

## LIST OF TABLES

<i>Sr. No.</i>	<i>Table No.</i>	<i>TABLE DESCRIPTION</i>	<i>Page No.</i>
1	2.1	<i>Details of Red/Similar Color Natural Dyes</i>	10
2	2.2	<i>Details of Yellow/Similar Color Natural Dyes</i>	11
3	2.3	<i>Details of Blue/Similar Color Natural Dyes</i>	12
4	2.4	<i>Details of Brown/Similar Color Natural Dyes</i>	12
5	2.5	<i>Classification of some natural dyes based on application properties</i>	14
6	2.6	<i>Classification of some of Natural dyes based on Structure</i>	14
7	2.7	<i>Typical Composition of Raw Cotton</i>	20
8	3.1 (A & B)	<i>Details of dyes used</i>	54
9	3.2	<i>Experimental setup for Extraction Optimization</i>	58
10	3.3	<i>Experimental Setup for Optimization of Dyeing Parameters</i>	59
11	3.4	<i>Dyeing Conditions for selected dyes as per Box Behnken Design of Experiment</i>	60
12	3.5	<i>Details of Binary Mixture</i>	62
13	3.6	<i>Details of Tertiary Mixture</i>	62
14	3.7	<i>Dyeing conditions of Set I for Binary and Tertiary mixtures</i>	63
15	3.8	<i>Dyeing Conditions of Set II for binary and tertiary mixtures</i>	64
16	3.9	<i>Concentration of dye material for primary dyes samples</i>	64
17	3.10	<i>List of Pantone standards for recipe prediction</i>	66
18	4.1	<i>Experimental setup for Extraction Optimization</i>	73
19	4.2	<i>Optical density/absorbance of aqueous extract of Annatto dye at various extraction conditions</i>	74
20	4.3	<i>Optical density/absorbance of aqueous extract of Madder dye at various extraction conditions</i>	76
21	4.4	<i>Optical density/absorbance of aqueous extract of Sappanwood dye</i>	78

		<i>at various extraction conditions</i>	
22	4.5	<i>Optical density/ absorbance of aqueous extract of Babool dye at various extraction conditions</i>	80
23	4.6	<i>Optical density/ absorbance of aqueous extract of Katha dye at various extraction conditions</i>	82
24	4.7	<i>Optical density/ absorbance of aqueous extract of Rhubarb dye at various extraction conditions</i>	84
25	4.8	<i>Optical density/ absorbance of aqueous extract of Marigold dye at various extraction conditions</i>	86
26	4.9	<i>Optical density/absorbance of aqueous extract of Pomegranate dye at various extraction conditions</i>	88
27	4.10	<i>Optimized extraction conditions for dyes</i>	90
28	4.11	<i>CIEL*,a*,b*,C*, h and K/S values of Annatto dyed samples</i>	91
29	4.12	<i>CIEL*,a*,b*,C*, h and K/S values of Madder dyed samples</i>	93
30	4.13	<i>CIEL*,a*,b*,C*, h and K/S values of Sappanwood dyed samples</i>	95
31	4.14	<i>Optimum dyeing conditions and K/S for three Red/Orange tone dyes</i>	97
32	4.15	<i>CIE a*, b*, and h values of three red/orange tone dyes at pH 7, temperature - 95° C, time – 60 min</i>	97
33	4.16	<i>CIEL*,a*,b*,C*, h and K/S values of Babool dyed samples</i>	98
34	4.17	<i>CIEL*,a*,b*,C*, h and K/S values of Katha dyed samples</i>	100
35	4.18	<i>CIEL*,a*,b*,C*, h and K/S values of Rhubarb dyed samples</i>	102
36	4.19	<i>Optimum dyeing conditions and K/S for three brown dyes</i>	104
37	4.20	<i>CIE a*, b*, and h values of three brown dyes at pH 7, temperature - 95° C, time – 60 min</i>	104
38	4.21	<i>CIEL*,a*,b*,C*, h and K/S values of Marigold dyed samples</i>	105
39	4.22	<i>CIEL*,a*,b*,C*, h and K/S values of Pomegranate dyed samples</i>	107
40	4.23	<i>Optimum dyeing conditions and K/S for two Yellow dyes</i>	109
41	4.24	<i>CIE a*, b*, and h values of three Brown dyes at pH 7, temperature - 95° C, time – 60 min</i>	109

