

**FACULTY OF ENGINEERING
DEPARTMENT OF AGROPROCESSING
ENGINEERING**

**DESIGN AND CONSTRUCTION OF A MANUALLY
OPERATED JACK FRUIT PULPING MACHINE FOR
SMALL SCALE PROCESSORS**

BY

ARINDA GANAF A

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Email: alindagnfa@gmail.com



MAIN SUPERVISOR: Ms. KABASA SALLY

CO – SUPERVISOR: Mr. OKIRYA MARTIN

**A PROJECT REPORT SUBMITTED IN PARTIAL
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DECLARATION

I ARINDA GANAFa declare to the best of my knowledge that the work presented in this project report is as a result of my own research and effort and has never been presented or submitted to any institution or university for any academic award.

SIGNATURE *Arinda*

DATE 20.06.2014



APPROVAL

This project report has been submitted to the department of Agro processing engineering for examination with approval from the following supervisors:

1st supervisor

Ms. KABASA SALLY

SIGNATURE

DATE

2nd supervisor

Mr. OKIRYA MARTIN

SIGNATURE

DATE

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I am so grateful to the Almighty God who has seen me through the years and who by His grace I have kept shining.

I extend my gratitude to all my Lecturers at the Faculty of Engineering, Department of Agroprocessing Engineering, who have equipped me with academic knowledge that has guided me in a bid to come up with this report. Special thanks go to Ms. Kabasa Mary Sally and Mr. Okirya Martin whose directions and guidance have enabled me to successfully compile the material herein.

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Finally, special thanks go to Mr. Kasumba Andrew for the academic assistance and time offered during my stay at Busitema University.

DEDICATION

I dedicate this report to my dear parents Mr. and Mrs. Ganafa William, for the love, care, support, encouragement, and belief in me that has got me this far.

LIST OF FIGURES

Figure 2.1: The mortar and pestle	6
Figure 2.2: The basket press	7
Figure 2.3: The roller press	8
Figure 2.4: The mincing pulping machine	8
Figure 2.5: The centrifugal pulping machine	9
Figure 3. 1: the screw press.....	15
Figure 3. 2: The cylinder	18
Figure 3. 3: The tray.....	19
Figure 3. 4: The machine frame.....	22
Figure 3. 5: The assembled pulping machine.....	26
Figure 4. 1: A graph of efficiency against input.....	30
Figure 4. 2: A graph of input against pulp out put.....	31

LIST OF TABLES

Table 2.0: Nutritional composition of jackfruit pulp.....	4
Table 3.0: Material selection for the pulping machine components.....	23
Table 3.1: Economic evaluation of the pulping machine.....	27
Table 3.2: Net present value (NPV) evaluation.....	28
Table 4.0 pulping results obtained from several tests.....	30

ABSTRACT

Today's consumers with busy lifestyles need development of value added products owing to the fruit's sticky sap exuded from the rinds, voluminous size, strong aroma and laborious preparation operations.

Marketing and consumption of jackfruit is done locally as whole-fruit on a large scale or minimally processed products whereby the fruit bulbs are separated from the whole-fruit and consumed fresh. Jack fruit processes include; slicing, pulping, drying and canning to help prolong their shelf life for preparation of value added products (Chowdhury *et al.*).

A manual pulping machine is thus required so as to extract pulp which is used in the making of jam; juice which is consumed is utilized as a soft drink (cocktail) when mixed with other fruit juices. In a day a minimum number of 10 jackfruits having a capacity of 20kg/hr can be worked on to produce a pulp efficiency of 65%.

The pulping machine can be used by all groups of people thus isn't gender sensitive and can be affordable to small scale processors.

This report contains chapter one which brings out the background on jackfruits, objectives of the study, the problem statement as well as its justification. Chapter two highlights the existing technologies available for pulping jackfruits and explains why the theories exist and their related constraints.

Chapter three explains the steps that enabled me achieve the objectives of the project and how they were evaluated. While chapter four entails the results obtained well discussed and chapter five contains conclusions and recommendations.

The scope of the project involved pulping jackfruit bulbs to extract both juice and pulp to be used in the production of value added products

The objective of the study was thus to design, construct, test and asses the economic evaluation of a manual jackfruit pulping machine.

