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**FACULTY OF ENGINEERING**

**DEPARTMENT OF AGRICULTURAL MECHANISATION AND  
IRRIGATION ENGINEERING**

**(AMI)**

**DEVELOPMENT OF MULTIPURPOSE FOUR ROW ANIMAL  
DRAWN PLANTER FOR GROUNDNUTS**

**BY**

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## ABSTRACT

Groundnut is one of the important cash crops mostly grown in the north and eastern districts of Uganda. They are rich sources of proteins, edible oils and add nitrogen into the soil and can be grown in poor soils. In Uganda the production level was 160,000 metric tonnes per year in 2006. The small scale farmers are capable of growing 1 to 2.5 acres, under natural Ugandan climatic conditions, and yields of between 3 - 8 bags per acre of shelled Red Valencia and 6 - 12 bags per acre of Manipinta can be realized.

One of the major challenges in groundnuts production at smallholder level in Uganda is the lack of an implement which ensures precision in row planting, saves time and reduces drudgery in planting. The current traditional methods for planting groundnuts are labour intensive and time consuming, estimated to take approximately 25 to 30 man days to plant an acre. In a bid to improving yields and ease weeding and harvesting operations, small scale farmers have massively responded to planting groundnuts in rows from traditional methods, however these operations are still manual.

The groundnuts crop play a big role in the economy of Uganda and a number of traditional varieties such as Masoga, Tatu, Bukene, and improved varieties such as Red beauty, SERENUT, IGOLA are commonly grown in Uganda and planting season vary according to the region. The groundnut do best in deep, well drained sandy, sandy loam or loamy sand soils below an altitude of 1500m above sea level. Groundnut seeds are sown at a depth of 5-6 cm. Research results have shown that a spacing of 45 cm x 10 cm gives better yields in Uganda than 60 cm x 10 cm for most of varieties except IGOLA 1 and SERENUT II varieties which are spaced at 45cm x 15cm.

The methods used in planting ground nuts in Uganda include both traditional such as broadcasting, and improved methods which involve use of new technologies developed by use of tractor operated planters, ox-drawn planters and some improved hand operated planter such as jab planter.

The main objective of this project is to develop a four row animal drawn planter for groundnut crops that meets farmers' planting requirements. In achieving the above objective, the researchers has carried out necessary assumptions and calculations needed considering the basic engineering principles and some physical properties of groundnuts such as, size, density and weight of the grains, to design the various components of groundnut planter which has parts such main frame, seed hopper, metering mechanism assembly, furrow opener assembly and furrow coverer. The research has fabricated the designed parts assembled them following recommended procedures and methods, and then carried out evaluation of the working efficiency, and performance of the proto-type through on station testing which will be followed by field testing.

## **DEDICATION**

This project report is dedicated to my dear parents, Karim Abdul, late Jalia Nakabuye, my brother and two sisters who have devoted their valuable time and finances along the line of studies for me to reach this far. I also give regard to Mr. Kirumira Hussein of Katwe Noor Secondary School for all that he has given in both financially and morally. Above all, may the almighty God bless and reward you accordingly

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May the almighty God keep and reward you accordingly.



**APPROVAL**

This project was compiled and submitted to the department of Agricultural Mechanisation and Irrigation Engineering under the supervision as approved below.

Supervisors:

1. Main supervisor

Mr Otim Daniel Signature..... Date.....

2. Co-supervisor

Mr. Mugisha Moses Signature..... Date.....

## LIST OF ABBREVIATIONS

<b>AEATREC</b>	-	Agricultural Engineering and Appropriate Technology Research centre
<b>DAP</b>	-	Draft Animal Power
<b>FAO</b>	-	Food and Agricultural Organisation
<b>HET</b>	-	Hand Tool Technology
<b>ICRISAT</b>	-	International Crop Research Institute for the SemiArid Tropics
<b>NARO</b>	-	National Agricultural Research Organisation
<b>SAARI</b>	-	Serere Agriculture and Animal Research Institute
<b>SIAMMCO</b>	-	Serere Industry and Manufacturing Metal Company
<b>UBOS</b>	-	Uganda Bureau of Statistics

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## CHAPTER ONE

### DESIGN AND CONSTRUCTION OF A MULTIPURPOSE FOUR ROW ANIMAL DRAWN GROUNDNUTS PLANTER.

#### INTRODUCTION.

This chapter briefly gives the general information relevant to the study (Design and construction of an animal drawn combined groundnuts planter) whilst clearly showing the problem of interest for the intended study. It as well shows how this study will help reduce the problem through the fulfillment of a number of objectives and also the scope of the study.

#### BACKGROUND.

Groundnut (*Arachis hypogea* L.), also known as peanut, is the second most important legume after beans (*Phaseolus vulgaris* L.) in Uganda. The traditional groundnut varieties are of the red Valencia type, but of a very mixed nature ranging from large seeded manyema group e.g. Roxo to small seeded group e.g. Red Beauty. zinc, iron, riboflavin, thiamine and potassium (Savage and Keenan, 1994). A pound of groundnuts is high in food energy and provides approximately the same energy value as 2 pounds of beef, 1.5 pounds of Cheddar cheese, 9 pints of milk, or 36 medium-size eggs (Woodroof, 1983). Groundnut is consumed raw, roasted, blanched, as peanut butter, crushed and mixed with traditional dishes as a sauce or as binyebwa, a cooked paste. Groundnut is an excellent source of oil for cooking and groundnut cake and haulms (straw, stems) are commonly used as animal feed. Groundnuts thrive under low rainfall and as a legume; groundnuts improve soil fertility by fixing nitrogen. Therefore, the crop generally requires few inputs, making it appropriate for cultivation in low-input agriculture by smallholding farmers (Smartt, 1994). As a cash crop, it gives relatively high returns for limited land area and is well adapted to the hot, semi-arid conditions of Uganda. These multiple uses of groundnut make it an excellent cash crop for domestic markets as well as for foreign trade. The returns for groundnuts greatly surpass those reported for soybeans and are less uncertain than those of sunflower (Laker-Ojok, 1996). A number of factors contribute to this. First, the area planted in groundnut far exceeds that of soybeans and sunflower. This increases the potential for large scale national benefits. Secondly, the markets for groundnuts are better established. Groundnuts are highly valued on the domestic market and its export market has been flourishing in recent years. Uganda can therefore save a lot of foreign exchange from the imports of sunflower and soybean vegetable oils if it can turn to wide scale oil extraction from groundnuts. Currently, vegetable oil extraction is mainly from sunflower yet groundnut is the most established oil crop and its production is continually increasing at a rate higher than all the other oil crops (sunflower, soybean and sesame).

Planting of groundnuts in most parts of Uganda is done manually and the seeds are planted in a well cultivated piece of land well tilled. Groundnut seeds are planted in numbers of 3 or 2 seeds per hole and they yield better when row planted. However groundnuts growing have been readily affected by

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