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FACULTY OF ENGINEERING

DEPARTMENT OF TEXTILE AND GINNING ENGINEERING

FINAL YEAR PROJECT REPORT

ON

PRODUCTION OF BRIQUETTES FROM PEELINGS OF DIFFERENT SPECIES OF BANANA

BY
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A fourth year project report submitted to the department of Textile and Ginning leading to the award of Bachelors in Textile Engineering of Busitema University

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DECLARATION

I Namatovu Debora Patience, hereby declare to the best of my knowledge that all the educative material contained in this booklet is an account of my own efforts and all the content presented in it is personally developed and has not been presented in any college, university, or any other institution of learning.

Signature.....

APPROVAL

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

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DEDICATION

I dedicate this project report to my parents the late Mr. Simon Luwemba, Mrs. Grace Luwemba, my sisters and brothers for their devotion toward my growth and excellence. May God continually bless you.

ABSTRACT

Biomass particularly agricultural wastes, has become one of the most promising energy sources for most developing countries. In East Africa, where biomass dominates the domestic energy market, briquetting technology is gaining momentum particularly as wood resources become scarcer and the price of regular charcoal increases. The idea of utilizing the residues from agricultural sectors as primary or secondary energy sources is somewhat attractive since they are free, indigenous and environmentally friendly. The major source of energy to the community is wood fuel since other sources of energy (electricity, gas and kerosene) are grossly inadequate where they are available and they are beyond the reach of the masses. Fuel wood collection leads to deforestation, desertification, global warming and pollution and these bring grave consequences on forest conservation sustainable forest resources management.

The study evaluated briquettes from different species of Musa sapientum plant (banana) peelings that is to say Gros Michel (bogoya), Musa x paradisiaca (plantain/gonja) as well as Musa AAA (matooke) for fuel production. The parameters analysed were moisture content, ash content, volatile matter, density, fixed carbon, nitrogen content and the heating value. The peelings were dried under the sun to remove some of the moisture content. The char was produced through the carbonisation process. The crusher was used for crushing and sieving. Binders for example char dust, starch were added in a mixer and mixed with addition of water. Pressing was done using a compactor and the briquettes were dried under the sun. The auto balance was used for density (g/cm3), the hot air oven for percentage moisture content, a marfle furnace for percentage volatile matter, percentage ash content, percentage fixed carbon, percentage nitrogen content by elemental analyser and the heating value was determined in kcal/kg.

All the peelings from the different banana species were capable of briquette production with Gros michel presenting the highest heating value than the rest.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

For most developing countries, biomass particularly agricultural wastes, has become one of their most promising energy sources (**(Ferguson, 2012)** The idea of utilizing the residues from agricultural sectors as primary or secondary energy sources is somewhat attractive since they are free, indigenous and environmentally friendly **(Patomosk, 2009).** Furthermore, the decreasing availability of firewood has necessitated that efforts be made towards efficient utilization of agricultural wastes **(Mishra, 1996).** They have acquired considerable importance as fuels for many purposes viz. domestic cooking, industrial process heating, and power generation **(Ferguson, 2012).** Some of them, such as coconut shell, corn cob and wood waste, are ready to be directly used as fuel **(Patomosk, 2009).** The majority of them, however, are not appropriate to be used as fuel without a suitable process since they have low density, high moisture content, and low energy density **(Emerhi, 2011).** All of these issues may cause problems in transportation, handling, storage, entrained particulate emission control including direct combustion. One of the optimistic technologies for alleviating these problems is briquetting, which has been studied by many researchers **(Patomosk, 2009).** The technology may be defined as a densification process for improving the handling characteristics of raw material and enhancing the volumetric calorific value of the biomass **(Patomosk, 2009).**

Considerable amount of research on briquetting technology has been conducted **(Cintia, 2014).** Examples of biomass studied are wheat straw hazelnut shell, woods, grass, cotton, olive refuse, banana leaves and pseudostem, rice straw and husk as well as maize cob **(Patomosk, 2009).**

Worldwide many different types of briquettes exist for a variety of applications **(Prior, 1990).** In industrialised countries briquettes are commonly used as a fuel in industrial boilers and biomass cogeneration plants **(Ferguson, 2012).** In East Africa, where biomass dominates the domestic energy market, briquetting technology is gaining momentum particularly as wood resources become scarcer and the price of regular charcoal increases. Briquettes made from materials that cost little or no money to obtain such as newspaper or partially decomposed plant waste or sawdust can be an alternate source of domestic and industrial energy to charcoal, firewood, gas, coal and

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