

BUSITEMA UNIVERSITY

Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF TEXTILE AND GINNING ENGINEERING

EVALUATION OF DYE FROM *INDIGOFERA ARRECTA* PLANT SPECIES FOR SILK AND
COTTON FABRICS COLOURATION

BY

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23RD MAY 2014

DECLARATION

I KANENE LEVI BRIAN do hereby declare that this research project is my original work and has never been submitted to any higher institute of learning.

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APPROVAL

I hereby submit in this research report with permission from the following supervisors;

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ACKNOWLEDGEMENT

I am so much indebted to God for the success of this project; His sufficient grace carried me on in the darkest moments.

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DEDICATION

I dedicate this project report to my parents, Mr. Bulima Noah and Mrs. Bulima Prossy, for their devotion toward my growth. May God continually bless you.

ABSTRACT

The study evaluated the dye from *indigofera arrecta* plant leaves for silk and cotton fabrics colouration. The effects analysed are colour fastness, colour shades and dyeing conditions. The direct aqueous extraction method was used to extract the dye. The mordants which were used for dyeing were; alum, iron water, ash water and sodium chloride. The mordanting methods used include; pre-mordanting, simultaneous mordanting, post mordanting and combined pre-and post mordanting.

In the control dyeing, without the use of mordants, average fastness ratings were registered viz; for washing (2-3), dry rubbing (4), wet rubbing (3) and light (4). The natural dye is therefore substantive since it has average fastness even without mordants. The use of mordants generally improved colour fastness for most mordants with post mordanting method registering the best results. Multiple colours were produced with different mordants therefore the plant leaves possess a polygenetic dye. It was observed that cotton fabrics did not pick the dye.

Furthermore, it is found that the colour fastness of the dye on silk fibre increased with increase in dyeing time. Similarly the fastness increased with increase in temperature till (85^o C) and then decreased. Optimum dyeing was observed at 60^oC for a dyeing time of 35 minutes.

Considering dyeing conditions and colour fastness, dye from *indigofera arrecta*, using the direct aqueous method, is highly applicable in the dyeing of silk fibre.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Nature expresses itself in a wide spectrum of colours all around us. The alchemy of colours started from an early time. The advent of synthetic dyes caused rapid decline in the use of natural dyes, which were completely replaced by the former within a century. Earlier understanding of dyeing techniques and their application was empirical and was not backed by scientific reasoning. Natural dyeing had developed as a folk art. However, in recent times the dyeing technique is interpreted on sound scientific principles (Padma, 2000).

Uganda has a rich biodiversity. It harbours a wealth of useful resources and there is no doubt that the plant kingdom is a treasure-house of diverse natural products. One such product from nature is dyes. A few publications on dyes from Uganda have generated a fresh interest on this aspect. Recently, over forty (40) plants with potential of yielding dyes of good characteristics for application in the textile industry were identified in Uganda (Wanyama *et al.*, 2010). Another recent study shows that dyes from the leaves of coffee and mulberry can effectively be used for dyeing silk fabrics (Loum and Drajoru, 2013).

The major sources of natural dyes are: specialised plants and animals (Padma, 2000), arthropods and marine invertebrates (*e.g.*, sea urchins and starfish), algae (*e.g.*, blue-green algae), bacteria and fungi such as (*Drechslera* which produces anthraquinone derivatives, as secondary metabolites), and Production from by-products (especially lac dye which is extracted from the effluent (Sengupta and Singh, 2003 and Padma, 2000).

Dyes are one of the most important uses of plants. They are related with cultural practices, rituals, arts and crafts, fabrics and for the satisfaction of personal embodiment. However, dye yielding plants have not received significant attention. Recently, interest in the use of natural dyes has been growing rapidly due to the result of stringent environmental standards imposed by

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