GROWTH PERFORMANCE OF MIXED SEX NILE TILAPIA IN CAGE MONOCULTURE AND POLYCLTULTURE WITH AFRICAN CATFISH AND AFRICAN CARP

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A Thesis Submitted to the Graduate School in Partial Fulfillment of the Requirements for the award of a Master of Science Degree in Limnology of Egerton University

EGERTON UNIVERSITY
NOVEMBER, 2016
DECLARATION AND RECOMMENDATION

DECLARATION
This thesis is my original work and has not, wholly or in part, been submitted or presented for examination for award of a degree in any other University

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Omondi Alfred George Ajuoga
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RECOMMENDATION
This thesis is the candidate’s original work and has been prepared with our guidance and assistance and submitted with our approval as the University Supervisors

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DEDICATION
To my beloved wife Carolyne, children John Junior, Monica, Mary, Marga and my beloved mum Monica Senior and dad John.

Thank you for being there for me always.

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ABSTRACT

The excessive breeding of mixed sex Nile tilapia (*Oreochromis niloticus*) in ponds often lead to stunted growth. This study hypothesized that cage culture was a potential alternative in solving the problem. Furthermore, it was hypothesized that its growth performance does not significantly vary when polycultured in cages with the African catfish (*Clarias gariepinus* Burchell 1822) and African carp (*Labeo victorianus* Boulenger 1901). An experiment was set up in a completely randomized design (CRD) for four months to test these hypotheses. There were 4 treatments (T) each with three cages were as follows: in T1 (control), was a 100% monoculture treatment of mixed sex Nile tilapia; T2, had a 1:1 combination treatment of mixed sex Nile tilapia and the African catfish; T3 had another 1:1 combination treatment of mixed sex Nile tilapia and African carp and T4 had a 5:3:2 combination of all the three species; mixed sex Nile tilapia, African catfish and African carp, respectively. Representative fish samples of 30 per species per cage were taken during stocking and biweekly thereafter and measured for weight using a standard digital weighing scale (model Kern 572), total length using a standard measuring board while water quality parameters were measured using HANNA Multiprobe meter. Length-Weight (L-W) relationship were calculated using the equation \( W = aL^b \) while condition factors using \( K = 100W/L^b \). Growth parameters were tested using One way ANOVA, \( p<0.05 \) and Tukey’s Honest Post hoc test used to separate the means. The results revealed that there were no significant differences (\( p>0.05 \)) in the growth rates, and final weight of juvenile mixed sex Nile tilapia when mono-cultured and poly-cultured. However, there were significant differences in the survival rates (\( p<0.05 \)). The final weight (g) achieved were 32.59±8.75, 36.58±7.29, 34.16±7.73 and 32.02±9.00, respectively. The mean weight gain (g) for mixed sex Nile tilapia monocultured, polycultured with African carp, polycultured with African catfish and polycultured with the two in cages were 25.07±0.62, 29.86±3.04, 25.91±4.98 and 25.05±2.23, respectively. The survival rates were 72.5±7.2%, 61.7±2.5%, 42.3±4.5% and 48.7±5.5%, respectively. All the mixed sex Nile tilapia treatments showed isometric growth, with regression slope/weight at unit length (b) values ranging between 2.73 and 3.0. The condition factors for the treatments were all above 1 but there were significant differences between them (ANOVA, \( p<0.05 \)). The water quality parameters monitored throughout the culture period had no significant variations that would adversely affect growth rate of fish. Mixed sex Nile tilapia cultured with the African carp showed a relatively higher potential for higher productivity with a relatively higher growth.
rate, isometric growth, high condition factor and relatively higher survival rates. African catfish treatments were generally characterized by high levels of predation.

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<th>Abbreviation</th>
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<tbody>
<tr>
<td>CRD</td>
<td>Completely Randomized Design</td>
</tr>
<tr>
<td>DWG</td>
<td>Daily Weight Gain</td>
</tr>
<tr>
<td>ESP</td>
<td>Economic Stimulus Program</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organization</td>
</tr>
<tr>
<td>FFEP</td>
<td>Fish Farming Enterprise Productivity Program</td>
</tr>
<tr>
<td>HIV/Aids</td>
<td>Human Immuno Deficiency Virus-Acquired Immuno Deficiency Syndrome</td>
</tr>
<tr>
<td>KMFRI</td>
<td>Kenya Marine and Fisheries Research Institute</td>
</tr>
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<td>LIFDC</td>
<td>Low Income Food Deficit Countries</td>
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<td>SDG</td>
<td>Sustainable Development Goals</td>
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<td>MT</td>
<td>17 α-MethylTestosterone</td>
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<tr>
<td>MWG</td>
<td>Mean Weight Gain</td>
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<td>NARDTC</td>
<td>National Aquaculture Research Development and Training Centre</td>
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<tr>
<td>PD/CRSP</td>
<td>Pond Dynamics Collaborative Research Support Program</td>
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<tr>
<td>PWG</td>
<td>Percentage Weight Gain</td>
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<td>Specific Growth Rate</td>
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<td>Survival Rate</td>
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