42	4.25	<i>Optimum and common dyeing conditions for all dyes</i>	110
43	4.26	<i>CIEL*, a*, b*, C*, h and K/S values of samples dyed at pH 9 &amp; 11</i>	111
44	4.27	<i>Colorimetric parameters for the fabric dyed with a binary mixture of Babool and Annatto dyes (BA)</i>	115
45	4.28	<i>Colorimetric parameters for the fabric dyed with a binary mixture of Babool and Madder dyes (BD)</i>	116
46	4.29	<i>Colorimetric parameters for the fabric dyed with a binary mixture of Katha and Annatto dyes (KA)</i>	117
47	4.30	<i>Colorimetric parameters for the fabric dyed with a binary mixture of Katha and Madder dyes (KD)</i>	118
48	4.31	<i>Colorimetric parameters for the fabric dyed with a binary mixture of Marigold and Annatto dyes (MA)</i>	119
49	4.32	<i>Colorimetric parameters for the fabric dyed with a binary mixture of Marigold and Babool dyes (MB)</i>	120
50	4.33	<i>Colorimetric parameters for the fabric dyed with a binary mixture of Marigold and Madder dyes (MD)</i>	121
51	4.34	<i>Colorimetric parameters for the fabric dyed with a binary mixture of Marigold and Katha dyes (MK)</i>	122
52	4.35	<i>Colorimetric parameters for the fabric dyed with a binary mixture of Pomegranate and Annatto dyes (PA)</i>	123
53	4.36	<i>Colorimetric parameters for the fabric dyed with a binary mixture of Pomegranate and Babool dyes (PB)</i>	124
54	4.37	<i>Colorimetric parameters for the fabric dyed with a binary mixture of Pomegranate and Madder dyes (PD)</i>	125
55	4.38	<i>Colorimetric parameters for the fabric dyed with a binary mixture of Pomegranate and Katha dyes (PK)</i>	126
56	4.39	<i>Coefficient of variation for set I, set II and sum of both sets</i>	161
57	4.40	<i>Compatibility factor of binary mixtures</i>	164
58	4.41	<i>Visual Score and Rating for Binary Mixture</i>	165

59	4.42	<i>Summary of different method's results and overall rating for binary mixtures</i>	167
60	4.43	<i>Colorimetric parameters for the fabric dyed with a tertiary mixture of Marigold, Babool, and Annatto dyes (MBA)</i>	170
61	4.44	<i>Colorimetric parameters for the fabric dyed with a tertiary mixture of Marigold, Babool, and Madder dyes (MBD)</i>	171
62	4.45	<i>Colorimetric parameters for the fabric dyed with a tertiary mixture of Marigold, Katha, and Annatto dyes (MKA)</i>	172
63	4.46	<i>Colorimetric parameters for the fabric dyed with a tertiary mixture of Marigold, Katha, and Madder dyes (MKD)</i>	173
64	4.47	<i>Colorimetric parameters for the fabric dyed with a tertiary mixture of Pomegranate, Babool, and Annatto dyes (PBA)</i>	174
65	4.48	<i>Colorimetric parameters for the fabric dyed with a tertiary mixture of Pomegranate, Babool, and Madder dyes (PBD)</i>	175
66	4.49	<i>Colorimetric parameters for the fabric dyed with a tertiary mixture of Pomegranate, Katha, and Annatto dyes (PKA)</i>	176
67	4.50	<i>Colorimetric parameters for the fabric dyed with a tertiary mixture of Pomegranate, Katha, and Madder dyes (PKD)</i>	177
68	4.51	<i>Coefficient of variation for set I, set II, and the sum of both sets</i>	200
69	4.52	<i>Compatibility factor for tertiary mixtures based on <math>\lambda_{max}</math> of Component A, B, C</i>	203
70	4.53	<i>C.V. for compatibility factors</i>	204
71	4.54	<i>Visual Score and Rating for Tertiary Mixture</i>	205
72	4.55	<i>Summary of different method's results and overall rating for tertiary mixtures</i>	208
73	4.56	<i>Colorimetric parameters of various concentrations for Annatto, Madder, Marigold, Pomegranate, Katha, and Babool dyes (from A to F)</i>	209
74	4.57	<i>List of Pantone standards for recipe prediction</i>	216

75	4.58	<i>Recipe prediction and matching details for TCX 15-1327 (A, B, C &amp; D)</i>	217
76	4.59	<i>Recipe prediction and matching details for TCX 16-1317 (A, B, C &amp; D)</i>	218
77	4.60	<i>Recipe prediction and matching details for TCX 15-1317 (A, B, C &amp; D)</i>	220
78	4.61	<i>Recipe prediction and matching details for TCX 14-1122 (A, B, C &amp; D)</i>	221
79	4.62	<i>Recipe prediction and matching details for TCX 16-1220 (A, B, C &amp; D)</i>	223
80	4.63	<i>Recipe prediction and matching details for TCX 15-1213 (A, B, C &amp; D)</i>	224
81	4.64	<i>Recipe prediction and matching details for TCX 15-1415 (A, B, C &amp; D)</i>	226
82	4.65	<i>Recipe prediction and matching details for TCX 14-1316 (A, B, C &amp; D)</i>	227
83	4.66	<i>Color fastness to washing for pure dyes</i>	231
84	4.67	<i>Color fastness to washing for binary combinations</i>	232
85	4.68	<i>Color fastness to washing for tertiary combinations</i>	233
86	4.68	<i>Colorfastness to washing of binary mixtures with respect to component dyes</i>	234
87	4.70	<i>Colorfastness of washing tertiary mixtures with respect to component dyes</i>	235
88	4.71	<i>Color fastness to light for pure dyes</i>	236
89	4.72	<i>Color fastness to light for binary combination with respect to component dyes</i>	237
90	4.73	<i>Color fastness to light for tertiary combination with respect to component dyes</i>	237
91	4.74	<i>Color fastness to rubbing for pure dyes</i>	238

92	4.75	<i>Color fastness to rubbing for binary mixtures</i>	239
93	4.76	<i>Color fastness to rubbing for tertiary mixtures</i>	239
94	4.77	<i>Anti-Microbial results</i>	240