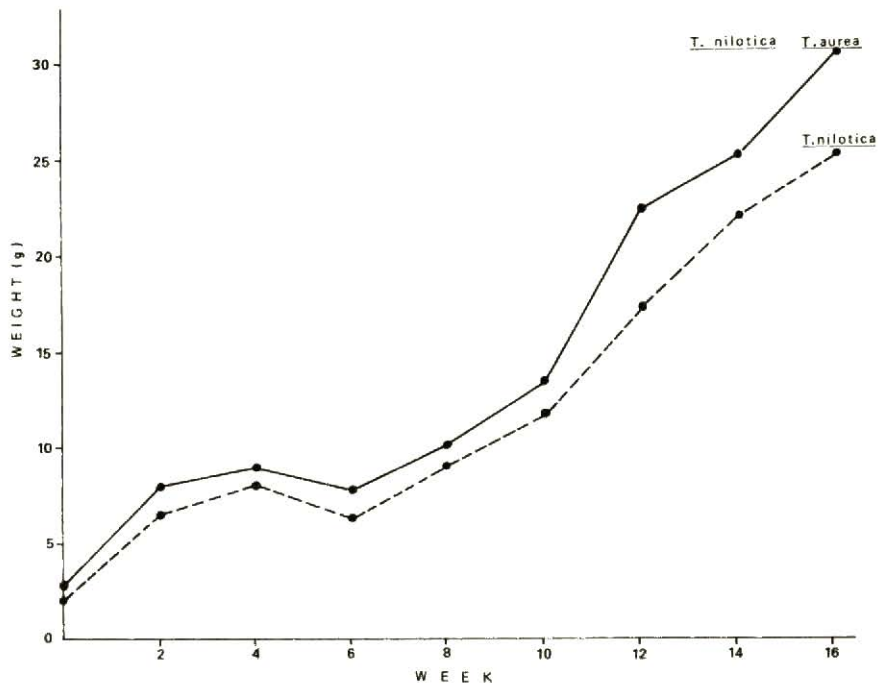


Figure 1. Growth curves of *Tilapia nilotica* and *Tilapia nilotica* x *Tilapia aurea* hybrid cultured in cages for 16 weeks.

The percentage male of the hybrid tested in this study was lower than those reported by Bautista *et al.* (1981) and Abella (1982). This discrepancy may be due to the different *T. nilotica* strains used. At least two strains of *T. nilotica* have been introduced to the Philippines. These are the Egyptian and Ghanaian strains. According to Mires (personal communication), the Ghanaian strain gives higher percentages of male in hybrid crosses than other strains. It is interesting to note, however, that in Philippine tilapia hybridization studies (Bautista *et al.*, 1981; Abella, 1982) the crossing of female *T. aurea* and male *T. nilotica* yields a higher percentage of male in the progeny than the reciprocal cross.

The generally slow growth of the experimental fishes in this study may be attributed to the cold season and low productivity of the lake during the first 10 weeks (Figure 1). Plankton production is relatively low in Laguna de Bay from November to April (Bhent, 1981). The water temperature in the Los Baños area ranged from 23.5 to 27.5°C in November to January.

### Acknowledgement

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### **Tereso A. Abella, Discussant**

We have also conducted similar studies on the evaluation of the growth performance and survival of different tilapia species/strains at the Freshwater Aquaculture Center in ponds and in cages. Most of the results of our studies here have shown the superiority of the hybrid over the purebred. This similar finding with Dr. Guerrero's study could be attributed to the hybrid vigor which has resulted to increased growth rate of the hybrid over their parents.

I am suggesting that a similar study be conducted during the warmer months of the year because temperature has a significant effect on the primary productivity of the lake which somehow have affected the total fish production in the study. This follow-up study may also determine the efficiency of the experimental fish in utilizing the predominant species of phytoplankton during this period.

Although it was observed in the study that the hybrid grew faster than the purebred it was not statistically reported whether the result was significant or not.

### **Antonio M. Bautista, Discussant**

1. Based on the result of the experiment, the bigger experimental fingerlings (hybrid) remained bigger from the start until the termination of the study. Although the initial difference is only 0.7 g., the hybrid is about 74 per cent larger than the purebred. However, it is really very difficult to get experimental animals that are uniform in size. Some workers use co-variance to analyze their data to avoid bias.

2. To produce all male hybrids, parent stocks, whether Ghanaian or Egyptian strain should be progeny tested. In progeny testing, a series of crosses between female *T. nilotica* and male *T. aurea* should be made to select those that produce all male progenies. Simultaneously, a series of reciprocal crosses are made followed by broodstock production and finally multiple spawn to validate the procedure.

3. As in our experiment on the reciprocal crosses of *T. aurea* and *T. nilotica* (1981), the higher the number of males the greater was the average weight per fish. The same result was obtained in this paper. As we all know, the males reached as high as twice the size of the female.

4. The growth rate and survival are influenced by two factors, the environment and genetic make of the fish. Slow growth rate and reduced percentage of survival could be attributed to the inbreeding depression.

