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INFLUENCE OF WATER QUALITY IN SEMI-INTENSIVE PRODUCTION SYSTEMS ON NILE TILAPIA PRODUCTION IN SOROTI DISTRICT

BY

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A DISSERATTION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF A BACHELORS DEGREE IN ANIMAL PRODUCTION AND MANAGEMENT IN THE FACULTY OF AGRICULTURE AND ANIMAL SCIENCES OF BUSITEMA UNIVERSITY

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DECLARATION

I **MERCY CHRISTINE**, declare that this dissertation is a compilation of what I did, together with contributions from other authors which made it a reality. And has never been submitted to any higher institution of learning in partial or whole in regard to any academic qualification.

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DEDICATION

This research work is dedicated to my mother Mrs. Munduru Mary, Aunties Sinia Pamela, Lucy, sisters and friends for all your unfailing support towards my education.

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To God be the glory alone.

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LIST OF ABBREVIATIONS

DO.....Dissolved oxygen

N.....Nitrogen

NO_3.....Nitrate

pH.....Hydrogen potential

mg/L .....milligrams per liter

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ABSTRACT

The study was conducted to determine the levels of water parameters (temperature, pH ,dissolved oxygen, nitrate and chlorophyll a) and their effect on Nile tilapia productivity in earthen ponds. All ponds were sampled once, recording of water quality parameters and weight of fish was done ranging from 3 to 7 times. Most ponds were poorly maintained with a lot of vegetative growth and organic matter which led to such observations in the parameters. Mean pH was weakly alkaline ranging from 7.1 to 7.8; mean temperature ranged from 22.9 (pond 1) to 28.1 (pond 4); least DO concentration was 0.78 mg/L (pond 2) and highest was 8.07 mg/L (pond 5); concentrations of chlorophyll a were generally low, ranging from 0 mg/L (pond 6) to 0.007 mg/L (pond 3); nitrate ranged from 0.06 to 0.13 mg/L. The weight of fish ranged from as low as 8.3g to 429g. Most parameters showed no significant effect on weight of fish apart from chlorophyll a ($p<0.05$) but there was a significant variation of water quality parameters among ponds (one way ANOVA).In recommendation, Nile tilapia is a warm water species thus siting of fish ponds in swamps detrimentally affects its productivity as swamps have cold environments as fish growth depends on its immediate environment.

CHAPTER ONE: INTRODUCTION

1.1: Background

Tilapia is a fresh water species with the highest culture worldwide and in 2010, the world's total production was 3.49 million tons (Küçük, Karul, Yildirim, & Gamsiz, 2013).Nile tilapia, *Oreochromis niloticus*, production has been significantly increasing all over the world and is now considered as one of the most productive and internationally traded food fish in the world (Abu, Siddik, Nahar, Ahamed, & Hossain, 2014).

Tilapias are a tolerant (hardy) species produced by several culture methods under a wide range of environmental conditions (Kolding, Haug, & Stefansson, 2008).Though they are a tropical and subtropical species of fish, tilapia have been cultured in temperate sites using geothermal water, greenhouses, and other means of providing warm water during winter (Boyd, 2004). Good growth and prolific breeding have certainly favored the large tilapia culture (Kuri & Sarker, 2012).From the standpoint of reproduction, they breed freely in captivity without the need for hormonal induction of spawning (Watanabe, Losordo, Fitzsimmons, & Hanley, 2002), however too early maturation and high mortality under crowded conditions have constrained Nile tilapia production (Migiro, Ochieng, & Munguti, 2014).

The critical parameters for fish culture are temperature, suspended solids and concentrations of dissolved oxygen, ammonia, nitrite, carbon dioxide and alkalinity (Kane, Qarri, Lazo, & Bekteshi, n.d.). However, dissolved oxygen is the most important and critical parameter, requiring continuous monitoring in aquaculture production systems because it plays a distinctive role in fish aerobic metabolism (Yovita John Mallya, 2013).The productivity depends on these physic-chemical characteristics of the water body (Keremah, Davies, & Abezi, 2014).According to Kunlasak *et al.*, 2013,water quality parameters influence growth and survival rates as well as reproduction and likelihood of disease infection.

Semi-intensive (earthen ponds) culture system is the most common practiced production system of growing tilapia worldwide characterized by high stocking densities and heavy use of commercial feeds and fertilization (Elnady, Alkobaby, Salem, & Asran, 2010). As fish waste and

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