BUSITEMA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF TEXTILE AND GINNING ENGINEERING

THE SUITABILITY OF UGANDAN BANANAS FIBRE FOR COMPOSITE APPLICATIONS

BY

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BU/UG/2009/82

A PROJECT REPORT SUBMITTED TO THE FACULTY OF ENGINEERING IN PARTIAL FULFILMENT OF THE AWARD OF BACHELOR OF SCIENCE IN TEXTILE AND GINNING ENGINEERING OF BUSITEMA UNIVERSITY

MAY 2013

DECLARATION

I, **OKELLO JOE,** do declare that this report entitled "the suitability of Ugandan bananas fibre for structural applications" is the result of my own research except the quotations and summaries that I have stated the sources clearly.

Signature: Okello Joe.....

Date: ....28/05/2023.....

DEDICATION

I dedicate this project report to my dear parents, aunts, uncle and cousins for all the financial, moral and spiritual support they offered to me during my education carrier and make me fulfill my dream

May the Heavenly Father bless them abundantly!

ACKNOWLEDGEMENT

Firstly, I would like to express my greatest gratitude to Mr. Rwawiire Samson and Madam Namuga Catherine for their invaluable guidance.

I would like to acknowledge my lovely parents, brothers and sisters whose wisdom and love shaped me as I grew up.

I would like to extend my great appreciations to all Textile and Ginning Engineering program lecturers and supporting staff in Busitema University.

Many thanks go to all my friends and colleagues in Busitema university main campus especially; Mutabazi Denis, Kashemri Damalie, Osinde Job, Habby geoffrey and Luggya George, for their support and help during my project.

Thus, I would like to thank everyone from the bottom of my heart and may almighty God bless you all!

APPROVAL

This project report by **Okello Joe** has been prepared under my supervision and is now ready for presentation to the Department of Textile and Ginning Engineering of Busitema University with my approval.

Signature: .....

Date: .....

Mr. Rwawiire Samson

Signature.....

Date.....

Ms Namuga Catherine

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ABSTRACT

Banana plant fibres which are abundantly available, banana fibre is light but high moisture content and less dense compared with other fibre. The fibre tensile properties are relatively low compare to the literature which may due to degradation problems. This study initially investigated the tensile behavior of single banana fibre and physical properties like, moisture content and fibre density. Then, the tensile behavior of banana fibre reinforced composites as a function of weave pattern (plain) and fibre surface modification. Lastly, comparing flexural strength and flexural modulus of reinforced composite with the weave pattern species of banana fibre composite was tested and was compared with epoxy resin property (control experiment). The stiffness of the composite is significantly improved when the fabric is increased. The failure pattern of the composite also study in the project and it show a matrix failure pattern. The alkali treatment increases of the tensile strength of the fibres. Banana fibre composite could be used as strengthening material in structural applications.

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INTRODUCTION

1.1 Background

It is a well known fact that banana is one of the oldest cultivated plants in the world. The word 'banana' comes from the Arabic language and means 'finger'. It belongs to the Musaceae family. The main countries of origin of banana plants are India, Indonesia and Philippines. East Africa produces over 20 million tones of bananas annually which accounts for 25.58% of total world output. Uganda is among the world's leading countries in terms of banana production with an annual output of 9.84 million tones accounting for 11.18% of the world's total production. The area under banana production is 1.3 million hectares and this constitutes 75% of arable land (NARO, 2011) since each house hold has to grow it for food consumption and for generating income. The banana basts /pseudo stem are usually treated as residue product and cause environmental problems when disposing by burning them (Johnston, T. 2003).

Comparatively, man made fibers are created by humans from minerals like petroleum sources. Recently, due to uncertain conditions in the shortage, increased environmental consciousness, toxic, high energy consumption for production, high cost of petroleum, and its by products, there is a need to search for its alternate which is nothing but natural according to (Schemenauer et.al., 2000). In recent years the plant fibers proves itself as an alternative fiber to its synthetic counterpart due to that natural fibers are cheaper, bio-degradable and have no health hazard. Furthermore natural fiber reinforced fibers are seen to have good potential in the future as a substitute. It is interesting to note that natural fibers such as banana, sisal, etc., are abundantly available in countries like Uganda and some of the East African countries but are not optimally utilized. At present these banana fibers are used in a conventional manner for the production of yarns, ropes, mats, paper, cordage, tea bags, handbags, footwear and as well as in making articles like wall hangings, table mats, handbags, and purses and also used in making cloth.

The potential of banana fibres replacing synthetic fibres in composite is possible . In general, banana fibres offer high specific properties, low cost, light in weight, non abrasive, readily available and environmental friendly where no synthetic fibres can surpass these advantages according to (Matthiesen, M. L; Boteon, M. 2003). These advantages attract me to

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