Improvement in wash fastness of dyed silk after treatment with *Lacefera Lacca* Kerr and *Curcuma Longa*

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Abstract

The objective of this research is to study the silk dyed with natural pigments from the *Lacefera Lacca* Kerr and *Curcuma Longa*. The study used a mordant dyeing. Mordant such as tamarind and alum study found that the ratio of contact with agents that affect the tone. Test results clear seizure at 45 C and 60 C with a solution of water and detergent. And light fastness test color and light shower scene was read. Mordant at different ratios of agents attached to the robust staining did not differ. And durability to washing with water, detergent, washing with detergent was found that the brightness of the color reduction than using the washing water [1, 2]. They also found that washing with detergent, increasing the number of seizures increased to 3 times and 6 times the brightness of the color, the lower till. Results are shown. Process of silk dyed with natural pigments from the two species together with local textile manufacturers expensive Ban PhonPhang Kham Muang District, Kalasin Province. And compare the physical properties. Scope of silk with local textile manufacturers. Under controlled conditions that simulate the texture may be different from the amount of dye. And water used in dyeing are different.

Keywords: Dying Process, Natural Dyes, *Lacefera Lacca* Kerr, *Curcuma Longa*, Silk yarn

Since prehistoric times, natural dyes have been used for many purposes such as the coloring of Silk yarn for produces Kalasin's Traditional Silk: Praewa. Most natural dyes have poor to moderate wash fastness, while synthetic dyes represent the full range of wash fastness properties from poor to excellent. The first systematic tests of the light fastness of dyes were made by Dufay about 1730. The modern system for the light fastness testing was introduced by the in 1914. The wash fastness is influenced by internal factors: the chemical and the physical state of dye, the dye concentration, the nature of the fibers, the mordant type 3, 4,5].

In this work, *Lacefera Lacca* Kerr and *Curcuma Longa* were chosen as a representative source for a plant based red and yellow natural dye. The dyes found in Curcuma Longa are the flavonoids dyes. A set of simple analytical procedures and variations in application of the dyes were compared with regard to a possible correlation of the dyeing results. Different photometric methods were studied to predict the shade and colour strength in the following dyeing procedure [6, 7]. The methods should enable the natural dye to produce batches of plant material with similar, i.e. almost identical dyeing properties. However, they believe that it can also be used as a natural mordant solution for the dyeing of silk yarn with *Lacefera Lacca* Kerr and *Curcuma Longa.* The

results of our studies on the effect of mordant on the dyeing process are now reported in this paper.

2. Experimental

2.1 Plant material and mordant

To investigate the variations in the dyestuff content during different ratio a number of plant samples were collected from same sites and during (Table 1). The plants were collected as a whole including buds, part of stem and upper part of leaves.

2.2 Extraction of dye

A weighed amount of dry plant material was extracted with water in a stainless steel. In the standard procedure the ratio of mass of plant material to the unit of 1:1000 should be indicated; extraction was performed for approximately 60 min at 80 °C in an open stainless steel. Due to the rather high liquor ratio some manual stirring was sufficient to distribute the plant material in the liquid during the extraction period.

The detailed dyeing procedure is given in literature [8, 9]. At the end of the dyeing period at 80 °C the bath was cooled down to approximately room temperature with cold water. After dyeing, excess dye was removed from the dyeing by rinsing with cold water. The CIELab coordinates for the dyeing were measured. The L*, a*, b* were calculated for light source D65. The values are calculated from three repetitive measurements at the same place of sample.

3. Results and discussion

In this work, the tow batch which were suitable for silk used. The high to poor fastness of these batches to repeat washing was clear. Thus, it was decided to investigate the effectiveness of the after treatments in improving the wash fastness of the batch. In the context of the wash fastness change which the dyeing underwent different after treatments with ratio of mordant, wash fastness was determined by the reduction in color strength. The advantage of this approach for determination of wash fastness was that even low degree of variation in Light fastness properties and wash fastness changes could be measured. Table 1 show the result of light fastness was poor compared with standard grey scale; Tables 2 to 4 shows the reduction in color strength that occurred for the dyeing. It is apparent that the reduction in color strength achieved for the dyeing increased with increasing number of washes; thus, showing that dye loss occurred in a progressive manner. Clearly, each of the after treatments reduced the extent of dye loss that occurred during repeated washing; and the effectiveness of the after treatments in reducing dye loss followed the order: 1:5 < 1:3 < 1:3.5 < 1:4 < 1:4.5 natural mordant/Alum. Also, Tables 2 to 4 shows the colorimetric data obtained for dyeing which had been subjected to the ISO 105CO1 wash test, data are shown for dyeing which had received no after treatment, for dyeing which had been treated with the natural mordant/ Alum. The lower color strength observed for treated dyeing is attributable to removal of the amount of dye during the after treatments. However, the use of the natural mordant/Alum in conjunction was far more effective in reducing the extent of dye loss that occurred during washing. The after treatments employed had very little or no effect upon the shade of the dyeing. This can be seen from the colorimetric parameters given in Tables 2-4 which show variation only within a small range. The only great difference noted was between the lightness (L*) values, which increased with washing, but this was expected as color strength reduced following the ISO 105CO1 wash test.

