



**FACULTY OF ENGINEERING**  
**DEPARTMENT OF AGRICULTURAL MECHANIZATION AND**  
**IRRIGATION ENGINEERING**

**DESIGN AND CONSTRUCTION OF AN ANIMAL-DRAWN**  
**BEAN PLANTER**

BY

**NABUNYA VICTO**

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Email: vinabsharon@gmail.com

Main Supervisor: Mr. OBETI GRISM LAWRENCE

Co-supervisor: Mr. MUGISHA MOSES



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I thank God Almighty for his never-ending love, grace, mercy and kindness He has showed me my entire life. All he glory and honor be unto Him.

Sincere thanks go to my supervisors, Mr. Mugisha Moses and Mr. Obeti Grism Lawrence for their guidance, advice, counseling and the knowledge they added to ensure that this research proposal is a success.

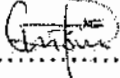
I dearly thank my parents for the financial support they offered and all my friends who contributed greatly to the success of this report.

May God bless you all abundantly.

## APPROVAL

This project report has been presented to the department of Agricultural Mechanization and Irrigation Engineering for examination with approval of my supervisors

Mr. Obeti Grism Lawrence

Signature.....

Date.....25/05/2016.....

Mr. Mugisha Moses


Signature.....

Date.....

## DECLARATION

I Nabunya Victo hereby declare that this project report is a true outcome of my original work and it has never been presented to any institute of higher learning for any academic award.

Nabunya Victo

Signature.....

Date..... 25/05/2016



## **ABSTRACT**

Beans are one of the most important crops grown in almost all parts of Uganda, and they are appreciated throughout the developing world because they have a long storage life, good nutritional properties and can be easily stored and prepared for eating. They are rich sources of proteins, add nitrogen into the soil and can be grown in poor soils.

This study was undertaken to design, fabricate and evaluate the performance of a prototype planter capable of planting common beans at predetermined spacing and depths. Seed metering device was designed to be interchangeable to allow for the different varieties of beans. It is aimed to enable the rural farmers to improve on yield productivity and quantity of their crops thus enhancing the country's food security status. The field tests included the determination of effective field capacity, intra-row spacing, number of seeds dropped and average depth of planting. Three seeds were dropped on average, and intra-row spacing of 16.5 cm was obtained indicating a deviation of 1.5 from the required spacing of 15cm, and an average depth of 3.5cm was obtained. The planter had an average field capacity of 0.285 acres/hr. and efficiency of 66.7%. It was recommended that only properly cleansed seeds be used with this planter. It was also able to adequately meet the need of various height of operator

The animal drawn bean planter is very simple to use, the various adjustments are made with ease, and it is maintenance free, except for the bearings which needs to be lubricated from time to time to allow the planter's ground wheel to move freely.

## **LIST OF ACRONYMS**

FAO - Food and agriculture organization

UNBS - Uganda National Bureau of Standards

NARO - National Agricultural Research Organisation

UEPB - Uganda Export Promotion Board

SAARI - Serere Agricultural and Animal Research Institute

AEATREC - Agricultural Engineering and Appropriate Technology Research Centre

UBOS - Uganda Bureau of Statistics

MTC - Maintenance Costs

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# **1 CHAPTER ONE: INTRODUCTION**

## **1.1 Introduction**

This chapter briefly gives the general information relevant to the topic under study while clearly shows the statement of problem and brings forth the solution that will help reduce the identified problem, through the main and specific objectives. It as well indicates the scope of the study.

## **1.2 Background**

Bean is a leguminous crop, the common bean also known as *Phaseolus Vulgaris* L in Latin is the mostly widely grown legume in Uganda. It is readily available and a popular food to both the urban and rural populations in Uganda. In addition, according to Kara et al. (2009) it is consumed by people from all income levels and serves as a primary source of dietary protein for people in the lower income bracket (Wortmann et al.,2004). Shelled beans are richer than green beans as they provide about 25% of the total calories and 45% of the protein intake of the diets of many Ugandans (Gepts, 1998; NARO, 2000).

Agriculture is the leading contributor to Uganda's economy, contributing 22.5% of total GDP, 46% of export earnings, and providing employment for over 65.65% of the population above 10 years (UBOS, 2011). And according FAO statistics (2009), the value of bean output was USD 244.02 (million) while the agricultural GDP was USD 4,010.75 (million) indicating that bean accounted for 6.1% of the total national agricultural GDP. The production of beans in Uganda has gone high with Uganda being the 8<sup>th</sup> among the top ten producers of common bean worldwide, and second, next to Tanzania among the 28 countries that produce common bean in Sub- Saharan Africa. In addition, bean is an important source of income for many Ugandan farmers and traders, due to the increasing demand both in the domestic and export markets such as Kenya.

Beans are majorly planted using traditional practices which are manual based and now some farmers have adopted modern practices by use of implements which are animal drawn, tractor pulled and some hand operated such as jab planter. The rudimentary tools (hand hoe) used for planting involve a lot of drudgery and are time consuming, while the tractor driven planters require high initial costs as well as high maintenance costs. Animal power is widely used to perform both stationary and mobile operations such as; land development, planting, transport,