



**BUSITEMA  
UNIVERSITY**  
*Pursuing Excellence*

**FACULTY OF ENGINEERING  
DEPARTMENT OF TEXTILE AND GINNING  
BSc. TEXTILE ENGINEERING  
FINAL YEAR PROJECT REPORT**

**MUSOKE RASHID**

**BU/UG/2012/151**

**Email: [musraemma@gmail.com](mailto:musraemma@gmail.com)**

**Tel: 0706654220 / 0782517235**



**TOPIC:**

**PRODUCTION OF HANDMADE POLISHED PAPER FROM  
MAIZE COBS AND ITS BLENDS WITH WASTE PAPER**

A PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF THE BACHELOR OF SCIENCE IN TEXTILE ENGINEERING OF BUSITEMA UNIVERSITY.

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## ABSTRACT

Maize cobs are a by-product of the maize crop (*Zea Mays L.* [Poaceae]), consisting of the central fibrous rachis of the female inflorescence (the maize "ear"). While the whole maize ear (with the grains, with or without the husks) is also sometimes called a maize cob, this data sheet concerns only the maize cob without the grains and basically how we can add value to them through making handmade paper. Since this waste (maize cobs) is highly fibrous material, it is normally used for a number of industrial and agricultural applications like as fuel, litter for poultry and other animals, mulch, soil conditioner and as fodder for ruminants despite their low nutritive value (Evers et al., 1994; Jansen, 2012). While their absorbency and abrasiveness makes them useful for several industrial applications that is; absorb finishing fluids (oil and water) in industrial applications and also help to clean up industrial or environmental spills. They are excellent carriers for vitamins and antibiotics in animal feed, and for herbicides and pesticides in lawn care products. They are used for the production of chemicals such as furfural or the sugar replacement xylitol. Maize cobs are used to blast and polish many materials, from jewelry, nuts and bolts, to golf club heads. More recently, maize cobs were reported to be a potential cheap and promising source for sustainable energy production (Evers et al., 1994; Jansen, 2012; Göhl, 1982). In addition, maize cobs are a feed ingredient of low nutritive value, roughly similar to straw or poor hay. They also contain little protein (about 5% DM) and are mostly composed of fiber (NDF more than 80% DM). However, the lignin content is relatively low for such a fibrous product. During paper making, we initially add delignin components like NaOH or KOH to the crushed cobs in order to totally eliminate the lignin component and then follow the standard procedure for handmade paper making (Kraft pulping process). Through handmade paper making, we shall be able to make highly value-able products made of hard and soft paper from maize cobs like egg-trays, soft boards, hardboards, particle boards as well as plain paper with various chemical (bio-degradable) and non-chemical surface finishes for making paper bags, printing papers, cover papers and box papers. This handmade paper making technology will therefore provide a cost-effective means of making paper for various products since the maize cobs are readily available from the local maize processing firms/mills. It will also reduce on the need to use wood pulp for paper making which has greatly caused deforestation in the practicing countries.

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## DECLARATION

I Musoke Rashid do declare that the content of this report is original and was derived from the processes I followed while producing my research papers. The results are according to the tests which were carried out and conclusions drawn were based on them.

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## APPROVAL

I, Musoke Rashid hereby submit my research project proposal for approval to my beloved supervisors.

### MAIN SUPERVISOR

NAME: MR. MUSINGUZI ALEX

SIGNATURE: .....

DATE: .....

### CO-SUPERVISOR

NAME: MS. TUSHIMIRE YVONNE

SIGNATURE: .....

DATE: .....

## LIST OF ACRONYMS

- USA – United States of America
- UCA – Ugandan Census for Agriculture
- UNHS - Uganda National Household Survey
- GSM – Grammes per Square Meter
- MUF – Melamine Urea Formaldehyde
- DNA – Deoxy-nucleic acid
- FAO – Food Agricultural Organization
- UBC-TV – Uganda Broadcasting Television
- AKD – Alkyl Ketene Dimer
- ASD – Alkenyl Succinic Anhydride
- pH – Potential Hydrogen
- Kg/ha – kilogram me per hectare
- Ha – Hectare
- Mt – Million Tones
- Agri-Forum – Agricultural Forum
- KCCA – Kampala Capital City Authority
- KACITA – Kampala City Traders Association
- NEMA – National Environmental Management Authority

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# CHAPTER ONE

## 1.0 INTRODUCTION

Corn (maize) is an important food for many people in Africa, Asia and Latin America and is used in animal feeding in North America and some parts of the world. In sub-Saharan Africa, corn is a staple food for an estimated 50% of the population IITA, 2009 and it remains the most important agricultural crop for over 70 million farm families worldwide. Corn is used as human food in the form of tortillas, porridge, popcorn and barbecues and as forage and silage for animals. It is also a good source of industrial products such as starch (Zhang *et al.*, 2012), vitamin (Warman and Havard, 1998), fiber (Pandya and Srinivasan, 2012), oil (Cominet *et al.*, 2012) and ethanol (Lamsalet *al.*, 2011). The global corn production increased from 599.35-867.52 million tonnes (44.74% increase) during the period of 2001-2011 (USDA, 2011), which is much higher than the increase in the world population of 12.34% (6.16-6.92 billion) during the same period. The estimated value of global corn production in 2011 was US\$ 199.53 billion. Cobs, leaves and stalks are important residues of corn processing and consumption. For every 1 kg of dry corn grains produced, about 0.15 kg of cobs, 0.22 kg of leaves and 0.50 kg of stalks are produced (Sokhansanjet *al.*, 2002; 2010 (USDA, 2011). This results the production of about 130.13, 190.85 and 433.76 million tonnes of cobs, leaves and stalks in 2011, respectively.



*Figure 1: maize farmers' harvests*



*Figure 2: piles of waste cobs*

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