BUSITEMA UNIVERSITY
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF TEXTILE AND GINNING ENGINEERING

FINAL YEAR PROJECT

PRODUCTION OF BRIQUETTES FROM COTTON STALKS MIXED WITH PINE POWDER AS AN ALTERNATIVE SOURCE OF ENERGY

BY

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ABSTRACT

The study was undertaken to assess the properties of briquettes produced from a mixture of carbonized cotton stalks and pine powder. The cotton stalks were obtained chopped to sizes of 10cm, dried to 10%moisture content then carbonized to obtained smokeless char. The pine pieces were grinded to obtain fine pine powder. The properties of pine powder and carbonized char were analyzed in relation to briquettes. The carbonized cotton stalks and pine powder where mixed in different proportions to make briquettes using cassava starch as a binder. Different levels of briquettes were produced. Briquette A (100% cotton stalks: 0%pine powder), Briquette B (95%cotton stalks to 5%pine powder), Briquette C (90% cotton stalks: 10%pine powder) and Briquette D (85%cotton stalks: 15%pine powder). The moisture content, shatter index and combustion related properties namely percentage volatile matter, percentage ash content, ignition time and percentage fixed carbon content of the briquettes where determined. The test results showed that all briquettes had moisture content between 0%-18%the required range, the shatter index ranged from 93%-99.5% indicating that all the briquettes were resistant to vibrations, transportation and handling. The ash content for all the briquette samples was below 10% meaning the briquettes burn with minimum slagging effect. The percentage volatile matter increased with increase in pine powder concentration in the briquettes with the highest value being seen in sample D. The percentage fixed carbon content ranged between 54%-64% with sample A having the highest value of fixed carbon content. Since the aim of briquetting was to produce briquettes that would serve as good source of fuel and support quick combustion with reduced ignition time, the best briquette with short ignition time was produced when 85% cotton stalks were mixed with 15% pine powder. Also the use of 100% cotton stalks produced a briquette with properties in the required standard values for all the tests.

DECLARATION

I **SAMANYA PATRICK** declare to the best of my knowledge that this project is a result of my research and effort and it has never been presented or submitted to any institution or university for any academic award.

DATE ...24th/05/2019.....

SIGNATURE .....

APPROVAL

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

Dr. NIBIKORA ILDEPHONSE

MAIN SUPERVISOR

Date: .....

Signature .....

Ms. YVONNE TUSIMIIRE

CO-SUPERVISOR

Signature.....

Date: .....

DEDICATION

I dedicate this final year project to my parents; **Mr. MANGENI BATULUMAYO** and **Ms. DOLOKASI NABWIRE** who have enabled me to see the light of education from my childhood and to my dear lecturers who have mentored me from first year up to now. GOD bless you

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Contents

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

CO_2	Carbon dioxide
H	Hydrogen
TGA	Thermo gravimetric analyzer
Na	Sodium
K	Potassium
P	Phosphorous
Mg	Magnesium
Ca	calcium
SiO_2	Silicon dioxide
S	Sulphur
Wt.	Wait basis
Db.	Dry basis

CHAPTER ONE
1.0 INTRODUCTION

This chapter presents the general information relevant to the research and it clearly shows the problem of interest for the intended research. It as well shows how this study will help reduce the problem through the fulfillment of a number of objectives listed

1.1 BACKGROUND

Energy is considered the basis for the progress and prosperity of nations and societies. Availability and consumption levels of energy is the best indicator of economic and social development. In many developing countries energy from crop residues (CR) has been the main source of energy, mostly in its traditional forms designed to meet the demands of domestic uses (Arellano, Kato, & Bacani, 2015). In industrialized countries, the use of crop residues for energy production has been propagated as a substitute for fossil fuels(Križan & Šooš, 2009).

Global fossil fuel deposits are declining at high rate which requires alternative renewable energy sources in order to meet the increasing energy demand for development (Zhanbin, 2003). The limited availability of fossil fuels and the growing awareness of the detrimental environmental consequences resulting from greenhouse gas emissions have reinforced the importance of crop residues as an energy resource in developed and developing countries.(Kathuria & Grover, 2012) Successfully tested technology packages are needed to promote use of crop residues based energy generation and these should include equipment and practices for all operations from harvest, collection of crop residues to their supply in the desired form to the energy generation system. It has been estimated that 3 billion people worldwide use traditional biomass for cooking and heating, and majority of them are located in Sub Saharan Africa. Biomass accounts for 90% of the energy used in Uganda which can further be partitioned into 70% wood, 16% charcoal and 4% crop residue (Okello, Pindozzi, Faugno, & Boccia, 2013). Development of renewable energy sources will reduce the degree of dependence on energy imports as well as it can be a tool for curbing carbon emission. So, emphasis is given to the renewable energy program and this can be enhanced by bio briquetting from the available agro waste(Kumar Sharma, Priyank, & Sharma, 2015) .Briquettes can be defined as a product formed from physic-mechanical conversion of loose and tiny particle size materials with or without binder in different shapes and sizes. Examples of binders include crude oil, starch, molasses, clay, sodium silicate and

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