BUSITEMA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF TEXTILE AND GINNING ENGINEERING

BACHELOR OF SCIENCE IN TEXTILE ENGINEERING

PRODUCTION OF PACKAGING BAGS FROM PAPER BLEND OF CORN STALKS AND COTTON COMBER WASTES USING DIFFERENT DELIGNIFYING COMPOUNDS.

LWANDAGO Hajarah

BU/UG/2012/149

Email:hajarahlwandago263@gmail.com

Tel: +256 705 264 987

SUPERVISORS

1. MADAM TUSIIMIRE YVONNE
2. MR SENDAULA CHARLES

Final project report submitted as a partial fufilment of the requirement for the award of bachelor's degree in textile engineering at Busitema university.

May 2016

DECLARATION

I LWANDAGO HAJARAH, declare that the work presented in this report is my own and has never been presented to any University or higher institute of learning for any academic award.

Signature.....

Date.....18/5/2016.....

APPROVAL

This research project report has been submitted to the Department of Textile and Ginning Engineering for examination with approval from the following supervisors:

Main supervisor: Madam Yvonne Tusiimire

Signature……

Date……

Co- supervisor: Mr. Sendaula Charles

Signature……

Date……

ACKNOWLEDGEMENT

All glory and thanks go to ALLAH, who has granted me the gift of life and a chance to reach this moment of report writing.

To my lovely supervisors, Madam Yvonne and Mr. Sendaula Charles, I sincerely appreciate you for all the time, support, guidance, knowledge and advice that you readily provided during the preparation of this report, may your prayers in life always be answered. More thanks go to the entire staff of Textile and Ginning Engineering and all those who readily gave me a go ahead to work on this project with guidelines to follow.

Lastly to all my fellow students who rendered all that was within their reach towards the accomplishment of this project, only ALLAH the almighty can reward you generously for only HE knows how to reward the good work of HIS creations.

DEDICATION

I dedicate this report to my beloved parents Mr. and Mrs. Senyomo Nurdin who have seen me through my academic trying moments.

LIST OF ACRONYMS AND ABBREVIATIONS

BOS – Uganda bureau of Statistics

TAPPI – Technical Association of the Pulp and Paper Industry

ISO – International Organization for Standardization

GSM – Grams per Square Meter

ABSTRACT

The main objective of the study was to produce packaging bags from paper blend of com stalks and cotton comber wastes. The use of cotton comber waste and sorghum stalks for manufacturing packaging paper will not only help in solving the disposal of this agro-waste but also fetch additional income to the farming community.

Pulp mill based on sorghum stalk and cotton stalk can be small scale and community based. Optionally, a large-scale mill may be used depending on the availability of cornstalk and supply logistic of cotton stalk. Alternatively, it is to establish a mini mill at the center of the com growing area where farmers will have their own storage facility and will transport the materials to the mill at a schedule set by the mill.

LIST OF FIGURES

Figure 1: Global production of paper by 2013 3
Figure 2: Layout of process parameters undertaken. 16
Figure 3: Drying under the sun. 18
Figure 4 : Paper bag formation Figure 5: Paper bags formed. 19
Figure 6: A GSM test machine 21
Figure 7: The graph showing the variations in basis weight of papers produced using different delignifying compounds 21
Figure 8: The graph showing the variations in burst strength of papers produced using different delignifying compounds 23
Figure 9: The graph showing the variations in water absorbence of papers produced using different delignifying compounds 24
Figure 10: The graph showing the variations in tear strength of papers produced using different delignifying compounds 25

LIST OF TABLES.

Table 1: Different delignifying compounds..... 4
Table 2 : Production statistics of maize corn in Uganda. 10
Table 3: Designations used for different material ratios..... 20
Table 4: Basis weight(g/m^2) of paper samples produced using different delignifying compounds. 21
Table 5 : Burst strength(Kg/cm^2) of paper samples produced using different delignifying compounds. 22
Table 6 : Moisture absorbance (Kg/cm^2) of paper samples produced using different delignifying compounds. 24
Table 7 : Tear strength(Kg/cm^2) of paper samples produced using different delignifying compounds. 25
Table 8: General project work plan. 27

Table of Contents

DECLARATION i

APPROVAL ii

ACKNOWLEDGEMENT iii

DEDICATION iv

LIST OF ACRONYMS AND ABBRIEVIATIONS v

LIST OF FIGURES vi

LIST OF TABLES vii

CHAPTER ONE: INTRODUCTION 1

1.1 Back ground 1

1.2 Problem statement 5

1.3 Objectives 5

1.3.1 Main objective 5

1.3.2 Specific objective 5

1.4 Justification of the study 5

1.5 Scope of the study 6

1.6 Significance of the study 6

CHAPTER TWO: LITERATURE REVIEW 7

2.1 The chemical composition of the raw materials for paper making 8

2.2 Existing Researches on handmade papers from corn and cotton stalks 11

2.3 Paper properties 13

CHAPTER THREE: METHODOLOGY 15

3.1 Detailed process parameters that were undertaken 16

CHAPTER FOUR :RESULTS AND DISCUSSIONS 19

CONCLUSION 26

WORK PLAN 27

REFERENCES 28

CHAPTER ONE: INTRODUCTION

This presents the general information about the research topic giving its background, problem statement, objectives, study scope and its justification.

