

CONTENTS

<i>List of Tables</i>	<i>iv</i>
<i>List of Figures</i>	<i>x</i>
1 Introduction	1
1.1 Statement of the problem	1
1.2 Objective of the Research	2
1.3 Delimitation of the Study	2
1.4 Scope of the Study	3
2. Review of Literature	4
2.1 Natural dyes	4
2.1.1 Introduction	4
2.1.2 Historical Perspective	5
2.1.3 Advantages and Limitations	6
2.1.4 Classification of Natural Dyes	7
2.1.5 Extraction Methods	15
2.1.6 Mordants	16
2.1.7 Mixed or Compound shades of natural dyes	19
2.2 Cotton	20
2.3 Compatibility of dyes	24
2.4 Introduction to Computer Color Matching	25
2.5 Research Review	30
2.5.1 Research Review related to Natural Dyes Used in the Present Study	31
2.5.2 Research Review related to Compatibility Assessment Methods	45
2.5.3 Research Review related to Compatibility of Dyes in Combination	49
3. Materials and Methods	53
3.1 Materials Used	53

3.1.1 Cotton Fabric	53
3.1.2 Chemicals, Dyes and Auxiliaries	54
3.1.3. Instruments and Apparatus	57
3.2 Methods	58
3.2.1 Pilot Study	58
3.2.2. Experimental Study	61
3.3 Testing and Evaluation	67
3.3.1 Optical Density measurement	67
3.3.2 Computer Color Measurement using Spectrophotometer	67
3.3.3 Compatibility Evaluation	67
3.3.4 Color Fastness Evaluation	70
3.3.5 Anti-Microbial Testing	72
4. Results and Discussion	73
4.1 Pilot Study	73
4.1.1 Optimization of Extraction parameters for all the selected dyes	73
4.1.1.1 Red/Orange tone Dyes	74
4.1.1.2 Brown Dyes	80
4.1.1.3 Yellow Dyes	86
4.1.1.4 Optimized Extraction Parameters for dyes	90
4.1.2 Optimization of Dyeing Parameters	90
4.1.2.1 Red/Orange tone Dyes	91
4.1.2.2 Brown Dyes	98
4.1.2.3 Yellow Dyes	105
4.1.2.4 Common Dyeing conditions for dye mixtures	109
4.1.2.5 Effect of Alkaline pH	111
4.2 Experimental Study	112
4.2.1 Dyeing Results and Compatibility Assessment for dye mixtures	113

4.2.1.1 Dyeing Results and Compatibility Assessment for binary mixtures	113
4.2.1.1.1 Compatibility Assessment Methods	127
4.2.1.1.2 Summary of Different Method's results and overall rating	165
4.2.1.2 Dyeing results and Compatibility Assessment for Tertiary mixtures	169
4.2.1.2.1 Compatibility Assessment Methods	178
4.2.1.2.2 Summary of Different Method's results and overall rating	206
4.2.2 Dyeing Results of Primary Dyes	209
4.2.3 Prediction of Recipe and Dyeing of Samples as per standard	216
4.3 Color Fastness Tests	230
4.4 Anti-Microbial testing results	240
5. Conclusions	241
Bibliography	245
<i>Appendix</i>	254
<i>Appendix I Sample Scan</i>	
<i>Samples Dyed with Primary Dyes</i>	254
<i>Samples Dyed with 12 Binary Mixtures</i>	255
<i>Samples Dyed with 8 Tertiary Mixtures</i>	258
<i>Appendix II Abbreviations</i>	
<i>Appendix III Paper Published and Presented</i>	