



**BUSITEMA
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Pursuing Excellence

**FACULTY OF ENGINEERING
DEPARTMENT OF AGRO-PROCESSING ENGINEERING**

FINAL YEAR PROJECT REPORT



**DESIGN AND CONSTRUCTION OF A
MANUALLY OPERATED CASSAVA PEELING
MACHINE**

By

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APPROVAL

This project report is submitted to Faculty of Engineering for examination with approval from the following supervisors:

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DECLARATION

I NAKASEETA LYDIA declare that it has been from my own efforts, knowledge and research to come up with such a project report which has never been submitted before at University level for any academic award.

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DEDICATION

I dedicate this report to my beloved mother, the best woman I've ever seen. This is to appreciate your support towards my education but especially my future. May the Almighty God bless and reward you abundantly.

ABSTRACT

The recent transfiguration of cassava from a low profile into an industrial raw material, have resulted in a serious surge in the demand for cassava and cassava-based products locally and the world over. Cassava (*Manihot esculenta* Crantz), is one of the most important energy sources in the human diet. It is an important staple food and cash crop that thrive where most other crops fail commonly grown in tropical countries. Cassava is utilized extensively for human and livestock consumption as well as a raw material for both industrial and pharmaceutical products. Cassava is mostly used in processed form thus only a small quantity is consumed directly. Cassava processing is labor-intensive thus requires mechanization in order to meet the rising demand for cassava products. One major bottleneck in cassava processing has been cassava peeling, hence the objective of this study to develop a simpler and affordable cassava peeling machine to quicken the process.

The study goes through the step by step procedures which led to the achievement of the intended main and specific objectives. The designed cassava peeling machine comprised of inner and outer drums, the frame and a cranking handle for operational mechanism. This machine was designed, fabricated and tested to examine its performance. The peeling machine is essential in production of a number of products such as; cassava flour, cassava chips and pellets but basically in cassava starch-based production. It may also be used for peeling other root tubers like yams. The results of this study were discussed and it was found that the machine works moderately effective compared to existing manual peeling.

Finally, conclusions and recommendations were drawn from the discussed results got. This work is intended to help solve some of the problems hindering a successful design and fabrication of a cassava peeling machine. It is believed that the machine has a positive impact on food quality and security as well as on economic empowerment of the rural cassava processors in Uganda where cassava starch-based products are becoming increasingly important.

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May the good Lord bless and reward you all abundantly.

ACRONYMS

Nase	-	Namulonge Serere selection
NARO	-	National Agricultural Research Organisation
IJET	-	International Journal of Engineering Technology
JAET	-	Journal of Agricultural Engineering Technology
FAO	-	Food and Agriculture Organization
MAAIF	-	Ministry of Agriculture Animal Industry and Fisheries
HP	-	Horse Power
Rpm	-	Revolutions per minute
CAD	-	Computer Aided Drawing

TABLE OF CONTENTS

APPROVAL.....	i
DECLARATION.....	ii
DEDICATION.....	iii
ABSTRACT.....	iv
ACKNOWLEDGEMENTS.....	v
ACRONYMS.....	vi
LIST OF FIGURES.....	ix
LIST OF TABLES.....	x
CHAPTER ONE.....	1
1. INTRODUCTION.....	1
1.1 Background of the study.....	1
1.2 Problem statement.....	2
1.3 Justification.....	2
1.4 Purpose of the study.....	3
1.5 Objective of the study.....	3
1.5.1 Main objective.....	3
1.5.2 Specific objectives.....	3
1.6 Scope of study.....	3
CHAPTER TWO.....	4
2. LITERATURE REVIEW.....	4
2.1 Physical Properties of Cassava Tubers.....	4
2.2 Methods of Cassava Peeling and Related Machinery.....	5
2.2.1 Manual Method.....	5
2.2.2 Chemical Method.....	5
2.2.3 Mechanical Method.....	5
2.3 The economic advantage of this cassava peeler in relation to other existing peelers.....	9

