



## PRELIMINARY FINDINGS ON GROWTH PERFORMANCE OF *Chrysichthys nigrodigitatus* UNDER DIFFERENT CULTURE CONDITIONS

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### ABSTRACT

A study was conducted to compare the growth performance of fingerlings of the silver catfish *Chrysichthys nigrodigitatus* in fibre-glass tanks and earthen ponds for eight weeks. One hundred and forty-four fingerlings of *C. nigrodigitatus* with a mean weight of 3 g obtained from the wild were stocked in triplicates and differences in growth indices were determined at the completion of the study. Silver catfish reared in earthen ponds gained more weight than their counterparts in the fibre-glass tanks. Final mean weight of the tank and pond reared catfish were  $10.237 \pm 1.23$  g and  $17.698 \pm 0.17$  g respectively. The mean weight increase of pond reared fish was significantly higher ( $P < 0.05$ ) at 176%. The specific growth rate of the pond reared catfish was 3% while that of the tank reared was 2%. This study demonstrated improved growth performance of pond reared *Chrysichthys nigrodigitatus*.

**Keywords:** Brackish water catfish, culture medium-environment interaction

### INTRODUCTION

The silver catfish, *Chrysichthys nigrodigitatus* (Lacépède, 1803) is among the dominant commercial catches exploited in many rivers in Africa and is highly priced (Offem *et al.*, 2008). Presently, there is a yearning at the Institutional level for a brackish or marine fish that has the potential of being popularized for aquaculture. The claroteid catfish, *C. nigrodigitatus* has been identified as a cultivable fish species by Ezenwa *et al.* (1990). Findings of the survey indicated that fingerlings of *C. nigrodigitatus* were very abundant within the lagoons, estuaries and creeks between April and September of each year surveyed.

The rate at which fish grow is dependent on a number of factors including species, age, genetic potential, water temperature, health, and quantity and quality of food. As a potential culturable species, studies have been carried out especially in the West African region where the species are in abundance. However, the studies carried out by Ezenwa, (1982), Adewolu and Fagade (1996), Adewolu and Fagade (1998), Adewolu (2002), Adewolu and Benfe (2009) focused on the dietary requirements and protein utilization of this species. There is a dearth of information on the impact of the culture medium-environment interaction on the growth performance of silver catfish. Efficient growth performance evaluations of a novel aquaculture entrant such as the silver catfish require the simultaneous utilization of different culture mediums with satisfactory number of replicates in order to give a true picture of their response. Often, the constraints of collecting adequate numbers of fish seeds with uniform initial

size from the wild dictate the resultant sample size for a comparative study as was the case in the present study.

The purpose of this study was to compare the growth performance of fish seeds of *C. nigrodigitatus* in fibre-glass tanks and earthen ponds for eight weeks.

### MATERIALS AND METHOD

*Chrysichthys nigrodigitatus* fingerlings were collected by fishermen from River Oluwa ( $6^{\circ} 31.383' N$  and  $4^{\circ} 47.883' E$ ), close to Ilu-Agbo water front in Ese-Odo local government area of Ondo State. They were conveyed to Nigerian Institute for Oceanography and Marine Research, Badore in plastic vats containing water with the aid of aerators (Model: ACD-9800 Resun air pump) and left to acclimatize for one week.

Thereafter, one hundred and forty-four fingerlings of *C. nigrodigitatus* were stocked in the fibre glass tanks and earthen ponds at the rate of 24 fingerlings  $m^{-3}$  and 3 fingerlings  $m^{-3}$  of water respectively in triplicates. The initial/final and bi-weekly length and weight measurements of the fish were taken and recorded for a period of eight weeks with the aid of a digital scale (Model: DT-302) and vernier caliper (Model: GuangLu@ 0 – 200mm).

During the growth trial, feeding was administered daily at 5% body weight. Every fortnight following the weight measurements, amount of feed to be given was calculated and adjusted accordingly.

The physico-chemical parameters of the water, such as pH, phosphate, ammonia, and nitrite were monitored and recorded throughout the experimental period with the aid of a test kit (Pondcare® Master liquid test kit). Temperature was measured using mercury-in-glass thermometer.

