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FACULTY OF ENGINEERING

**DEPARTMENT OF AGRICULTURAL MECHANIZATION AND IRRIGATION
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**DESIGN AND CONSTRUCTION OF A PEDAL OPERATED SUNFLOWER
THRESHING MACHINE**

BY

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**Submitted in partial fulfillment of the award for the award of the Bachelor of Agricultural
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ABSTRACT

The Introduction is a summary of the background of sunflower and this project, the problem statement which includes the problems faced by sunflower farmers in Uganda during the threshing of their crops. The introduction also bears the justification of this project, the objective: both main and the specific objectives and the scope of this project.

Literature review is a chapter that contains the details of sunflower as an oil producing crop in Uganda, the numerous existing types of threshing machines with all their characteristics and downfalls, the choice of the machine to be designed including the reasons for the choice of the design and the design methods that will be used for this design.

The methodology contains the achievement of the specific objectives involving the design of the machine components, construction of the machine and then testing.

Results and discussions contain the results got from the test made on the machine showing graphs and other formats of results. The discussion shows in details the implications of the results obtained in the test.

Conclusion contains the achievements made in the project and the extent to which the project has been achieved. Recommendations shows in some ways the areas which were not able to accomplish that further researches can be done on and also observations that need corrections on the machine to improve its performance.

DEDICATION

I dedicate this project to my parents Mr. Okello Johnson and Mary and Brother Mr. Ojok Bonny for all the financial, moral and spiritual support they have always offered to me whole heartedly to see me through in my education carrier. May God almighty reward and bless them abundantly!

ACKNOWLEDGEMENT

I take this opportunity to thank Ms. Mwogeza Mary and Mr. Kilama George for all the consultancy, help and advice that they have always extended to me before and during preparation of this final year report and the project as a whole.

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I thank my fellow students who have taken their time to help me in preparation of the report, the advisory point of view and the construction of the prototype. They include Mr. Ebic Andrew, Mr. Elong Isaac Omedi, and Mr. Lematia Richard. May God bless and reward them abundantly in whatsoever thing they do.

APPROVAL

This Final year project report by **Okello Norman** has been prepared under my supervision and is now ready for presentation to the Department of Agricultural Mechanization and Irrigation Engineering of Busitema University for an award of a Bachelors degree with my approval.

Mr. Kilama George

Signature: Date:

Ms. Mwogeza Mary

Signature..... Date.....

DECLARATION

I, **Okello Norman**, do declare that this project is my original work and has never been presented to any university or any other institution of higher learning for an award of a bachelor's degree.


Signature:  Date: 27/05/2014



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CHAPTER ONE

1.0 INTRODUCTION

Sunflower (*Helianthus annuus*) is a member of the dicotyledonous which grow best in semi-arid fertile, well-drained soil with heavy mulch. It grows commonly to a height of 1.5 and 3.5m. It is among the largest oil producing crops in Uganda and the world as a whole after soybeans. However; its production majorly threshing is not highly mechanized for local farmers which have greatly reduced its quality and quantity in Uganda.

1.1 Background

Sunflower (*Helianthus annuus*) is an indigenous N. American crop and was brought by the Spanish to Europe. It was later introduced in Russia, Ukraine, and Turkey which are up to now main production countries apart from the USA and Argentina.

In Uganda, sunflower was introduced in the 1920s and by 1960s it was widely grown in many parts of the country. Prior to 1991, no improved varieties were widely available and no variety had ever been presented to the release committee for consideration. Ugandan farmers depended on land races and scanty imports of seeds from neighboring countries.

A number of private, cooperative and religious organizations have promoted sunflower growing at various times. Currently the biggest private promoter of sunflower growing is Mukwano Industries. Since 1991, Mukwano Industries has contracted farmers in Northern, Western and Eastern Uganda by supplying them with seeds and buying the harvested crop from them at a pre-agreed price. The northern and north-eastern Uganda are most suitable for sunflower production because of their semi-arid ecology, evidence suggests that it can also be produced in the southern and western regions (Godfrey Turiho Habwe, 1992)

Sunflower production in Uganda in recent years increased greatly but most of the farmers use manual labour. Its production in Uganda is faced with many challenges mainly in activities like; ploughing, planting and harvesting due to limited mechanization of the processes, there is therefore need for expanding: ox-ploughing services for land preparation, mechanized sowing and threshing of sunflower.

References:

- Amir Hossein Mirzabe and Javad Khazaei. (2012). Physical properties and modeling for sunflower seeds. *Agric Eng Int: CIGR Journal 14(3)*, 190-202.
- Amir Hossein Mirzabe* Javad Khazaei* Gholam Reza Chegini. (2012). *Physical properties and modeling for sunflower seeds, vol.14* . New Delhi.
- Beysac, K. a. (2012). Oil seeds in Uganda. In K. a. Beysac, *SNV Oil seeds in ganda* (pp. 2-3). Washington: United States Agency for International.
- Billy. E. W. (2004). Sunflower production guide. 1-15.
- Callister William D, .. I.-4.-5.-3. (1994). *Materials Science and Engineering: An introduction Third Edition Inc.* Newyork: John Wiley & Sons.
- Godfrey Turiho Habwe. (1992). the accomplishments and constraints of sunflower research in Uganda. *the accomplishments and constraints of sunflower research in Uganda.*, 3,9-10.
- John Furber Lawrence and M. Halls Lauren Howard. (2012). Understanding Pedal power. 6,7.
- R.S. Khurmi & J.K. Gupta. (2005). *machine design 14th Ed.* . New Delhi-110 055: Eurasia Publishing House (PVT.) LTD.Ram Nagar.
- Schild et al. (1991). The effect of drum speed type and feed rate of sunflower threshing. *The effect of drum speed, type and feed rate of sunflower threshing*, 3.
- Sudajan, S., Salokhe, V., & K. Triratanasirichai, (. (2008). Effect of Type of Drum, Drum Speed and Feed Rate on Sunflower Threshing. *The 15th Annual Conference of the Misr Society of Ag. Eng., 12-13 March, 2008* (p. 4). calcutta: Mansoura University.