Table 1 Light fastness properties of dyed silk yarn by conventional conditions of natural mordant and dyed with *Lacefera Lacca* Kerr and *Curcuma Longa* (ISO150-B02(1994))

Plant ratio	Plant Light fastness				
	Ratio of natural mordant/				
	1:3	1:3.5	1:4	1:4.5	1:5
1:1	2	2	2	3	3

Standard grey scale, 1 = poor, 8 = excellent)

Table 2 Wash fastness properties of dyed silk yarn by conventional conditions of natural mordant and dyed with *Lacefera Lacca* Kerr and *Curcuma Longa* (water washing)

Ratio of Mordant	Natural dye			water washing @ 45 C 6 washed			Water washing @ 60 C 6 washed		
	*L**	*a**	*b**	*L**	*a**	*b**	*L**	*a**	*b**
1:3	54.48	19.73	63.06	49.71	20.24	56.32	49.50	19.95	56.07
1:3.5	56.71	19.98	66.55	53.02	20.76	61.85	53.01	21.50	63.70
1:4	55.02	18.97	64.75	50.28	20.52	59.54	45.77	19.07	53.71
1:4.5	57.35	18.93	69.29	49.98	17.15	57.46	45.53	16.22	51.81
1:5	54.41	18.94	61.85	50.52	20.46	60.23	49.00	20.06	56.47

Table 3 Wash fastness properties of dyed silk yarn by conventional conditions of natural mordant and dyed with *Lacefera Lacca* Kerr and *Curcuma Longa* (detergent washing @ 45°C)

Ratio of Mordant	Natural dye			Detergent washing @ 45 C 1 washed			Detergent washing @ 45 C 3 washed			Detergent washing @ 45 C 6 washed		
	*L**	*a**	*b**	*L**	*a**	*b**	*L**	*a**	*b**	*L**	*a**	*b**
1:3	54.48	19.73	63.06	51.01	17.88	55.81	50.08	18.71	54.3	55.37	16.96	53.78
1:3.5	56.71	19.98	66.55	56.35	17.78	66.53	51.34	20.07	57.19	53.78	18.31	54.67
1:4	55.02	18.97	64.75	50.34	16.63	56.36	54.35	17.89	58.24	58.46	16.24	58.51
1:4.5	57.35	18.93	69.29	55.87	17.36	66.79	51.56	17.26	56.94	59.84	14.75	60.41
1:5	54.41	18.94	61.85	52.49	17.98	58.7	55.88	18.28	59.25	56.21	17.41	58.03

Table 4 Wash fastness properties of dyed silk yarn by conventional conditions of natural mordant and dyed with *Lacefera Lacca* Kerr and *Curcuma Longa* (detergent washing @ 60°C)

Ratio of Mordant	Natural dye			Detergent washing @ 60 C 1 washed			Detergent washing @ 60 C 3 washed			Detergent washing @ 60 C 6 washed		
	*L**	*a**	*b**	*L**	*a**	*b**	*L**	*a**	*b**	*L**	*a**	*b**
1:3	54.48	19.73	63.06	53.72	17.73	55.45	55.57	16.29	43.81	56.39	14.68	28.04
1:3.5	56.71	19.98	66.55	56.18	17.31	58.26	57.12	16.41	51.83	57.75	14.71	37.21
1:4	55.02	18.97	64.75	53.68	18.22	56.07	56.49	16.09	47.46	57.54	15.24	34.34
1:4.5	57.35	18.93	69.29	59.2	16.50	65.02	60.76	13.75	57.19	56.94	16.71	30.83
1:5	54.41	18.94	61.85	53.61	18.45	57.63	57.09	15.25	46.77	60.24	14.48	33.21

** L**, vertical axis (lightness); *a**, axis in plane normal to *L** (redness-greenness quality of the color); *b**,axis in plane normal to both *L** and *a** (yellowness-blueness quality of the color)

Figure 1 Production process of silk dyed with natural pigments from the two species together with local textile manufacturers Ban PhonPhang Kham Muang District, Kalasin Province

4. Conclusion

Lacefera Lacca Kerr and *Curcuma Longa* were found to have good agronomic potential as a dye plant. Natural mordant when used in conjunction *Lacefera Lacca Kerr* and *Curcuma Longa* was found to enhance the dye ability and fastness properties. Enhancement of dye uptake was better than unmordant fabrics. Even the fastness properties in the case of labs scale dyeing shows good results. The two step process of pre-mordant- conventional dyeing developed was for the ease of industrial application, reduced wastes, and makes it the established best available technique in the natural dyeing.

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