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FUCULTY OF ENGINEERING

DEPARTMENT OF AGRICULTURAL MECHANIZATION AND IRRIGATION ENGINEERING

FINAL YEAR PROJECT REPORT

DESIGN AND FABRICATION OF A MANUALLY OPERATED ROTARY CHILI DRYER

by

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A final year project report submitted to the faculty of Engineering as a partial fulfillment of the requirements for the award of a Bachelor's Degree in Agricultural Mechanization and Irrigation Engineering of Busitema University

ABSTRACT

In Uganda, chili crop plays a great role in earning a foreign exchange. It is grown as a subsistence crop and a cash crop with annual production of 300-700kg per year. It's majorly grown in Western region, West Nile, lira towns of Uganda, and Lango areas which include Ngai and Otwai sub-counties in Oyam Abako, Barr and Amac sub-counties in lira.

At post-harvest level, chili has been continuously not handled well which has led to the deterioration of its quality on the market. This is because of uncontrolled drying rate using natural methods of drying, and polythene papers. These methods are time wasting, energy sapping, injuries on chili and contamination due to prolonged handling by human beings.

To overcome this problem, this study chose as its main objective to design and fabricate a manually operated rotary chili dryer.

Different components of the rotary dryer were designed using fundamental engineering principles and some physical properties of chili such as size, density, and moisture content. The machine was then fabricated and assembled using methods like, welding, bolting, cutting, and boring.

The machine was tested for both the drying rate and the heating efficiency. The drying required a period of 10 minutes to become steady at a rate of1.2674g/min, with heat utilization factor of 0.89 and heating efficiency of 94%. The economic analysis using the discounting method of net present worth was used to determine the economic viability of the machine. The net present worth was Shs 2706910.871. Since NPV>0, then the machine was economically viable in a period of 5 years.

DECLARATION

I, **TWESIGE BERON** do hereby declare that this final year project report is the original copy of my personal research carried out on the fabrication of a rotary chili dryer under serious supervision. No parts of it are duplicated unless cited and it has never been submitted in for award of bachelor's degree of Agricultural Mechanization and Irrigation Engineering of Busitema University or any other institution of learning.

Name TWESIGE BERON **Signature**..... **Date**..19th-05-2016.....

APPROVAL

This is to certify that Mr. TWESIGE BERON carried out the final year project on design and fabrication of a manually operated rotary chili dryer and submitted it to the department of agricultural mechanization and irrigation engineering.

Main supervisor

Mr. ERIAU EMMANUEL

Signature……

Date……/……/…....

Co-supervisor

Ms KABASA MARRY

Signature……

Date…../……. /…….

DEDICATION

I dedicate this final year project to my fellow student engineers and relatives for the prayers, advice, and continuous encouragement and guidance they gave me during my project design and research and may God bless them abundantly.

ACKNOWLEDGEMENT

My sincere thanks go to the Almighty God for the wisdom, knowledge, grace, mercy, and protection He has given to me.

I would like to extend my sincere gratitude and appreciation to the following persons who made my final year project period a successful one. I sincerely thank my Departmental Supervisors Mr. Eriau Emmanuel and Ms Kabasa Mary who sacrificed time out of their busy schedules to help me progress and understand all the design concepts.

I am indebted to my parents, friends, relatives, and fellow students who have assisted me through guidance and support during my entire study life time in Busitema University.

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BCR – Benefit cost Ratio

DCFs- Discounted Cash Flows

IR- Infra Red

NPV – Net Present Value

RPM- Revolutions Per Minute

SPB- Simple Pay Back

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CHAPTER ONE

1 INTRODUCTION

1.1 Background

Chilies exist as ripe fruits of the species of genus Capsicum, (Wade, Wane, Kshirsagar, Kendra, & Kendra, 2014). They are known as red peppers of capsicums. Chili plants grow from small to medium sized bushes from 1/2 a metre to 2 metres tall, most of the common varieties belong to the species *capsicum annuum*, the "annual" species (Hossain, Hossain, Awal, & Alam, 2015). Varieties grown include Capsicum annum var. acuminatam Linn which is most consumed spice in the world, capsicum frutescens, capsicum chinense, and capsicum pubescens, (Hare, Bagshaw, Li, & Johnson, 2001).

In Uganda, chili is majorly grown in Western region, West Nile, lira towns of Uganda, and Lango areas which include Ngai and Otwai sub-counties in Oyam Abako, Barr and Amac sub-counties in lira, (*NARO*, 2006). The expected yield is 250 tons of chili per year.

Figure 1-1: A Chili crop

(Source: FAO Uganda, 2014)

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