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# FACULTY OF ENGINEERING

# DEPARTMENT OF TEXTILE AND GINNING ENGINEERING

## PROJECT TITLE: PREPARATION OF A BIO PLASTIC FROM RAW BANANA PEELS USING SODIUM BI CARBONATE AS A PRESERVATIVE

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*A final year project proposal submitted to the Department of Textile and Ginning Engineering as a partial fulfillment for the award of a Bachelor of Science in Textile Engineering*

**December 2020**

## DECLARATION

I **NANTONGO SARAH** Reg. **No BU/UG/2015/84** hereby declare that this project work is my original work and that the information contained in this project work is out of my hard work and research, except where explicit citation has been made and it has not been presented to any institution of higher learning for any academic award.

**Signature:** ..... **Date:** 7/01/2020.

# APPROVAL

This proposal entitled "Preparation of a bio plastic from raw banana peels using sodium bicarbonate as a preservative" has been written under the supervision of;

**Main supervisor**

Dr. Nibikora Ildephonse

Signature: .....

Date: .....

**Co. Supervisor**

Madam Namuga Cathy

Signature: .....

Date: .....

# ACKNOWLEDGEMENT

I would love to extend my gratitude to a number of persons whose efforts have managed me to progress and put a landmark in my education.

First and foremost, I would like to thank the almighty God for giving me the strength to carry on with my final year project research.

Sincere thanks go out to Busitema University, department of Ginning and Textile Engineering and most importantly my supervisors Dr. Nibikora Ildephonse and Madam Namuga Cathy for the great work done (guidance and consultations).

I also acknowledge the love and care of my family and loved ones, for all the financial, moral, spiritual, and physical support.

Lastly, to all my course mates with whom I study with at Busitema University, thank you for the team cooperation.

## DEDICATION

I dedicate this report to my lecturers, friends and family.

## ABSTRACT

Plastic industry is considered one of the most important industries because plastic is an important factor in the making of many useful products such as sheets, tubes, rods, slabs, building blocks and domestic products. Plastic offers a variety of benefits, in a variety of shapes, such as sheets, panels, film, which can all be flexible as the application requires. Plastic is a price competitive with other materials that offer similar advantages in industrial applications, which is why it is used in a number of applications. It is light weight, strong, visually aesthetic, flexible size and shape, and cheaper price. However, use of too many plastics results in massive harmful effects. It takes longer time to degrade which is estimated about 500 years to degrade and will become toxic after decomposed. Plastic pollution can unfavourably affect lands, waterways and oceans. Humans are also affected by plastic pollution, such as through the disruption of the thyroid hormone axis or hormone levels. Thus, the biodegradable plastic becomes a promising solution to solve all these problems. Making bioplastic from banana peels instead of the traditional petroleum-based plastic is believed to be a successful solution to increase the efficiency of plastic industry.

The project research work aimed at preparation of bio plastic sheet using raw banana peels. The banana peels were amalgamated with glycerol as plasticizer and sodium bicarbonate as an antimicrobial. This research work was completed in four steps, first step will be to prepare the banana peels, the second step will be the production of starch, thirdly will be the production of the bio-plastic by heating at temperatures above $300^0$C and lastly testing the performance of the bio-bag. Its properties like tensile strength and water absorption will be performed in this research work.

# LIST OF ACRONYMS

| | |
|---|---|
| $NaHCO_3$ | Sodium bicarbonate |
| UIRI | Uganda Industrial Research Institute |
| $Na_2S_2O_5$ | Sodium bisulphite |
| $C_6H_{10}O_5$ | Starch |
| HCl | Hydrochloric acid |
| NaOH | Sodium hydroxide |
| $C_3H_8O_3$ | Glycerol |
| FTIR | Fourier Transform Infrared Spectrometry |

Table of Contents

# LIST OF FIGURES AND TABLES

# Chapter 1: INTRODUCTION

## 1.0 Introduction

This chapter presents the role of bio-composites in the current century. It highlights the paradigm shift from non-renewable and non-biodegradable synthetic and solid wood products to eco-friendly materials. It further elaborated on the underlying dangers of petroleum-based resources in relation to advantages accruing to renewable natural resources. The chapter therefore, justified the need for research in bio-composites and the likely positive outcomes. The main and specific objectives and the scope of the study illustrating how these objectives were achieved are outlined.

## 1.1 Background of the study

Banana is a tropical fruit grown in over 122 countries worldwide. Until 2014, the cultivated area of 3.8 million hectares and a total production of 56.4 million metric tonnes of the fruit were produced ranking it fourth behind rice, corn and milk(Rana *et al.*, 2018).

In recent times, banana peels have been utilized for various industrial applications including bio-fuel production, bio-sorbents, pulp and paper, cosmetics, energy related activities, organic fertilizer, environmental cleanup and biotechnology related processes. Its mass cultivation and consumption in the recent decades made it the world second largest fruit crop with an estimated gross production exceeds 139 million tonnes(Oever *et al.*, no date). World leading banana and plantain producers are India, China, Uganda, Ecuador, Philippines, and Nigeria.

The native people have been utilizing these banana plants more than just for food purposes but have begun to explore the possibilities of utilizing banana plants in their daily life. Banana plantation occupies large part of the land, but it is a contamination source because after harvest, the tree is cut down and abandoned in the fields, which incites Sigatoka. In this project raw banana peels were used to prepare a bio plastic bag.

Bioplastics can be defined as plastics made of biomass such as corn, banana peels and sugarcane. Biodegradability of bioplastics has been widely publicized in society and the demand for packaging is rapidly increasing among retailers and the food industry at large scale. Biodegradable plastics are a new generation of polymers emerging on the world market and have

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