BUSITEMA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF AGRICULTURAL MECHANIZATION AND IRRIGATION ENGINEERING

DESIGN AND CONSTRUCTION OF A MANUALLY AND ENGINE POWERED CASSAVA CHIPPING MACHINE

BY

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DECLARATION

I **Taban Moses** do declare that this project content is my original work and has never been produced in a part or whole for any award in any university, college or institution of learning.

Signature.....Date.....26th/05/2011

APPROVAL

This project report was presented for approval and was satisfied by my supervisors

Main Supervisor: **Eng. Odogola Wilfred. R**

Signature.....Date.....6/06/2011

Co-supervisor: **Mr. Okirya Martin**

Signature.....Date.....28/06/2011

DEDICATION

I dedicate this final year project to my late uncle Mr.Lobia Simon, my beloved mother and father, for the financial, material support and guidance they gave me throughout my life. . I am very grateful and proud of you, because without you I would not have reached these far.

May the loving Lord reward you abundantly

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ABSTRACT

Cassava *manihot esculentus*, is one of the important crop grown in most parts of Uganda. They are rich sources of carbohydrates and can be grown in poor soils. The crop today in Uganda receives a major boost due to the joint efforts of Ugandan government and has led to drastic increase of cassava production in the country.

The predominantly manual cassava processing methods currently used in the country is tedious and time consuming. Where mechanical efforts exist, these are inappropriate to local needs and are often unaffordable by smallholder farmers.

As the main subject of this study, there is need to develop technologies that meet farmers' demands through reduction in post-harvest losses and expose the crop to vibrant markets through its numerous industrial uses.

To address the challenge, the researchers carried out a review of relevant literature related to various uses of cassava in Uganda, common varieties grown, a cassava processing methods, in particular the traditional and improved methods of cassava processing currently in use in the country. Based on these findings, the researcher developed design criteria for the different components of the targeted machine, selected appropriate materials for the components.

Specific calculation were made so as to arrive at the different components at included; the frame, hopper , pulleys, chipping frame and disc, shaft belt and bearing selection and pulley. After fabricating the machine, limited on-station and field testes using farmers in the neighborhood farmers to evaluate the performance of the prototype machine.

The capacity of the machine is then determined from the tests carried out. Machine capacity is 174kg/hr and .the sizes of chips ranged between 5-10mm diameters.

The developed machine can improve crop and labor productivity and boost farmers' income while releasing valuable time for other activities. The machine is efficient and can be adapted for use in Uganda. The technology should be utilized by a group of small scale farmers to boost cassava production and rural development

LIST OF ACRONYMS

NARO.....National Agriculture Research Organization

FAO.....Food Agriculture Organization

IITA..... International Institute of Tropical Agriculture

AEATREC.....Agricultural engineering and Appropriate Technology Research Centre.

LIST OF FIGURES

LIST OF TABLES

TABLE OF CONTENTS

CHAPTER ONE

1.1 OVERVIEW

This chapter briefly discusses the historical background of cassava as a crop, its production and spread worldwide and in Uganda; details the problems particularly related to the handling and processing of the crop, and provides justification of the study to develop a motorized/manually operated chipping machine which is to address farmers' and market needs.

1.2 Background

Cassava Manihot Esculentus, originated in Brazil and Paraguay. Today it has been given the status of a cultigen with no wild forms of this species being known (Stephen K. O'Hair et al1995)

It can grow in areas where other crops cannot grow because it is very drought resistant, water efficient and exceptionally tolerant to high soil acidity and low levels of phosphorus (Howeler et al., 2004). Cassava production in Asia increased from 51.6 million tonnes in 1993 to 55.5 million tonnes in 2003.

In 2003, 54% of cassava in the world was produced in Africa with Nigeria as the leading producer of cassava, 29 % in Asia and 14% in Latin America, (FAOSTAT, 2004).

Cassava is Africa's second most important food staple, after maize, and it is believed to have been grown in South Africa before spreading to other countries in Africa,(Rehm and Espig, 1991).In some countries, cassava is consumed daily and sometimes more than sonce a day. It is adapted to zone within latitudes 30° north and south of the equator, at elevations up to 2000 meters above sea level, in temperatures ranging from 18°C to 25°C, and rainfall of 50 to 5000mm annually, and to poor soils with a PH from 4 to 9 (Nweke, 2006).

Traditionally cassava roots are processed by a variety of methods to form many different products used in diverse ways according to local customs and preference to provide the carbohydrate part of diet. Processing cassava reduces food losses and stabilizes seasonal fluctuation in supply of the crop.Cassava is among the high priority commodity crops grown in the Eastern and northern parts of Uganda. According to records by the National Agricultural Research Organization (NARO), the crop was introduced to Uganda through Tanzania by Arab

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