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# Comparative Studies on the Growth Performance of *Cyprinus Carpio* (Common Carp, Linnaeus, 1758) Fingerlings in Earthen and Polyethene Line Ponds

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***Abstract****: A comparative study was conducted to assess the growth performance of Cyprinus Carpio (common carp) fingerlings in earthen and polyethene-lined ponds at Federal Polytechnic, Monguno, Borno State, Nigeria. One hundred fingerlings were acclimatized and distributed equally between the two pond types. The fish were fed a local diet containing 28% crude protein over a 42-day period, and water quality parameters were monitored to ensure consistency across treatments. Survival rates were recorded, and growth parameters including initial and final lengths and weights, length and weight gains (%), and specific growth rates (%) were measured and analyzed using descriptive statistics and T-tests. The study found that Cyprinus Carpio fingerlings exhibited significantly better growth performance in earthen ponds compared to polyethylene-lined ponds. Specifically, fish in earthen ponds showed higher final weights (0.63 ± 0.02 g vs. 0.42 ± 0.02 g) and greater length gains (33.09 ± 1.29% vs. 12.7 ± 0.03%) than those in polyethylene-lined ponds. Survival rates were also markedly higher in earthen ponds (80.08 ± 10.96%) compared to polyethylene-lined ponds (20.43 ± 3.99%). These results suggest that earthen ponds are more suitable for the mass production of common carp fingerlings in Maiduguri, Borno State, Nigeria. Future research could explore additional factors influencing growth performance in different pond types to optimize aquaculture practices.*

***Keyboard:*** Common carp; Fingerlings; Broodstock; Growth rate; Fish culture***.***

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## Introduction

Aquaculture is a rapidly growing industry worldwide. In the future, fish supplies from traditional fisheries are unlikely to increase substantially; therefore, aquaculture production should grow to help satisfy the growing world demand for fishery products.

Aquaculture in Maiduguri was started recently in small-scale ponds by introducing the seed of African Catfish or Tilapia. While common carp (***Cyprinus Carpio***) is still lacking in many parts of Borno State. Aquaculture is still subsistence type except raceways and mostly carps are emphasized to grow in part of Biu and Hawul Local Government Arae of Borno State. Aquaculture is still limited on extensive and semi-intensive system. According to Balami and Pokhrel (2020),

Common carp and Grass carp are mostly cultured in Nepal and some parts of the World. Common carp dwells in the bottom and feed on the bottom insects, insect larvae, zooplankton, dead and decayed vegetation, whereas grass carp dwells in the middle layer and feeds on aquatic vegetation, terrestrial plants and plankton in the water column with same habit of warm water fish. So the idea is to rear them together in the same pond as they utilize the two different niches of the pond. The production of common Carp (Cyprinus carpio) fingerlings is a project designed to meet the requirements of fish farmers in Maiduguri, Borno State. The main economic significance of the proposed project is its contribution towards narrowing down the fish demand-supply gap deficit in Nigeria as well as the supply of proteins and micronutrients for feeding the teeming population of Borno State and Nigeria at large. The project's aims specifically at fingerlings production as well as table- size common Carp fish production to boost the domestic fish supply in the country and for export purposes too.

## Materials and Methods

### Study Area

The nursing of the common carp in Earthen and polyethene line ponds were carried out in Monguno Maiduguri, Borno State. Both Earthen pond and polyethene line ponds size was 10m × 8m.

### Methodology

**Procurement of brood stock:** Common Carp Juveniles were procured from the reliable fish farm in Jos, plateau state and were transported to Federal Polytechnic Monguno, Borno State. Pond preparation was done by draining and drying of the pond. Liming was done at the rate of 250 Kg/ha for disinfection. Urea (0.54 Kg) and DAP (1.127 Kg) were used for fertilization (Balami and Pokhrel, 2020). A total of 50 common carp juveniles of average weight 0.8g were successfully stocked in both the Earthen and Polyethene line ponds and fed 5% of their body weight.

**Local feeds**

Pellet feed of 28 % Crude Protein was fed two times a day at a rate of 5% of total body weight. Periodic fertilization using organic (cow dung) and inorganic (DAP and Urea) was done to produce the natural foods, phytoplankton and zooplankton. All other materials like Borholes, indoor hatchery, etc are available.

**Experimental design.**

The juveniles were fed for the period of 4 months for the two different ponds type (earthen and polythene) measuring 10x8x1.5 m2 and were be stocked at the rate of 50 juveniles of common carp.

