



**BUSITEMA
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Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF TEXTILE AND GINNING ENGINEERING

**DEVELOPMENT OF A BIOACTIVE FABRIC USING DYE EXTRACTS
FROM SELECTED INDIGENOUS MEDICINAL PLANT SPECIES**

BY

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DECLARATION

I GUMISIRIZA Onesmas Registration Number BU/UG/2012/144 do hereby declare that this research project is my original work and has never been submitted to any higher institute of learning for any academic award.

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APPROVAL

I hereby submit in a research project for approval under the supervision of the following supervisors;

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ABSTRACT

In this context, the antimicrobial activity of 100% plain woven scoured and bleached cotton fabric sample, and 100% degummed and bleached hand knitted fabric dyed with the extracts from *Aloe Vera*, *Bidens Pilosa*, *Datura stramonium*, *Ricinus. Communis* and *Galinsoga Parviflora* plant species was investigated against two strains of *Staphylococcus aureus* (gram-positive bacterial) and *pseudomonas aeruginosa* (gram-negative bacteria). The dye extracts from medicinal plants were added onto both fabric samples using post mordanting method with two mordants vis Alum and Iron II Sulphate. The present study has revealed the importance of using natural dyed fabrics to control antibiotic resistant bacteria, which have been a threat to human health and posed noticeable challenges confronted with medical physicians in the treatment of many infectious diseases. Among the five plant species, only four that is, *Aloe Vera*, *Bidens Pilosa*, *Datura stramonium* and *Ricinus. Communis* showed positive results on both fabric samples against the two selected bacteria strains.

Keywords: Bioactive, Medicinal plants, Antimicrobial activity, *pseudomonas aeruginosa* and *Staphylococcus aureus*

LIST OF ACRONYMS

- ATCC - American Type Culture Collection
- AATCC - American Association of Textile Chemists and Colorists
- ISO - International Standards Organisation
- JIS - Japanese Industrial Standards
- MRSA - Multiresistant Staphylococcus Aureus
- SN - Swiss Norm
- O.W.F - On Weight of Fabric
- WHO - World Health Organization
- MIC - Minimum Inhibitory Concentration
- MHA - Mueller Hinton Agar

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CHAPTER ONE

1.0 Introduction

1.1 Background of the study

Textiles play an important role in the daily lives of humans, and the demand for various quality attributes of them are based on enhancing the properties through proper finishing (*Resmi & Amsamani, 2014*). Textiles are excellent substrates for bacterial growth and microbial proliferation under appropriate moisture, nutrients and temperature conditions. Natural fibres are more liable to bacterial attack than synthetic fibres due to their porous and hydrophilic nature. The structure of natural fibers retains water and oxygen along with nutrients, in that way offering optimal environment for microbial growth (*A Khan et al, 2012*). On the other hand, direct contact with human body supplies warmth, humidity and nutrients, which provides a perfect environment and optimal conditions for microbial growth. (*Hooda et al. 2013*).

The term bioactive refers to a substance having an effect or causing a reaction in the living animal or plant tissue exposed to it thus a bioactive material is the one that induces a specific biological activity (*Elmajdoub et al, 2014*). Natural bioactive compounds with antimicrobial properties are gaining considerable attention as attractive eco-friendly alternative to synthetic antimicrobial agents for textile applications, especially in medical and health care textiles, as they are safe, non-toxic and skin-friendly (*Duangrsri et al. 2014*). The purpose of imparting antimicrobial activity to textiles is to protect the material from microbial attack, prevent the transmission and spreading of pathogenic microorganisms, inhibit odour development resulting from microbial degradation, and creating a material that will act as preventive or curative treatment (*Gao et al, 2004*). Although there are many natural products with antimicrobial agents, the study of their use in textiles is very limited and not well documented.

In developing countries Uganda inclusive, rapid urbanization increases overcrowding in slum areas, exacerbating the problem of skin diseases. Families often sacrifice part of their overstretched household budgets trying to treat the infections, only to see them reappear. Thus, controlling skin diseases through simple but effective public health measures is necessary and

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