BUSITEMA UNIVERSITY
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FACULTY OF ENGINEERING
DEPARTMENT OF AGRO PROCESSING ENGINEERING

DESIGN AND CONSTRUCTION OF A SOLAR BIOMASS POWDERED CONTINUOUS GRAIN DRYING CHAMBER.

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BU/UG/2013/17

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A design and construction of a powdered grain drying chamber report presented in Partial Fulfillment of the Requirements for the Award of the Degree of Bachelors of Agro-processing Engineering.
MAY; 2017

ABSTRACT

Well dried maize grains has an increased value in the daily living of humans.it is used as food in many institutions and also as a poultry and animal feed. However, its seasonal quantitative and qualitative loss is high due to the improper methods of drying used at farm level (the most growers). Drying grains below MC of 13% causes loss in quantity sold by weight, while above 13% causes mold and fungal growth resulting in qualitative loss. This has discouraged many growers resulting in decreased production. Therefore, the objective of this study is to design and construct a continuous flow drying chamber that will dry maize grains to required moisture content. This chamber reduces the losses, labor expenses and non-uniformities in the dried grains.

The chamber was designed with conveyors at three levels that move the grains. Heated air is allowed in the chamber from the bottom resulting in a countercurrent flow with grains. The conveyers receive motion from motor and convey grains up to exit. Grains are conveyed as they gradually increase temperature and loose MC. Hence the conveyors are made steel which has good thermal conductivity, food grade and durable.

The different components were designed basing on the strength requirement, constructed and assembled. It is a continuous system for heat and mass balance. Also the project has a payback period of 3.09months and 59% efficiency.

I recommend the drying chamber to have an increased insulation so that less heat is encountered. Also it requires the chamber to be taken nearer to grain growers who will be taught to operate it using user guide.

Generally, with this chamber implemented, the losses will approximately reduce by 90%.

DECLARATION

I, **NANGUMBA MARTIN (BU/UG/2013/17)** surely declare that all the written material contained in this report is an account of my own efforts and has never been submitted to any university or institution for an academic award.

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Date.....29/05/17.....

APPROVAL

This proposal has been submitted for examination with approval from the following supervisors:

MADAM; KABASA MARY SALLY

Signature.....

Date.....

Mr. DDUMBA JOSEPH LWANYAGA

Signature.....

Date.....

DEDICATION

I sincerely dedicate this report to the almighty lord God of hosts who laid a plan even for before I was born alongside with my dear friends and relatives for the firm foundation they laid for me upon which others have been added in a bid to fulfil God's plan for me.

ACKNOWLEDGEMENT

I am greatly indebted to many people for their valuable assistance in compilation of this final year project report. My fellow colleagues the parents and others who have been timely assets I will always owe gratitude.

For professional guidance and mentorship, I must acknowledge the effortless dedication and invaluable assistance of my supervisors Madam; KABASA SALLY and MR.DDUMDA JOSEPH

Thanks very much for your valuable discussions.

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MC-moisture content.

UBOS-Uganda bureau of statistics.

UBEBA-Uganda bureau of economics and business affairs

CHAPTER ONE

1.0 INTRODUCTION;

This chapter involves background, objectives, justification and scope.

1.0.0 Background

Maize drying is the major basis of food preservation in Uganda. With proper drying, it can be consumed over an increased period of time due to the increase in shelf life.

The grain drying methods have increased over the years as people change their consumption trends which has led to grain commercialization from purely subsistence.

Dried Maize in Uganda has a variety of uses like grain seeds for planting, processing flour and using it as animal feeds, but they all depend on the level of drying acquired.

In Uganda there are different drying methods like sun drying, biomass drying, and solar biomass drying and batch systems used where each has its advantages and drawbacks. (UBOS, 2006).

However there is continued quantity and quality fluctuations in the seasonal output of dry maize for sale from farmers. The fluctuations are significant from mostly farmers who produce little for home consumption and much for income generation. During post-harvest stage the major losses result from drying stage where farmers encounter the following challenges;

- Unreliability of sunshine during some days causing some grain to rot. Contamination with foreign matter when exposed to sunshine for drying
- Animals and birds which feed on it when allowed to dry.

After post-harvest stage some losses which result from drying stage are encountered as follows;

- Respiring seeds due to having moisture may generate enough heat to kill the seed viability and color quickly.
- Mold growth will be encouraged by moisture damaging the seeds either slowly or quickly.

According to the African Postharvest Losses Information System (APHLIS) postharvest losses in 2012 for maize were estimated at 16.8%. (*UBEBA*; **2013**)

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