



**BUSITEMA
UNIVERSITY**
Pursuing Excellence

FACULTY OF ENGINEERING

**DEPARTMENT OF AGRICULTURAL MECHANISATION AND IRRIGATION
ENGINEERING**

**DESIGN AND CONSTRUCTION OF A SMALL SCALE ENGINE POWERED
MILLET HARVESTER**

BY

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ABSTRACT

Finger millet (*Eleusine coracona*) is a cereal crop plant that belongs to the grass family which is grown in many countries of Africa and Asia. The millet is rich in polyphenols and particularly in calcium (Kidoido *et al.*, 2002). The crop is also processed into value added products like cookies or beer by the farmers themselves, or by processors at the local or national levels (Oduori 2005). Production of finger millet in Uganda is carried out on a small scale with farmers mainly growing traditional varieties (Mgonja, *et al* (2007)) and for subsistence purposes though it is second to maize as a major cereal crop and one of those whose demand is outstripping its supply hence calling for more production. Due to this fact, there is increase in labour demand especially during harvesting and on addition to that; the largest contribution comes from women (about 75% of the labour force according to FAO, 2000). The crop is harvested by hand, using locally fabricated blunt edged metal strips which results into drudgery, more time being spent in carrying out the operation and the operation coinciding with rains which leads to deterioration of the quality of the grains.

This project undertook the development of a small scale engine powered millet harvester with the aim of reducing on the drudgery and increasing timeliness of the harvesting operations. The main objective of the project was to design and construct a small scale engine powered millet harvester that meets the farmers' harvesting requirements. To achieve the above objective, basic engineering principles and the physical properties of millet were considered in the design of the various components of the harvester. Appropriate engineering drawings were produced using solid edge and AutoCAD and then the designed harvester was constructed at the Busitema University Work shop using the locally available materials (mainly mild steel) and common production technologies, including cutting, bending, welding, etc.

The field performance of the constructed harvester was determined by the field capacity, field efficiency and cutting efficiency. It was found out that the harvester has efficiency and actual capacity of up to 50.6% and 0.041ha/hr respectively. Thus the use of the harvester demonstrated to have a very big role in reducing drudgery and making farming attractive; thereby improving crop production and mitigating the labor shortages experienced during harvesting which finally increases the annual saving of the small scale millet farmers in Uganda.

DECLARATION

I MAGANDA AZIZI declare to the best of my knowledge that this final year project report is as a result of my research and effort on the stated topic and it has never been presented or submitted to any university or institution of higher learning for the award of a Bachelor's Degree in Agricultural Mechanization and Irrigation Engineering.

SIGNATURE.....

DATE.....

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DEDICATION

In the first place, special dedication goes to my dear parents Mr. and Mrs. Maganda for the support rendered financially and spiritually. It would be so unfair if I left out my dear sisters Namuli Shamim, Shaakirah and Zakiyyah whose continuous encouragement and guidance have enabled me go through this process. I pray that Allah grants them good for their efforts.

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APPROVAL

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

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CONTENTS

ABSTRACT.....	i
DECLARATION	ii
ACKNOWLEDGEMENT	iii
DEDICATION	iv
APPROVAL	v
LIST OF FIGURES	ix
LIST OF TABLES.....	ix
1.0 INTRODUCTION	1
1.1 Background	1
1.2 Problem statement.....	2
1.3 Purpose of the study	2
1.4 Objectives of the Project	2
1.4.1 Main objective	2
1.4.2 Specific objectives	2
1.5 Scope of the Project.....	3
1.6 Justification	3
2.0 LITERATURE REVIEW	4
2.1 Introduction	4
2.2 The millet crop	4
2.2.1 Categories of finger millet	5
2.2.2 Economic importance of millet in Uganda	5
2.2.3 Nutritional benefits	6
2.2.4 Millet production	7
2.2.5 Cultivation practices of finger millet	7
2.2.6 Physical properties/features of the millet crop.....	8
2.3 Harvesting of millet.....	8
2.3.1 Analysis of the available methods of harvesting millet	9
2.3.2 Mechanized harvesting;	11
2.4 Main components of a millet harvesting equipment	15

