FACULTY OF ENGINEERING

DEPARTMENT OF POLYMER, TEXTILE AND INDUSTRIAL ENGINEERING

FINAL YEAR PROJECT

UTILIZATION OF PET WASTE FOR PALF REINFORCED PAVERS

By

MUGISHA BRUCE

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Email: mugishabruce2017@gmail.com

Tel: +256704-966121/+256773-723021

SUPERVISORS

Dr. NIBIKORA ILDEPHONSE

Mr. TIGAWALANA DAN

This final year project report is submitted to the Faculty of engineering in partial fulfillment of the requirement for the award of the Degree of Bachelor of Polymer, Textile and Industrial Engineering of Busitema University

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DECLARATION

I Mugisha Bruce declare to the best of my knowledge that this final year project report is as a result of my research and effort and it has never been presented or submitted to any institution or university for an academic award.

Date ……

Signature ……

APPROVAL

This project report was compiled and submitted to the Department of Polymer, Textile and Industrial Engineering under the supervision of the following supervisors;

Dr. Nibikora Ildephonse

Signature ……

Date…… ….....

Mr. Tigawalana Dan

Signature……

Date……

DEDICATION

I pleasurably dedicate this report to my beloved family especially my siblings who have endeavored to adequately provide and care for me through thick and thin in absence of our beloved mother who left we at tender ages, May the Almighty God bless you abundantly.

Special dedications to the directors, staff and proprietors of the then Juna Amagara Ministries and now Hope Partners Africa for their support they rendered to me so as to reach where I have reached. Please, I salute you for your kind, generous and compassionate hearts. May the Almighty God bless you!

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ABSTRACT

Plastic waste which is increasing day by day becomes an eyesore and in turn pollutes the environment, especially in slum areas. PET waste that remains uncollected from the environment ends up in the drainage channels, wetlands, and natural water sources hence blocking the water flow which causes floods and breeding sites for mosquitoes which eventually leads to outbreak of diseases. Floods lead to poor hygiene and loss of property (buildings). In Uganda, the most affected slum areas around Kampala city include; Kalerwe, Bwaise and Banda. A developing country like Uganda that is experiencing rapid urbanization and industrialization and as a result a lot of infrastructure developments lead to shortage of construction materials. Pavement blocks are perfect materials on the pathways and streets for simple laying and finishing.

Therefore, this report gives an overview of the various activities conducted in utilizing polyethylene terephthalate (PET) waste in making paving blocks reinforced with pineapple leaf fibers (PALF).

Pineapple leaf fibers (PALF) were extracted and the fiber surface was be chemically treated/modified with alkaline sodium hydroxide so as to remove impurities and improve interphase bonding between fiber and matrix. The properties of the treated and untreated fibers were determined using the single fiber tensile tester and SEM TESCAN was used to analyze the surface morphology of the treated and the untreated fibers. Paving blocks were made by melting 150g of PET, mixing with 500g of sand, adding 0.92% of pineapple leaf fibers followed by mixing thoroughly to obtain a homogeneous mixture. The obtained mixture was poured in the prepared mold and the block was left to dry and cure for at least 7 days before taking it for testing. This procedure was repeated for different ratios of 172g, 172g, 225g, 225g, 225g, 278g, 278g and 300g of PET with 0.27%, 1.52%, 0.00%, 1.66%, 0.83%, 0.23%, 1.31% and 0.75% of PALF respectively so as to obtain different samples. A Tenstometric materials testing machine was used to test for compressive strength of the paving blocks. An analytical balance was used to weigh the paving blocks before and after dipping them in water for a period of 24hrs and water absorption rate was calculated.

