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FISH GROWTH PERFORMANCE AT HIGH ALTITUDE ENVIRONMENT AT KARATINA UNIVERSITY, KENYA

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ABSTRACT

This report entails the findings of fish growth performance project that targeted high altitude environment. One such environment is Karatina university fish ponds in Kenya. Fingerlings of Nile tilapia (*Oreochromis niloticus*), African catfish (*Clarias gariepinus*) and Common carp (*Cyprinus carpio*) were stocked at 3.3 fish m⁻² with an average body weight of 4.9-5.6 g. Feeding was done twice a day (10.00am and 4.00pm). Stocked – an average body weight of 4.9-5.6 g. The highest final mean weight of African catfish was (785.4±g), mean weight (248.4±1.4g), mean weight gain (780.4±5.5g) and SGR (2.9%) but lowest % survival (68%). It was clearly indicated that the African catfish is more adaptable to low water temperatures than the other two fish species. As recorded by this study, African catfish performed better than all the other fish species. The study recommended that on farm trials should be carried out to test the growth performance based on fish farmers environmental natural conditions

Key words: fish growth, performance, high altitude, Kenya.

1. INTRODUCTION

The Kenya government policy on Aquaculture Economic Stimulus Program (ESP) led to increased culture of warm water fish species in all parts of the country (KMFRI, 2017) including the high altitude areas. There was an unprecedented increased culture of Nile tilapia (*Oreochromis niloticus*), African catfish (*Clarias gariepinus*) and common carp (*Cyprinus carpio*) in the Mount Kenya region (Ngugi and Mugo, 2012). However, performance of these species in such altitudes has rarely been documented. Also, the performance of these species in such altitudes has rarely been assessed.

Introduction of ESP in Kenya led to increased culture of warm water fish species in high altitude areas (e.g. Nyeri County, Mathira sub-county). As a result, there has been unprecedented increase in culture of Nile tilapia (75%), African catfish (21%) and common carp in extremely high altitudes areas (> 3000 m asl).

Kumar et al., (2014) carried out a study on Length-weight Relationship and Growth Pattern of Common Carp (*Cyprinus Carpio* Var. *Communis*) in Different Pond Environment in Mid Hill Region of India.

The fish followed isometric growth in spring season (March-May); (however they did not follow in the remaining seasons). Further, there was no specific growth pattern of common carp observed in these pond environment.in Ethiopia, the *O.niloticus* significantly ($p<0.05$) higher average final weight of 174.2 ± 40.8 g at a faster daily growth rate (DGR) of 0.75 g.day⁻¹inT2 than in T1 with 80.0 ± 15.8 g final weight at DGR of 0.25 g.day⁻¹ during the culture period of 190 days, Endebu,Tugie and Negisho (2016).

The same scenarios are experienced in the neighboring countries. Tibihika, Barekye and Bykora (2014) cultured Mirror carp (*Cyprinus carpio*), Nile tilapia (*Oreochromis niloticus*) and Sharp toothed African catfish (*Clarias gariepinus*) in earthen ponds in Kigezi region South-western Uganda. Results indicated that Growth rates and average body weights of Nile tilapia and Mirror carp in Kabale and Kisoro was higher and significantly different ($p<0.05$) from Kanungu. Food conversion ratio for fish in Kanungu was higher compared to Kabale and Kisoro.

This study assess the growth of the three species in the high altitude areas near Mt. Kenya region. The broad objective of this study was to evaluate the growth of the three species in the high altitude areas near Mt. Kenya region. It was achieved by three objectives namely: to assess the growth performance of Nile tilapia, to assess the growth performance of African catfish and to assess the growth performance of Common carp.

Karatina university is in Mathira Sub-county, Nyeri county. It is in high altitude areas, location $1^{\circ} 0' 0''$ S, $36^{\circ} 46' 0''$ E, elevation of 3500m.

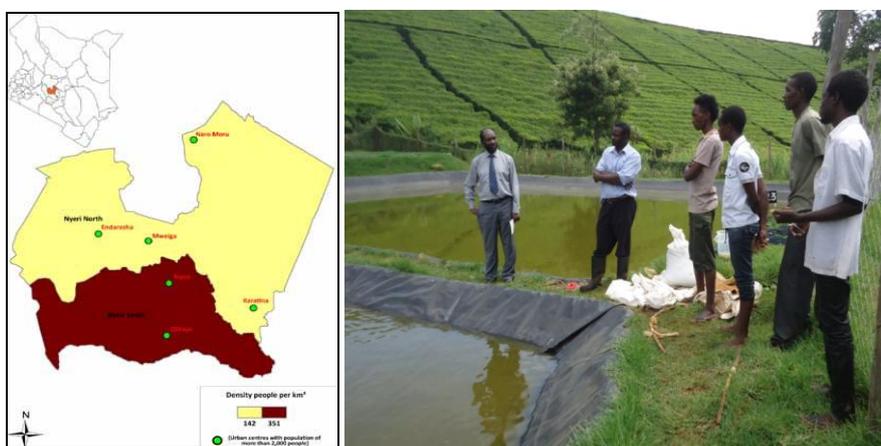


Figure 1: location of study area and study site

2. METHODOLOGY

Fingerlings of Nile tilapia (*Oreochromis niloticus*), African catfish (*Clarias gariepinus*) and Common carp (*Cyprinus carpio*) were stocked at 3.3 fish m^2 with an average body weight of 4.9-5.6 g.