2.5	Fabrication methods commonly used in engineering.....	16
2.6	Performance of harvesters.....	19
2.7	Economic evaluation of harvesters	22
2.7.1	Payback period method.....	22
2.7.2	The average return rate method (ARR)	22
2.7.3	The net present value (NPV).....	23
3.0	METHODOLOGY	24
3.1	Design considerations for the harvester	24
3.2	Physical properties of the millet at maturity	24
3.3	Design of the different components of harvester	24
3.3.1	Description of the machine	24
3.3.2	Design of the cutter bar.....	25
3.3.3	The cutting force required for direct cutting of millet	25
3.3.4	The power requirement for cutting	26
3.3.5	The slider-crank mechanism.....	26
3.3.6	Design of the frame.....	27
3.3.7	Design of the wheels.....	28
3.3.8	Design of the drive wheels shaft.....	30
3.3.9	The pulley and the transmission system	32
3.3.10	Bevel gear selection for the gear box.....	35
3.3.11	Selection of the bearings.....	35
3.3.12	Design of the reel	36
3.3.13	Design of the container	36
3.4	Fabrication of the harvester.....	37
3.4.1	Fabrication of the frame.....	37
3.4.2	Fabrication of the cutter bars	38
3.4.3	Fabrication of the reel	38
3.4.4	The crank	39
3.4.5	The collecting container.....	40
3.4.6	Fabrication of the wheels	40

3.5	Assembly of the various components.....	41
3.6	Performance evaluation of the harvester	41
4.0	RESULTS AND DISCUSSIONS	42
4.1	Cutting efficiency.....	42
4.2	Theoretical field capacity.....	42
4.3	Field efficiency.....	43
4.4	Actual field capacity.....	43
4.5	Economic analysis and evaluation	43
4.5.1	Harvesting by hands.....	43
4.5.2	Harvesting by the machine.....	44
4.5.3	The payback method.....	45
5.0	CONCLUSION, CHALLENGES AND RECOMMENDATIONS	46
5.1	Conclusion.....	46
5.2	Challenges	46
5.3	Recommendations	47
	APPENICES	48
	Appendix A	48
	Appendix B	49
	Appendix C	50
	Appendix D.....	51
	Appendix E.....	52
	Appendix F.....	52
	REFERENCES	55

LIST OF FIGURES

Figure 2-1: Finger millet (a) before maturity (b) at maturity	4
Figure 2-2: (a) the sickle (b) harvesting of millet using a sickle	9
Figure 2-3: The scythe.....	10
Figure 2-4: The paddy reaper	13
Figure 2-5: Showing a lawn Mower	14
Figure 2-6: The riveting process (a) initial position (b) Final position.....	18
Figure 2-7: Screwed fasteners (source; Khurmi and Gupta, 2005)	19
Figure 3-1: Shows the slider-crank mechanism.....	26
Figure 3-2: Shows the forces on the wheel shaft.....	30
Figure 3-3: Shows the shear force and bending moment diagram of the wheel shaft	31
Figure 3-4: Shows the cutting blade dimensions	38
Figure 3-5: Shows the fabricated reel.....	39
Figure 3-6: Shows the crank.....	40

LIST OF TABLES

Table 2-1: Finger millet production and area harvested in East African countries, 2005	5
Table 3-1: Shows some of the physical properties of millet used in the design of the harvester ...	24
Table 3-2: Standard values of belt thickness and width	33
Table 3-3: Shows material selection based on the properties.....	37
Table 4-1: Shows cost incurred during harvesting by hand.....	44
Table 4-2: shows the cost incurred when harvesting using the machine	44
Table 4-3: Shows the overall cost of the machine.....	45

1.0 INTRODUCTION

1.1 Background

Finger millet (*Eleusine coracona*) is a cereal crop plant that belongs to the grass family which is grown in many countries of Africa and Asia. The crop grows to a height of 40-130, and takes a period of 2.5 to 6 months to mature. The millet is rich in polyphenols and particularly in calcium (Kidoido *et al.*, 2002). The crop is also processed into value added products like cookies or beer by the farmers themselves, or by processors at the local or national levels (Oduori 2005).

Production of finger millet in Uganda is carried out on a small scale with producers mainly growing traditional varieties (Mgonja, *et al* (2007)) and for subsistence purposes that is, farmers growing it mainly consider it as a staple crop. Despite the small scale production, the crop yield in Uganda is one of the highest among the millet producing countries. It is second to maize as a major cereal crop and is widely grown in northern region which contributes 40% of the national production, followed by the Eastern region with 21% (Tenywa *et al.*, 1999).

Currently, the demand for the crop is outstripping its supply which calls for more of it to be grown. Some of the constraints or challenges faced in the production of millet are; weeding, the small size of the seeds making them difficult to handle as well as the labour constraint especially during times of harvesting operation.

There is mainly family labour used in harvesting with women contributing about 75% of the labour force (FAO, 2000). The crop is harvested by hand, using locally fabricated blunt edged metal strips which results into drudgery, more time being spent in carrying out the operation and the operation coinciding with rains which leads to deterioration of the quality of the grains.

There is no much evidence shown concerning mechanized harvesting of millet. Though it is reported that combine harvesting of the crop is possible, it can only be carried out particularly for millet that has uniform height. Not only that, the screen to retain good millet seeds in a combine harvester should be much smaller as compared to that of rice and maize and even if so, the combine harvester cannot be afforded by the small scale farmers carrying out millet production.

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