TABLE OF CONTENTS

DECLARATION	i
APPROVAL	ii
ACKNOWLEDGEMENT.....	iii
DEDICATION.....	iv
LIST OF TABLES.....	vi
ABSTRACT	vii
CHAPTER ONE	1
1. Introduction.....	1
1.1 Background of the study	1
1.2 Problem statement.....	2
1.3 Purpose of the study.....	2
1.4 Objectives of the study.....	3
1.4.1 Main objective	3
1.4.2 Specific objectives	3
1.5 Justification.....	3
1.6 Scope of the study.....	3
CHAPTER TWO	4
LITERATURE REVIEW.....	4
2. Introduction.....	4
2.1 Characteristics of jack fruit (<i>Artocarpus heterophyllus</i> L.).....	4
2.2 Importance of pulping in jack fruit processing.....	5
2.2.1 Selection of fruits for pulping.....	5
2.2.2 Precautions to be taken during jackfruit processing	5
2.3 Jack fruit pulping machines.....	6
2.3.1 The mortar and pestle.....	6
2.3.2 The Basket Press.....	7
2.3.3 The roller press	7
2.3.4 The Mincing pulping device.....	8
2.3.5 The centrifugal pulping machine	9
2.3.6 The Masticating pulping machine	9
CHAPTER THREE.....	10
METHODOLOGY.....	10
3. Introduction.....	10
3.1 Design Considerations	10
3.2 The mechanism of operation of the pulping machine.....	10

3.3	Design of the machine components	10
3.3.1	Design of the manual handle	10
3.4	Material Selection criteria	22
3.5	Fabrication procedure	24
3.5.1	<i>The pulping drum</i>	24
3.5.2	<i>The Machine frame</i>	24
3.5.3	<i>The screw press</i>	25
3.5.4	<i>The tray</i>	25
3.6	Assembly of the machine components.....	25
3.7	Testing of the jack fruit pulping machine	26
3.8	Economic analysis	27
CHAPTER FOUR.....		29
RESULTS AND DISCUSSIONS.....		29
4.0	Introduction.....	29
4.1	Design of the pulping machine components.....	29
4.2	Design of the bottom plate and cylinder.....	29
4.3	Design of the shaft.....	29
4.4	Design of the handle	29
4.5	Construction of the pulping machine	29
4.6	Testing of the machine	30
4.7	Cost benefit analysis.....	31
4.8	Discussions	31
CHAPTER FIVE		33
RECOMMENDATIONS AND CONCLUSION		33
5.0	Introduction.....	33
5.1	Recommendations	33
5.2	Conclusion	33
APPENDICES		35

CHAPTER ONE

INTRODUCTION

1. Introduction

This chapter gives the general information relevant to the research topic whilst clearly showing the problem of interest for the intended research. It also shows how the significance of the study is relevant to Agroprocessing engineering in Uganda. The study will help reduce the challenges encountered Jackfruit processing through the fulfilment of objectives and activities listed there in.

1.1 Background of the study

Jackfruit (*Artocarpus heterophyllus* L.) is a species of tree in the *Artocarpus* genus of the mulberry family (*Moraceae*). The tree is native to parts of South and Southeast Asia, and is believed to have originated in the southwestern rain forests of India,

The fruit is mainly categorized in two types that is; *Khuja* (green, pale green rinds, hard and smooth, with juicy pulp and small seeds) and the *Ghila* (rough, soft, with thin pulp, and large seeds). The *Khuja* type is considered for the production of juice and pulp because of its properties.

Production statistics of jackfruit in Uganda according to FIT (2007) reported fruit production in Uganda as often geared towards the domestic market and estimated per-capita/day consumption of fruits in Uganda was estimated at 29.4g.

In Uganda, jackfruit is a very common fruit in Eastern Uganda (within Busoga and the neighbouring regions) and in Central Uganda, particularly Mpigi (within Buganda and the surrounding areas). Marketing is usually done locally as whole-fruit on a large scale or minimally processed products whereby the fruit bulbs are separated from the whole-fruit and sold fresh as such.

The jackfruit consists of a combination of many volatile compounds that is; the esters and alcohols which contribute to its sweet and fruity aroma. However its strong aroma stands a challenge to many consumers.

The edible fruit bulbs of jackfruit are usually consumed raw or canned and no processing is done to preserve them so as to improve their shelf life. The pulping process helps extract juice (for cases where very ripe jackfruit is used) that can be prepared for cocktails and the

According to the economic evaluation, the machine was found to be affordable to the small scale processors.

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