CHAPTER THREE	10
3. METHODOLOGY	10
3.1 Identification of the functions of the Cassava Peeling Machine.....	10
3.2 Design considerations	10
3.3 Conceptualization of the Cassava Peeling Machine	11
3.3.1 Conceptual Model.....	11
3.3.2 Functions of the machine components	11
3.3.3 Mechanism of Operation of a cassava peeling Machine	12
3.4 Preliminary and detailed Design of the Components.....	12
3.4.1 Peeling Drum.....	13
3.4.2 The shaft.....	17
3.4.3 The cranking handle.....	21
3.4.4 The frame/ support stands.....	22
3.5 Selection of Materials for the Different Components.....	23
3.6 Fabrication and assembling of the Prototype	24
3.7 Testing of the machine	25
3.8 Economic Evaluation of the Prototype.....	26
CHAPTER FOUR	29
4. RESULTS AND DISCUSSIONS	29
CHAPTER FIVE	33
5. CONCLUSIONS AND RECOMMENDATIONS	33
5.1 CONCLUSIONS	33
5.2 RECOMMENDATIONS	33
REFERENCES	34
APPENDICES	36

LIST OF FIGURES

Fig (2-1): General view of a cross-section of cassava root tuber	4
Fig (2-2): Manual Peeling of Cassava	5
Fig (2-3): Abrasive peeling Drum	6
Fig (2-4): Experimental mechanical peeler	7
Fig (2-5): Outer cutting knives/edges	8
Fig (2-6): A pedal powered cassava peeler (AN NILE 2012).....	9
Fig (3-1): Components of the cassava peeler	11
Fig (3-2): Dimensions of the peeling drum	13
Fig (3-3): The outer drum	14
Fig (3-4): The inner drum.....	15

LIST OF TABLES

Table 1: Dimensioning of different components	12
Table 2: Material selection criteria	23
Table 3: Fabrication processes and tools used	24
Table 4: Costing of the machine and calculation of the payback period	27
Table 5: Calculation of the payback period	28
Table 6: Dimensions	29
Table 7: Fabrication of the machine components	30
Table 8: Results for testing of the machine	31

CHAPTER ONE

1. INTRODUCTION

This chapter presents the general background to the study, clearly identifies the problem of interest for the intended study, objectives of the study, and also provides the intended scope of the study.

1.1 Background of the study

Cassava (*Manihot esculenta* Crantz) is one of the most common economic and productive root-crops grown in tropical countries. Cassava is normally considered as a staple food, cash crop, industrial and pharmaceutical raw material and livestock feed (Kordylas, 2002). Cassava is one of the most drought-tolerant crops capable of growing on marginal soils (Odigboh, 1983). Uganda is one of the top producers of cassava in Africa. Uganda's annual cassava production is 5.5 million tonnes, grown on an estimated 500,000 hectares (New vision of 17th May 2012, Article by Kalyango Ronald), and that it is the second most important staple food after bananas. In Uganda, the districts that are leading producers of cassava include; Lira, Apac, Gulu, Arua, Nebbi, Soroti, Kumi, Tororo and Iganga. There are various varieties of cassava grown which include; Nase 1, Nase 2, Nase 3, Nase 4, Nase 10, Nase 12. In Uganda, Nase 3 (locally known as Migyera) is the most adopted variety. (Abele *et al.* 2005) This is due to its being high yielding and disease (mosaic) resistant. The Agricultural ministry's roadmap on cassava; to develop product market, that enhance establishment of medium and large scale industries for full commercialisation of the cassava.

Cassava production in Uganda is largely known for subsistence with 60% going to consumption and 40% to markets. (FAO 2010) The products from cassava tuber processing include; Cassava flour, Cassava chips, Cassava breakfast/snack flakes, Starch, Glue, Ethanol, Cassava leaves, Fresh roots and Cassava as an ingredient in Animal feeds. As the Agricultural ministry (MAAIF) struggles to commercialize cassava production, there is need to first eliminate the existing challenges in cassava processing. Peeling is the most important step in cassava processing as it determines the quantity and quality of the product to be obtained and therefore effective techniques must be adopted for high quality products. Cassava has poor protein content (1% fresh root weight) and contains cyanogenic glucosides that may cause intoxication. Thus peeling helps to overcoming these negative aspects of cassava. The cyanogens in cassava are hydrolyzed into volatile

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