1.1 Back ground

Paper is a thin material produced by pressing together moist fibers of cellulose pulp derived from wood, rags or grasses, and drying them into flexible sheets. Paper and the pulp papermaking process is said to have been developed in China during the early 2nd century AD, possibly as early as the year 105 A.D.(Hogben, Lancelot et al) by the Hancourt eunuch Cai Lun, although the earliest archaeological fragments of paper derive from the 2nd century BC in China.(Tsien 1985) The modern pulp and paper industry is global, with China leading its production and the United States right behind it.

The word "paper" is originally derived from Latin papyrus, the Greek πάπυρος (papuros), the word for the Cyperus papyrus plant.(Henry George Liddell) Papyrus is a thick, paper-like material produced from the pith of the Cyperus papyrus plant which was used in ancient Egypt and other Mediterranean cultures for writing before the introduction of paper into the Middle East and Europe. Although the word paper is etymologically derived from papyrus, the two are produced very differently and the development of the first is distinct from the development of the second. Papyrus is a lamination of natural plant fibers, while paper is manufactured from fibers whose properties have been changed by maceration (Tsien 1985). The first paper-like substance was invented by the Egyptians over 6,000 years ago. Papyrus, which is the root of our English word paper, was made by weaving reeds or other fibrous plants together and pounding them into a flat sheet. The Greeks and the Romans also used this technique, although some Ancient Greek paper makers were the first to create a kind of parchment paper made out of animal skins. Chances are, Aristotle, Socrates and other Greek philosophers originally wrote their books on the skins of dead cows.

REFERENCES

1. Hogben, Lancelot. "Printing, Paper and Playing Cards". Bennett, Paul A. (ed.) Books and Printing: A Treasury for Typophiles. New York: The World Publishing Company, 1951. pp. 15-31. p. 17.
2. Mann, George. Print: A Manual for Librarians and Students Describing in Detail the History, Methods, and Applications of Printing and Paper Making. London: Grafton & Co., 1952. p. 77
3. Murray, Stuart A. P. "The Library: An illustrated History". Sky horse Publishing, 2009, p 57.
4. Henry George Liddell, Robert Scott, A Greek-English Lexicon, on Perseus
5. McKenzie, Bruce G., The Hammer mill Guide to Desktop Publishing in Business, p. 144, Hammer mill Papers, 1989.
6. Johnson, Arthur (1978). The Thames and Hudson Manual of Bookbinding. London: Thames and Hudson.
7. Bergmann, Christopher J. (1993). Handbook of Pulping and Papermaking. San Diego: Academic Press. ISBN 0-12-097360-X.
8. Clark, James dean. (1985). Pulp Technology and Treatment for Paper (2nd ed.). San Francisco: Miller Freeman Publications. ISBN 0-87930-164-3.
9. Fabbri, Claudia; Bietti, Massimo; Lanzalunga, Osvaldo. "Generation and Reactivity of Ketyl Radicals with Lignin Related Structures. On the Importance of the Ketyl Pathway in the Photoyellowing of Lignin Containing Pulps and Papers". J. Org. Chem 2005 (70): 2720–2728. doi:10.1021/jo047826u.
10. Erhardt, D.; Tumosa, C. (2005). "Chemical Degradation of Cellulose in Paper over 500 years". Restaurator: International Journal for the Preservation of Library and Archival Material 26: 155. doi:10.1515/rest.2005.26.3.151.
11. "The Deterioration and Preservation of Paper: Some Essential Facts". Library of Congress. Retrieved 7 January 2015. Research by the Library of Congress has demonstrated that cellulose itself generates acids as it ages, including formic, acetic, lactic, and oxalic acids

12. Martin, Sam (2004). "Paper Chase". Ecology Communications, Inc. Archived from the original on 19 June 2007. Retrieved 21 September 2007.
13. EPA (28 June 2006). "General Overview of What's In America's Trash". United States Environmental Protection Agency. Retrieved 4 April 2012.
14. Groll, T. 2015 In vielen Büros wird unnötig viel ausgedruckt, Zeit Online, 20 June 2015.
15. "Effluents from Pulp Mills using Bleaching - PSL1". ISBN 0-662-18734-2DSS. Health Canada. 1991. Retrieved 21 September 2007.
16. "Dioxins and their effects on human health". World Health Organization. June 2014. Retrieved 7 January 2015. More than 90% of human exposure is through food
17. PaperFoam Carbon Friendly Packaging
18. Barrier compositions and articles produced with the compositions cross-reference to related application
19. Johnson, Arthur (1978). *The Thames and Hudson Manual of Bookbinding*. London: Thames and Hudson.