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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APPROVAL

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

MR. ERIAU EMMANUEL

Signature……

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MR. IGGA HUZAIRU

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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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