TABLE OF CONTENTS

DECLARATION i
APPROVAL ii
DEDICATION iii
ACKNOWLEDGEMENT iv
ABSTRACT v
TABLE OF CONTENTS vi
LIST OF TABLES ix
LIST OF FIGURES x
ABBREVIATIONS/ACRONYMS xi
CHAPTER ONE: INTRODUCTION 1
1.1 Background 1
1.2 Problem statement 4
1.3 Objectives 4
1.3.1 Main objective 4
1.3.2 Specific objectives 4
1.4 Justification 5
1.5 Significance of the study 5
1.6 Scope of the study 5
1.6.1 Conceptual scope 5
1.6.2 Geographical scope 5
1.6.3 Time scope 5
CHAPTER TWO: LITERATURE REVIEW 6
2.1 Overview of Plastics 6
2.1.1 Polyethylene terephthalate (PET) 7
2.2 Overview of pineapple leaf fiber (PALF) 8
2.2.1 Extraction of PALF 10
2.2.1.1 Hand scrapping method/ manual extraction 10
2.2.1.2 Novel technology 11
2.2.1.3 Scrapping machine 11
2.2.1.4 Decorticator machine 11
2.2.1.5 Rapic two roll machine 12

2.2.2 Surface modification of PALF 12
2.2.3 Characterization of PALF 14
2.3 Overview of Composites 14
2.3.1 Fiber-Reinforced Composites 16
2.3.1 Composite manufacture methods 16
2.4 Previous work related to utilizing natural fibers and plastic waste in production of composites 16
CHAPTER THREE: METHODOLOGY 18
3.0 Introduction 18
3.1 Materials 18
3.2 Methods 18
3.2.1 Methodology for specific objective 1 18
3.2.1.1 Extraction of PALF 18
3.2.1.2 Characterization of PALF 18
3.2.2 Methodology for specific objective 2 20
3.2.2.1 Surface modification of PALF 20
3.2.2.2 Determining properties of the surface modified PALF 20
3.2.3 Methodology for specific objective 3 20
3.2.3.1 Composite manufacture 20
3.2.3.2 Determining selected physical and mechanical properties of the paver samples 22
CHAPTER FOUR: RESULTS AND DISCUSSIONS. 24
4.1. Fiber length 24
4.2. Effect of sodium alkali treatment on surface of the fibers. 25
4.3. Effect of varying compositions of treated fibers on mechanical properties of the composite. 27
4.3.1 Results for compressive strength of pavers 27
4.3.2 Results for Water absorption rate 27
4.3.3 Analysis of the effect of PALF fraction on the selected properties of the composite 28
CHAPTER FIVE: CONCLUSIONS, CHALLEGES AND RECOMMENDATIONS. 30
5.1. Conclusions 30
5.2 Challenges 30
5.3 Recommendations 30
EXPENDITURE 31

REFERENCES 32
APPENDICES 34

LIST OF TABLES

Table 1: Chemical composition and structural parameters of PALF and sisal 10
Table 2: Mechanical properties of PALF 14
Table 3: Physical properties of PALF 14
Table 4: Average compressive stress for paving blocks made from plastic wastes, sand, coarse aggregates and ceramics. 17
Table 5: Ratios for different samples that were fabricated. 21
Table 6: Showing length of different fibers 24
Table 7: Showing analysis of compressive strength values using excel 28
Table 8: Analysis of water absorption rate values using excel 28

LIST OF FIGURES

Figure 1: Classification scheme for the various composite types. 16
Figure 2: A graph of length of fibers against sample number 24
Figure 3: Showing SEM micrographs for untreated PALF 25
Figure 4: Showing SEM micrographs for treated PALF 26

ABBREVIATIONS/ACRONYMS

PET……..Polyethylene terephthalate

PALF……Pineapple leaf fiber

PP…….Polypropylene

HDPE……High density polyethylene

LDPE……..Low density polyethylene

EG…….. Ethylene glycol

TPA…….Terephthalic acid

PTA……..Purified terephthalic acid

PVC…….Polyvinyl chloride

UNEP……United Nations Expanded Program

NaOH……Sodium hydroxide

PMC……..Polymer matrix composite

UIRI…….Uganda Industrial Research Institute

ASTM…….American standard of testing materials

ISO……..International standards organization

NEMA…….National environment management authority

Kg……Kilograms

ICBP…….. Interlocking Concrete Block Pavers