The weight gain [%] =  $100 \times \frac{\text{final weight} - \text{initial weight}}{\text{initial weight}}$ , feed intake [FI = total feed consumed per tank (g)/number of fish per tank], specific growth rate, SGR (%) =  $100 \times \frac{\ln W_f - \ln W_i}{\text{Time}}$ , and feed conversion ratio, FCR = feed consumed (g)/weight gained (g) were calculated.

Experimental data were presented as mean  $\pm$  standard deviation and evaluated using Student's t-test (paired) by means of GraphPad Prism Statistical Software©2012.  $P < 0.05$  was accepted as the level of statistical difference.

## RESULTS

The study was carried out over an eight-week period and throughout the study period there was no mortality of the experimental fish. The initial mean weight of the fingerlings in the fibre-glass tanks and earthen ponds were  $3.359 \pm 0.47$  g and  $3.304 \pm 0.52$  g respectively. At the end of the experiment, the final mean weight of the fingerlings in the tanks and ponds were  $10.237 \pm 1.23$  g and  $17.698 \pm 0.17$  g respectively. The growth trend from the two system types are depicted in figure 1. The summary of growth parameters presented in Table 1 indicated that the specific growth rate of the tank and pond reared silver catfish were 2% and 3% respectively while the feed conversion ratio were 3.44 and 3.04 respectively. Water quality parameters obtained during the study period are shown in Table 2.

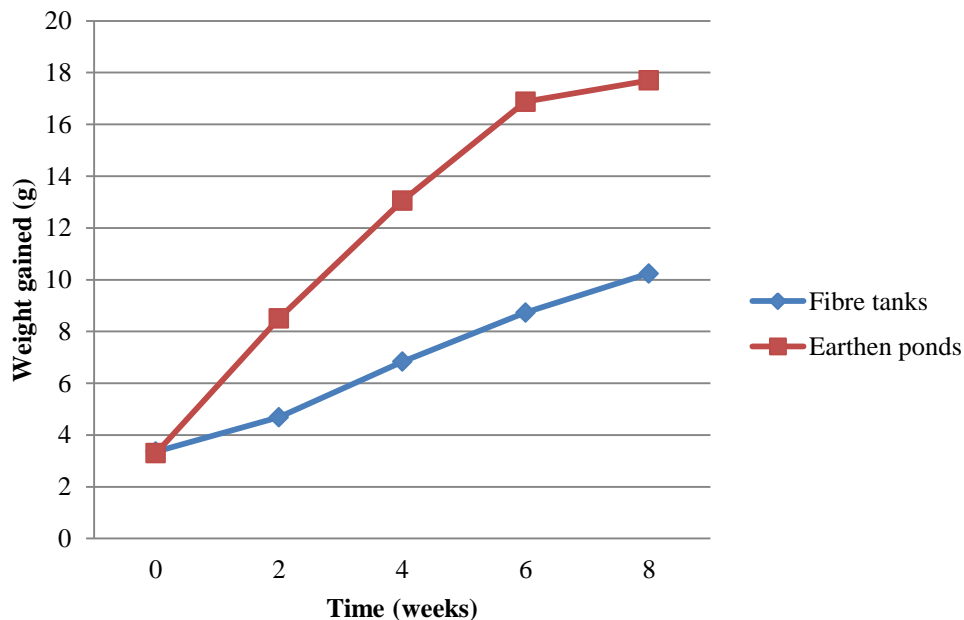


Fig. 1: Growth trend of mean body weight of *C. nigrodigitatus* fingerlings during the study period

**Table 1: Mean growth indices of *C. nigrodigitatus* fingerlings**

Growth parameters	Culture medium	
	Fibre-glass tanks	Earthen ponds
Mean Initial weight (g)	3.359±0.47	3.304±0.52
Mean Final weight (g)	10.237±1.23	17.698±0.17
Mean Weight gain (%)	204.763	435.654
Mean Feed intake [FI] (g)	23.688±1.99	43.704±3.12
Specific growth rate [SGR] (%)	2.0	3.0
Feed conversion ratio [FCR]	3.44	3.04

Values are mean of 3 replicates ± SD.