Feeding was done twice a day (10.00am and 4.00pm). Stocked – an average body weight of 4.9-5.6 g.



Figure 2 and 3 fish stocking taking place.



Figure 4 and 5: monthly fish sampling

Fish Sampling for growth performance was performed every two months.

3. ANALYSIS OF THE FINDINGS

Table 1. Growth performance parameters of Nile tilapia, African catfish and common carp

	Nile Tilapia	African catfish	Common Carp
Initial Mean Weight_g	4.8±0.4	5.4±3.2	5.3±2.2
Final Mean Weight_g	148.1±3.2	785.4±8.6	328.2±6.8
Mean Weight_g	54.1±1.2	248.4±1.4	167.7±1.2
Mean Weight gain_g	143.1±2.8	780.4±5.4	323.2±4.6
Daily weight gain_g	0.3	1.9	0.8
Specific Growth Weight_g	2.2	2.9	2.5
Percent Survival (%)	96.0	68.0	95.0

From table 1, the highest final mean weight of African catfish was (785.4±g), mean weight (248.4±1.4g), mean weight gain (780.4±5.5g) and SGR (2.9%) but lowest % survival (68%).

It was clearly indicated that the African catfish is more adaptable to low water temperatures than the other two fish species

Growth in weight

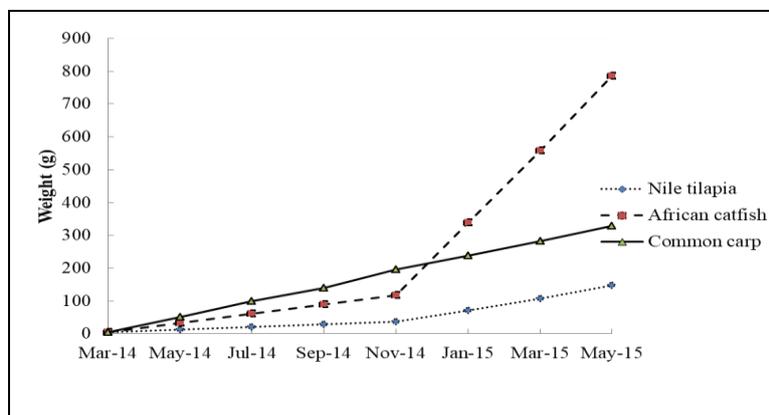


Figure 7: Growth in weight (g) of Nile tilapia, African catfish and common carp reared at high altitude areas

Parra I (2014) explored the effects of altitude (range 40–1,340 m) and latitude (range 40.6–61.7°N) on longevity, maximum length, length and age at maturity, and fecundity, comparing Spanish and Norwegian populations. Results showed that the brown trout lived longer but attained smaller sizes at higher latitudes.

Water quality – DO and temperature

Dissolved Oxygen (DO) (mg/l) in fish ponds stocked with Nile tilapia, African catfish and common carp at high altitude areas was analysed as shown in figure 8.

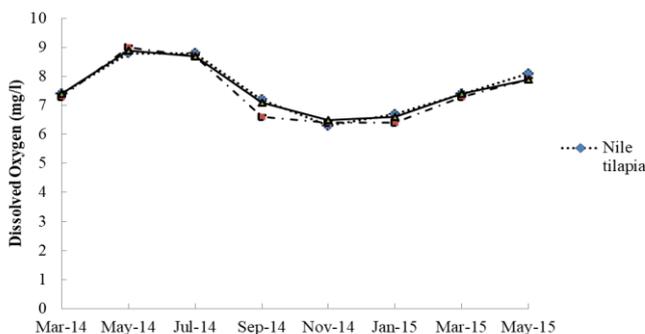


Figure 8: Dissolved oxygen (mg/l) in fish ponds

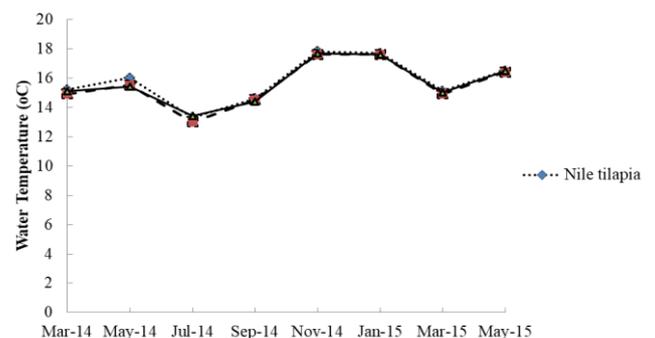


Figure 9: temperature

Water temperature in fish ponds stocked with Nile tilapia, African catfish and common carp at high altitude areas.

4. CONCLUSIONS

The low temperature in this study (13–17°C) was found still suitable for culturing warm water species at the high altitude areas

The findings demonstrate that warm water species can still be cultured in high altitude areas of which from the three fish species cultured in this high altitude area. As recorded by this study, African catfish performed better than all the other fish species.

The study recommended that on farm trials should be carried out to test the growth performance based on fish farmers environmental natural conditions. This might lead to fish zonation in terms of growth performance

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