**Fish growth and survival** for this study, growth will be expressed as Weight gain, Relative Growth Rate, Specific Growth Rate, Condition Factor (Bagenal ,1978) and Survival rate (Fasakin *et al*., 2001)

**Mean Weight Gain (MWG) =**M1 –M0/N

Where W0 = Initial mean weight-

W1 = final mean weight

**Specific Growth Rate (SGR)** =*LnW1 –LnW0 / T X 100*

Where:
Ln = Natural log
W1 = final mean weight
W0 = Initial mean weight
T = time interval

**Survival %(S) =***N1X100/N0*

Where:
N1 = final number of fish at the end of the experiment.
N0 = Initial No of fish at the beginning of the experiment.

**Statistical analysis**

Data collected on survival was analyzed using simple descriptive statistics such as percentages and specific Growth Rate was calculated using standard formula

**Results**

**Growth analysis**

The measurements of average initial length and weight, final length and weight, weight gain (%), length gain (%), specific growth rate (%) as well as survival (%) of C. carpio fingerlings fed with experimental diets for 42 days of rearing period are summarized in Table1

**Table 1: Summary of the mean, percentages and specific growth rate**

| Growth Parameters | Earthen Pond | Polyethene line pond |
|---|---|---|
| Initial length (cm) | 2.88 ± 0.04 | 2.83 ± 0.04 |
| Final length (cm) | 3.25 ± 0.03 | 3.48 ± 0.05 |
| Initial weight (g) | 0.24 ± 0.01 | 0.23 ± 0.03 |
| Final weight (g) | 0.63 ± 0.02 | 0.42 ± 0.02 |
| Length gain (%) | 33.09 ± 1.29 | 12.7 ± 0.03 |
| Weight gain (%) | 126.08 ± 1.77 | 65.03 ± 0.02 |
| Specific growth rate (%) | 2.94± 0.02 | 1.14 ± 0.08 |
| Survival (%) | 80.08 ± 10.96 | 20.43 ± 3.99 |

**Discussion of Results**

The comparative study on the growth performance of Cyprinus Carpio fingerlings in earthen and polyethene-lined ponds revealed significant differences in growth parameters over a 42-day rearing period. Initial measurements showed the fingerlings in both pond types started with comparable lengths and weights. However, by the end of the study, fingerlings in earthen ponds exhibited a greater final length of 3.25 cm compared to 3.48 cm in polyethene-lined ponds.

Similarly, the final weights showed a notable disparity, with fingerlings in earthen ponds reaching 0.63 g, significantly higher than the 0.42 g recorded for those in polyethene-lined ponds.

The growth performance, measured through length and weight gain percentages, further emphasized the superior conditions of the earthen ponds. Fingerlings in earthen ponds achieved a length gain of 33.09%, markedly higher than the 12.7% in polyethene-lined ponds. Weight gain followed a similar trend, with fingerlings in earthen ponds exhibiting a 126.08% increase compared to a 65.03% increase in the polyethene-lined ponds. The specific growth rate (SGR) reinforced these findings, with the earthen pond fingerlings attaining an SGR of 2.94%, while those in the polyethene-lined ponds had a much lower SGR of 1.14%.

Survival rates also varied significantly between the two pond types, with earthen ponds supporting an 80.08% survival rate of the fingerlings, contrasted by a mere 20.43% in the polyethene-lined ponds. This stark difference in survival rates highlights the more favourable environmental conditions provided by the earthen ponds, likely contributing to the overall better growth performance of the fingerlings. The study thus concluded that earthen ponds offered a more conducive environment for the growth and survival of Cyprinus Carpio fingerlings compared to polyethene-lined ponds.

**Conclusion**

The comparative study on the growth performance of Cyprinus carpio fingerlings revealed that those reared in earthen ponds exhibited significantly better growth metrics and survival rates compared to those in polyethene-lined ponds over a 42-day period. The fingerlings in earthen ponds had a higher final length (3.25 cm vs. 3.48 cm), weight gain (126.08% vs. 65.03%), and specific growth rate (2.94% vs. 1.14%). Additionally, the survival rate in earthen ponds was notably higher at 80.08% compared to 20.43% in polyethene-lined ponds. These results indicate that earthen ponds provided a more conducive environment for the growth and survival of common carp fingerlings than polyethene-lined ponds.

**Recommendation**

Based on the comparative study of the growth performance of Cyprinus Carpio fingerlings, it was recommended that earthen ponds were more favourable for rearing common carp fingerlings compared to polyethene-lined ponds. Fingerlings in earthen ponds exhibited significantly higher final lengths and weights, with a length gain of 33.09% and a weight gain of 126.08%, compared to 12.7% and 65.03% respectively in polyethene-lined ponds. The specific growth rate in earthen ponds was also markedly higher at 2.94% compared to 1.14% in polyethene-lined ponds. Additionally, survival rates were considerably better in earthen ponds, with 80.08% survival compared to just 20.43% in polyethene-lined ponds. These results indicated that earthen ponds provided a more conducive environment for the growth and survival of C. Carpio fingerlings.

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