**Table 2: Mean values of the water quality parameters during the study period**

Week	Fibre-glass tanks					Earthen ponds				
	Temp (°C)	pH	PO <sub>4</sub> <sup>3-</sup> (mg/L)	NH <sub>3</sub> (mg/L)	NO <sub>2</sub> <sup>-</sup> (mg/L)	Temp (°C)	pH	PO <sub>4</sub> <sup>3-</sup> (mg/L)	NH <sub>3</sub> (mg/L)	NO <sub>2</sub> <sup>-</sup> (mg/L)
0	26.5	7.09	2.0	0.5	0.05	30.0	8.0	0.25	4.0	0
2	26.6	7.03	1.5	0.5	0	30.4	7.08	0.25	3.0	0
4	26.7	6.99	1.5	0	0.05	30.9	7.02	0	0.5	0
6	26.8	6.95	1.0	0	0	31.7	6.56	0	0.5	0
8	26.8	6.92	1.0	0	0	31.9	6.23	0	0.5	0

Values are mean of 3 replicates

## DISCUSSION

The success or viability of an aquaculture project depends among others on regular supply of fingerlings of the desired fish species to stock ponds or tanks (Tawari and Abowe, 2011). However, the present status for *C. nigrodigitatus* in Nigeria is for the fingerlings to be sourced from the wild and this is seasonal. For this study, the fish seeds obtained were of fairly uniform weight, however at each sampling and at the end of the study period, the fingerlings that were reared in the pond performed better in terms of growth than their tank counterparts. This outcome tallies with the findings of Adebayo and Adesoji (2008), where a comparative assessment of catfish (*Clarias gariepinus*) reared in earthen ponds and concrete tanks resulted in a growth disparity of 1.1 kg and 0.9 kg respectively.

Outcome of the experimental trials demonstrated that there was an increased body weight in the pond reared catfish which resulted in a percentage body weight gain that was more than double those reared in the fibre-glass tanks at the end of the culture period (Table 1). Relative weight differences between these two groups were established by the second sampling as the tank reared fingerlings were 4.687±0.46 while the pond reared were 8.505±1.51, almost twice in mean weight than those in the fibre-glass tanks (Figure 1).

It is useful to be able to ascertain the rate at which fish are growing. The usual method of doing this is to calculate the specific growth rate, which is a measure of the percentage body weight increase per day. The result in this study showed that the tank reared fingerlings had SGR of 2% while that of the ponds was 3%. The SGR of 2% of the tank reared samples was within the range of the finding of Erondu *et al.* (2006), where the rearing of *C. nigrodigitatus* fingerlings in 1m<sup>3</sup> fixed cages held in a reservoir receiving tidal fresh water resulted in an SGR that ranged from 1.81 and 2.22%.

Comparatively lower FI of the tank reared fingerlings contributed to poor values for growth. Although the tank reared fingerlings consumed less and grew more slowly than the pond reared catfish, both were almost on a par with each other in terms of converting feed to weight gain. The better value of FCR suggested that the pond reared Silver catfish more efficiently converted the feed given to flesh.

These results appear to rule out the efficacy of fibre-glass tanks in obtaining a satisfactory growth performance for wild sourced *C. nigrodigitatus*. The earthen pond culture was therefore found to be an efficient and effective system for rearing Silver catfish fingerlings.

Apart from ammonia and phosphate, water quality parameters recorded during the study period

were within the appropriate regime for warm water fishes as reported by DWAF (1996). According to this report, the target water temperature range for larval development and growth was 27 - 30 °C, and the pH tolerance range of most freshwater fish species fell between 6 and 9. The target water quality range for ammonia, nitrite and phosphate concentrations for most fish species was 0 - 0.025 mg/L, 0 - 0.5 mg/L and 0.1 mg/L respectively. Therefore, ammonia and phosphate build-up in the fibre-glass tanks were reduced by partial water exchange.

## CONCLUSION

The percentage mean weight gain of the pond reared *C. nigrodigitatus* (435.654) was 231% (435.654 - 204.763) higher than ( $P < 0.05$ ) that produced from tank reared *C. nigrodigitatus* in this study. The two-tailed P value (0.0264) showed that  $P < 0.05$ ; therefore, the difference in growth performance was statistically significant. The growth difference is substantial and in terms of biological value has an economic significance.

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