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FACULTY OF ENGINEERING
DEPARTMENT OF CHEMICAL AND PROCESSING ENGINEERING
FINAL YEAR PROJECT PROPOSAL
DESIGN AND CONSTRUCTION OF A COFFEE BIOREACTOR

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NOVEMBER 2014

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ABSTRACT

Coffee is ranked second to crude oil as the most important internationally traded commodity across the world and it is also the most important cash crop in Uganda; Wet processing of coffee helps to preserve the intrinsic value of the coffee beans however when poorly conducted, it severely deteriorates the final product. Wet processing is done in two ways and this includes mechanical demucilating and natural fermentation. The main objective of this research was to design and construct a coffee parchment fermentation vessel to aid in natural decomposition of the sugars contained in the mucilage to allow it to be freely washed off. This was accomplished through a systematic study of the specific objectives which involved designing the components of the bioreactor, constructing and thereafter testing its usability. Much of the relevant information required to accomplish this study lies in comprehensive review of relevant literature and case studies to the various wet processing stations and the local farmers who are to use the equipment. The equipment was successfully designed, constructed and tested; the results from the testing clearly shown that regulating temperature of fermentation other than the ambient conditions significantly reduces the fermentation time by a round 68%, from the 16hours taken at uncontrolled conditions to 5hours. However the design had some limitations in controlling the temperature to the required optimum (37) degrees Celsius and it is recommended that a more efficient temperature control mechanism be incorporated for complete optimization.

DECLARATION

I OUMA HUMPHREYS declare that the work contained in this final year project proposal is from my own effort and has not been presented to any institution of higher learning

Signature 

Date 20th/05/2015



DEDICATION

This report is dedicated to my beloved mother **NABWIRE ROSEMARY**. There are no words to explain what you have done for me throughout my studies.

APPROVAL

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

Signature Date.....

Madam Kabasa Mary Sally

Main supervisor

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

Mr. Mugisha Moses

Co-supervisor

ACKNOWLEDGEMENT

First and foremost I thank the almighty God for protecting and guiding me in everything I have laid my hands on and for bringing me all this far

I extend my sincere gratitude to my supervisors Miss Kabasa Mary Sally and Mr. Mugisha Moses and all the lecturers of Busitema University for their tireless guidance throughout the formulation of this proposal

Last but not least I extend my sincere vote of thanks to all my friends especially Musanyana Ruben, Okwir Isaac and Wetaka David; and all my course mates who have made Busitema a better place for me.

LIST OF ACRONYMS

CSTRs	Continuously Stirred Tank reactor
FAO	Food and Agriculture Organisation
FAQ	Fairly Average Quality
GOU	Government of Uganda
ICO	International Coffee Organisation
MAAIF	Ministry of Agriculture Animal Industry and Fisheries
MAFAP	Monitoring of African food and agricultural policies
STRs	Stirred Tank Reactors
UCDA	Uganda Coffee Development Authority

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CHAPTER ONE: INTRODUCTION

Introduction

This section looks at the general background about coffee processing in Uganda, the main problem of the study, why the study should be carried out, systematic objectives to be followed to solve the problem not excluding the scope and limitations of the study.

1.1 Background of the study

Coffee is ranked second to crude oil as the most important internationally traded commodity across the world (FAO, 2004). Coffee is the most important cash crop in Uganda; the Uganda Coffee development authority estimates that over 500000 households distributed over two-thirds of the country depend on coffee production as their main source of income(Liangzhi, 2003) Coffee production creates employment for a significantly large number of people, as hired farm labour and in businesses such processing, input supply, trading and transport. In spite of high export earnings from coffee globally, coffee produced in most African countries fetch low prices compared to coffee from other continents due to relatively lower quality. The fact that coffee in Uganda is grown by small scale farmers, who can barely afford the necessary equipment for effective post-harvest handling of the crop, leaves the farmers with no option but to either sundry their products or sell the red fresh cherries to commercial coffee washers at very low prices.

In Uganda during the post-harvest handling of coffee, the red coffee cherries are harvested and dried under the sun this puts the coffee cherries at a risk of undesirable secondary fermentation which severely alters the quality of the final product. Natural fermentation of coffee is being practiced on small scale to aid maintain the quality of Ugandan coffee, by allowing the pulped coffee parchment to ferment and thereafter washed clean. However the equipment used by the local farmers especially for the fermentation process are unhygienic and give no room for monitoring and control of the process.

The government of Uganda through the Uganda coffee development Authority invested Shs.834, 815,878 in Wet Coffee processing machines under the Strategic Exports Program.

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