

**FACULTY OF ENGINEERING
DEPARTMENT OF AGRICULTURAL MECHANIZATION AND
IRRIGATION ENGINEERING**

**DESIGN AND FABRICATION OF EQUIPMENT FOR
TREATMENT OF NEMATODES-INFECTED PLANTING
MATERIALS.**

BY

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**Final Project Report Submitted In Partial Fulfilment for the Award of
Bachelor Degree in Agricultural Mechanization and Irrigation Engineering,**

Busitema University

MAY, 2017

ABSTRACT

Among the many challenges faced in crop production, pests are a very significant menace that terribly inhibit the growth and yield potential of plants. Nematodes are among the very catastrophic crops with over 2000 host plants that are susceptible to their attack and destruction.

Hot water treatment technology was developed based on the principle of the behaviour and relationship of the different living organisms with changes in temperature. Research discovered that nematodes when exposed to certain temperature ranges for specific durations, can be killed. Since these nematodes are embedded in the planting stock of the affected plants, care should be taken not to have the planting materials succumb to termination by heat injury.

In this study, a prototype was designed and fabricated to avail a setup to treat planting materials that have been affected by nematodes. Engineering drawing software were used to design the prototype and then the prototype was fabricated in adherence to the drawings. The design was based on the size of the planting materials and the volume of water required in the treatment process.

The prototype was technically and economically evaluated and it was found to have an operational capacity of 7.2kgs/hr and NPV of U.shs27, 511,820.

ACKNOWLEDGEMENT.

I want with utmost humility, to thank the almighty God for enabling me to carry out this study and to press on successfully to the very end.

I also want to thank my supervisors Prof. OCHWOH AKANGAH and Ms. ABBO JACQUELINE, for their continued support, and direction during this study which enabled me to sail through.

I also thank my friends Julius, Eve and Stewart for their endless support they offered to me during the undertaking of the study.

DEDICATION.

I dedicate this report to my family members; my parents Mr. ABRAHAM MOSES MAIRAH and Mrs. RACHEL MAIRAH, my sisters BECKY, FAITH and REDEMPTOR, and finally my brother CALEB, all together for being the reason as to why I have made it this far. May God bless you abundantly, Amen.

DECLARATION

I **MAIRAH ENOCH**, declare that the work in this report is my own except where indicated with reference within the text and that it has never been submitted before to any university or

Institution of higher learning for the award of Degree in Agricultural Mechanisation and Irrigation Engineering, AMI. I therefore take full responsibility over it.

Student's signature:

Date:

APPROVAL

This final year project report has been submitted for examination with approval from the following supervisors:

Prof. OCHWOH AKANGAH

Signature

Date.....

Ms. JACQUELINE ABBO

Signature.....

Date.....

LIST OF ACRONYMS.

CIDev - Center for Intergrated Development.

IITA - International Institute For Tropical Agriculture.

INED – Integrated Environmental Defence.

U.S EPA – United States Environment Protection Agency.

MATF - Maendeleo Agricultural Technology Fund.

FAO - Food and Agriculture Organization.

RPD - Report on Pests and Diseases

IDE - Integrated Development Environment

IC - Integrated Circuit.

Kgs – Kilograms

UBOS – Uganda Buearal of Statistics.

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CHAPTER ONE: INTRODUCTION

Preamble

This chapter describes the background information of the project, the problem statement, significance, purpose, objectives and scope of the study. The problem statement describes the research problem and identifies potential causes and a solution. The Justification describes the importance of the project. The specific objectives presented will achieve the main objective.

1.1 Background

Among the main challenges to agriculture in Uganda and the world as a whole, are pests. Pests significantly reduce the yield potential of the agricultural sector in Uganda during any growth cycle of crops.

Nematodes are among the main pests that affect the growth and yield of many crops negatively. Nematodes are non-segmented, bilaterally symmetric worm-like invertebrates that possess a body cavity and a complete digestive system but lack respiratory and circulatory systems (*Chitwood, 2002*). Nematodes are common economic pests of agricultural crops in the world; they cause huge yield losses globally. Plant parasitic nematodes cause annual losses estimated at U.S dollars 25 billion worldwide (*Chitwood, 2003*). Most crops are susceptible to nematodes. Total crop failures frequently occur when crops are planted in areas with high nematode population levels (*Noling, 2012*).

The methods for control of nematodes in plants are mainly sub-divided into chemical and non-chemical methods. The non-chemical methods include; soil solarization, burning stubble after harvest, flooding the infected garden, crop rotation, use of resistant plant varieties and hot water treatment of plant propagation materials.

The hot water treatment technology is conducted by submerging the commodity in a heated water bath at a constant temperature range for a specified time, consistent with the thermal death point of the targeted pest, yet within the thermal tolerance of the commodity. By doing so, both disinfection and product quality can be achieved. (*U.S EPA, 1996*)

The rapid heat transfer of water allows large amounts of the planting material to reach uniform temperature when submerged .temperature durations combinations vary for different planting materials, targeted pests and life stages of the pests. (*U.S EPA, 1996*)

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