

BUSITEMA UNIVERSITY

**FACULTY OF ENGINEERING AND
TECHNOLOGY**

**DEPARTMENT OF POLYMER, TEXTILE AND INDUSTRIAL
ENGINEERING**

FINAL YEAR PROJECT REPORT

**CHARACTERIZATION AND OPTIMIZATION OF DYEING
PROCESS PARAMETERS ON COTTON FABRICS WITH
IPOMEA BATATAS CRUDE LEAF EXTRACT.**

By

APIO REBECCA

KATUSABE ABIGAIL NABIRYE

**A final year research project submitted to the department of polymer
textile and industrial engineering as partial fulfillment for the award of
Bachelor of Science in polymer, textile and industrial engineering**

MAY, 2025



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By

APIO REBECCA

(BU/UG/2021/0342)

KATUSABE ABIGAIL NABIRYE

(BU/UG/2021/0084)

SUPERVISORS

PROF.AARON WANYAMA

DR.ALEX MUSINGUZI

MR.DAN TIGALANA

MAY, 2025

ABSTRACT

This dissertation reports a project aimed at extracting a natural dye from *Ipomea batatas* leaves and optimization of the dyeing process parameters, thus temperature, time, mordant, and dye concentration. Aqueous extraction method was used to obtain a crude dye solution from the dried pulverized *Ipomea batatas* leaves because of its eco friendliness, the high yield of the dye and its inability to degrade the bioactive compound. Tests were carried out to identify the bio active compounds. Ferric chloride test identified anthocyanins (responsible for color), Fourier Transform Infrared Spectroscopy (FTIR) identified the functional groups, Ultra Violet Visible Spectroscopy (UVVS) measured anthocyanins and the pH was analyzed. The cotton fabrics were dyed using a dye bath for the different experiments (31) and dyeing process parameters were optimized using Response Surface Methodology which gave optimum values as (62.9113 °C, 55.7053minutes, 96.5212g, and 1.2313g): temperature, time, concentration and mordant respectively. The fabrics were dyed with optimum parameters then evaluated for color fastness to perspiration and rubbing. Dyed cotton fabrics had a brown shade with well acceptable limits (4) for dry and wet rubbing and (4-5, 4) for acidic and alkaline perspiration respectively which aimed at commercial textile applications.

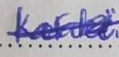
Key words; natural dyes, anthocyanins, cotton fabrics, optimization

DECLARATION

We APIO REBECCA, Reg no BU/UG/2021/0342 and KATUSABE ABIGAIL NABIRYE, Reg no BU/UG/2021/0084 hereby affirm to the best of our knowledge and understanding that the material presented in this report is a personal compilation of our work except where citation has been done and the report has never been presented to any institution of higher learning for any academic award.

Signature.....

Date... 16TH, MAY, 2025

Signature.....

Date... 16TH, MAY, 2025

APPROVAL

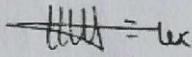
This project entitled “Characterization and optimization of dyeing process parameters on cotton fabrics with *Ipomea batatas* crude leaf extract” has been written under the supervision of;

PROF. WANYAMA AARON

Signature:.....

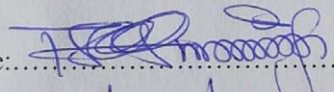
Date:.....

DR.MUSINGUZI ALEX

Signature:..... 

Date:.....15th May 2025.....

MR. TIGALANA DAN

Signature:..... 

Date:.....15/05/2025.....

DEDICATION

We dedicate this report to all our supervisors, lecturers, friends and our families

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First and foremost, we would like to thank the Almighty God for giving us life, knowledge, protection and all other requirements that we used for collecting the necessary information used in the compilation of this final year project report.

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LIST OF ABBREVIATIONS

RSM	Response Surface Methodology
CCD	Central Composite Design.
ISO	International Standards Organization
UVVS	Ultraviolet Visible Spectroscopy
FTIR	Fourier Transform Infra-red Spectroscopy
FAO	Food and Agriculture Organization
SDG	Sustainable Development Goal

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