BUSITEMA UNIVERSITY
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF AGRICULTURAL MECHANIZATION AND IRRIGATION ENGINEERING

IMPROVED DESIGN AND FABRICATION OF A SUNFLOWER THRESHING MACHINE

BY

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ABSTRACT

Sunflower (Helianthus annuus L.) are commonly used to extract oil for consumption. Certain varieties of sunflower seeds are used in confectionery and are called confectionery sunflower seeds. They are also used as snack foods. The traditional threshing process is time and labor consuming. Hence an improved sunflower threshing machine was developed and evaluated. Different components of the machine were designed basing on the physical, mechanical and chemical properties of sunflower, the components include, the feed hopper, beaters, sieve, frame, shaft, threshing unit analyzing the forces acting on the components to prevent failure. The machine uses 3hp motor. In Uganda, 30 percent of small scale farmers grow sunflower (Towo & Mugisha, 2013) but use rudimentary methods of threshing i.e. the sunflower is dislodged from the pods by stick beating. However, this method is time consuming and leads to the production of poor-quality seeds; where some seeds are broken, some are not completely removed from the sun flowerheads, contaminated with soil as the threshing is done on a bare ground. The production of broken seeds affects agriculture since they are not viable and difficult to store for a long period of time thus posing a potential threat of food insecurity. The already existing sunflower threshing machines have low threshing efficiency of 40% and are also sophisticated (UK Sunflower Association, 2003). Hence the need for designing and fabricating a sunflower threshing machine.

The methods used for assembly were machining, welding, milling, drilling, cutting and gridding. The machine uses a maximum power of 3hp motor. After fabrication the performance and economic analysis was performed in terms of threshing efficiency, Cleaning efficiency. The total cost of the machine is Ugx1.2m. Owing to the performance and economic evaluation of the machine it achieves all its design purposes hence its recommended for commercialization and adoption by the target group.

DECLARATION

I **AHIMBISIBWE SIMON PETER,** hereby declare to the best of my knowledge, that this project report is an outcome of my original work and that it has never been presented to any institution of learning for an academic award.

Date: ...../...../.....

Signature: .....

APPROVAL

This final year project report has been submitted to the Faculty of Engineering of Busitema University for examination with approval of my supervisor.

MR. IGGA HUZAIRU.

Date: .....

Signature: .....

DEDICATION

I dedicate this report to my parents Mr and Mrs. Tindamanyire Deo.

To all my friends and classmates and Mr. Igga Huzairu my supervisor for guidance and advice compiling this work.

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I wish to thank my family for supporting me throughout my academic journey.

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May God bless you all

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CHAPTER ONE

1.1 Introduction

This chapter describes the background information of the project, problem statement, significance, purpose, objectives and scope of the study. The problem statement describes the research problem and identifies potential causes and a solution. The significance describes the importance of the project. The specific objectives presented will achieve the main objective.

1.2 Background

Sunflower (Helianthus annuus L.) ranks third, next to groundnut and soybean in total production. It is cultivated in an area of 18.12 million hectares with an annual production of 22.03 million tones and 1216 kg per hectare, respectively (Ashwini, 2013). Sunflower is preferred by the consumers throughout the world due to its health appeal. Seeds of sunflower contain 39-49 percent edible oil, rich in polyunsaturated fatty acids, 14-19 per cent protein and 7.5-9.4 percent soluble sugar (Muttagi et al., 2017).

Seed supply is dominated by a few countries, the Russian Federation and Ukraine account for nearly 50% of global seed production, and the EU and Argentina included in the mix, this percentage goes up to 75%. Sunflower production has doubled in the last 20 years, driven by better yields and increasing acreage(ITC, 2016).

In Uganda, sunflower seed production is forecast to reach 48 million tons by 2030 and 60 million tons by 2050, from the current production figure of approximately 40 million tons. Production is found largely in Lango sub region, Lira being the major hub for production and processing, and 80% of sunflower comes from five of its surrounding districts: Apac, Lira, Oyam, Dokolo and Soroti. This is because these areas have the best agro-ecology for production of sunflower due to the vast land, proximity to processors, cheap labor, agro-ecological conditions where the dry period immediately after harvesting allows for drying and the crop grows well soils with in a wide texture thus few external inputs required. The average size of a sunflower farm in Uganda is 2.4 acres and 93.56% of the harvest is sold, clearly demonstrating that sunflower seeds are produced as cash crops. It is estimated that using basic husbandry skills, a Ugandan farmer can potentially produce 1200kg of sunflower seeds from a plot of one hectare (ITC, 2016)

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