

**UNIVERSITI TEKNOLOGI MARA**

**COLOUR PROPERTIES AND  
COLOURFASTNESS OF  
POLYESTER TREATED FABRICS  
DYED WITH *Melastoma  
Malabathricum* L. USING  
ULTRASOUND ASSISTED  
EXTRACTION & DYEING  
METHODS**

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## ABSTRACT

In this study, attempts were made to dye polyester fabric with natural colourants extracted from *Melastoma malabathricum* L. (or also known as senduduk). The fabric was first treated with sodium hydroxide and chitosan prior to dyeing in an attempt to increase the dye uptake on the structurally compact fibre of polyester. A comparative study in extraction and dyeing using ultrasonic and conventional techniques were investigated. The colour properties of the colourants were measured using colour spectrophotometer and the colour fastness of the dyed fabrics were evaluated for washing, crocking, light and perspiration. It was found that the extracts from ultrasound assisted extraction gave higher yield percentage and exhibited the original colour of the raw material, some 23.81% improvement in the dye yields as compared with the boiling technique. The utilization of ultrasound in dyeing also gave a significant improvement with increased dye uptake and shortened the duration of dyeing. Evaluation from the colour spectrophotometer indicated improvements in L\* and K/S values for samples treated with alkaline and chitosan. The alkaline treated fabrics were darker in colour as compared with the untreated and chitosan treated fabrics. Polyester treated with chitosan only gave a significant effect when dyed with the powdered dyes of *Melastoma Malabathricum* L. The addition of mordant in dyeing polyester with *Melastoma Malabathricum* L. resulted in some shade variations, from beige to brown. The use of metal mordant, iron II sulphate, gave darker shades and changed the hue of the polyester fabric to grey colour. The ratings for colour fastness to washing were 3 to 5 indicating moderate to good ratings. The staining on polyester and cotton were 4 to 5, which is rated as good.

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# TABLE OF CONTENTS

	<b>Page</b>
<b>CONFIRMATION BY PANEL OF EXAMINERS</b>	ii
<b>AUTHOR'S DECLARATION</b>	iii
<b>ABSTRACT</b>	iv
<b>ACKNOWLEDGMENTS</b>	v
<b>TABLE OF CONTENTS</b>	vi
<b>LIST OF TABLES</b>	ix
<b>LIST OF FIGURES</b>	x
<b>LIST OF ABBREVIATIONS</b>	xii
<b>CHAPTER ONE: INTRODUCTION</b>	1
1.1 Background of the Study	1
1.2 Problem Statement	2
1.3 Research Objectives	3
1.4 Scope and Limitations	4
1.5 Significance of the Study	4
<b>CHAPTER TWO: LITERATURE REVIEW</b>	6
2.1 Introduction	6
2.2 Natural Dyes	7
2.3 <i>Melastoma malabathricum</i> L.	10
2.4 Polyester Fabrics	12
2.5 Surface Modification	15
2.6 Natural Dyes Extraction	17
2.6.1 Conventional Method	17
2.6.2 Other Methods	17
2.6.3 Ultrasound Assisted Extraction	18
2.7 Ultrasound Dyeing	21

# CHAPTER ONE

## INTRODUCTION

### 1.1 BACKGROUND OF STUDY

Dyes and colourants from natural sources are getting more attention today due to the call for green and environmental sustainability. The society is now more concern on the widely and commercially used of synthetic dyes because of carcinogenic issues and inhibition of benthic photosynthesis even though it possesses strong colour reveals (Adeel et al. 2009). As a precaution step, Germany was the first to take initiative to put ban on numerous specific azo-dyes in manufacturing and applications of various products. Other countries such as Netherlands and India have subsequently followed and pursued the ban (Patel, 2011). Consequently, the use of natural dyes in the colouration of textile materials and other purposes were boosted up with the support of those environmental awareness (Alam et al. 2007) and eco-friendly approach to the community and nature. Natural dyes have better biodegradability with the environment plus they are non-allergic to the skin, non-carcinogenic, simple, readily available and can be replenished (Adeel et al. 2009; Pruthi, Chawla, & Yadav, 2008). Until the advent of synthetic dyes in the second half of the nineteenth century, all colouring matters was derived directly from vegetable or animal sources (Giles, 1971). Colouring agents from plants are derived from roots, leaves, barks, trunks or fruits (Adeel et al. 2009) while animal natural dyes such as cochineal and Thyrian purple are mainly obtained from shellfish, mollusks and dried bodies of insects. They are processed generally by mechanical ways like grinding, crushing and steeping in water to extract the coloured liquid and then dyed on the textile fabric. The extraction and dyeing process usually performed under various conditions such as temperature, time, liquor ratio and pH. Most natural dyes are often applied to cellulosic and protein fibres such as cotton, wool or silk. The poor substantivity and fastness properties of natural dyes are often improved if the fabric is treated with metal salt known as mordant which can help to fix the dye to the fibre