

Screen Printing of Silk Fabric by Natural Dyes

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1. Introduction

Although most of natural dyes used with human history have now little or no commercial use in modern industry because of its poor fastness, irregular dyeing property and development of synthetic dye.

This work is to develop the screen printing method by natural dye which can be obtained elaborate patterns.

2. Experimental

2.1. Materials

Fabric : 100% silk, satin

Natural dyes : Japanese pagoda tree, madder, clove, log wood, gallnut, alder

Printing paste : guar gum

Mordanting agents : $\text{AlK}(\text{SO}_4)_3$, CuSO_4 , SnCl_2 , FeSO_4

2.2. Preparation of natural dyes powder

Colorants were 25% methanol-extracted from natural dyes and freeze-dried to obtain colorants powder.

2.3. Determination of color strength

Color strength was determined according to the Kubelka-Munk equation and expressed as K/S values using a spectrophotometer (Minolta, 3700d). H(V/C) values were obtained from $L^*a^*b^*$ data by using CIE Munsell conversion program.

2.4. Assessment of color fastness

Color fastness of light, dry cleaning, rubbing, and perspiration for fabrics dyed with screen printing method by natural dyes was confirmed.

3. Results and Discussion

3.1. Preparation of natural dyes powder

Colorants were 25% methanol-extracted from natural dyes and freeze-dried to obtain colorants powder. Colorants powder yield were follow.

Japanese pagoda tree ; 4.3%, Madder ; 2.8%, Clove ; 3.5%, Log wood ; 4.4%, Gallnut ; 7.2%, Alder ; 12%

3.2. Color strength of screen printed silk fabrics.

K/S and H(V/C) value of dyed with screen printing method by natural dyes is shown in Table 1.

Table 1. K/S and H(V/C) value of screen printed silk fabrics.

Dye	Mordants	K/S	H(V/C)
(1)	$\text{AlK}(\text{SO}_4)_3$	3.39	4.59Y(7.90/6.04)
	FeSO_4	3.46	2.18Y(5.72/2.72)
(2)	$\text{AlK}(\text{SO}_4)_3$	2.99	0.22Y(7.45/6.13)
	FeSO_4	2.97	9.90YR(6.55/4.13)
(3)	$\text{AlK}(\text{SO}_4)_3$	1.35	6.16Y(8.67/3.22)
	FeSO_4	2.30	0.43Y(5.57/0.92)
(4)	SnCl_2	7.16	9.52P(3.39/3.80)
	$\text{AlK}(\text{SO}_4)_3$	3.70	3.07YR(4.43/1.90)
	CuSO_4	14.26	2.58PB(2.31/1.99)
	FeSO_4	3.86	5.94PB(3.80/0.81)
(5)	$\text{AlK}(\text{SO}_4)_3$	0.56	9.66YR(8.13/0.87)
	FeSO_4	9.99	9.79PB(2.62/1.15)
(6)	$\text{AlK}(\text{SO}_4)_3$	1.49	2.29Y(8.25/2.76)
	CuSO_4	3.36	0.46Y(6.84/3.86)
	FeSO_4	2.06	0.31YR(5.60/0.95)

(1) Japanese pagoda tree, (2) Madder, (3) Clove.

(4) log wood, (5) gallnut, (6) alder

3.3. Color fastness of screen printed silk fabrics.

Color fastness of light, dry cleaning, rubbing, and perspiration for fabrics dyed with screen printing method by natural dyes is shown in Table 2.

Table 2. Color fastness of screen printed silk fabrics.

Fastness	(A)	(B)	(C)	
Light	3	3-4	2-3	
Dry cleaning	3-4	4	4	
Rubbing	Dry	4	4-5	4-5
	wet	3-4	4-5	3-4
perspiration	Acidic	4	4	4
	Alkaline	4	4	4

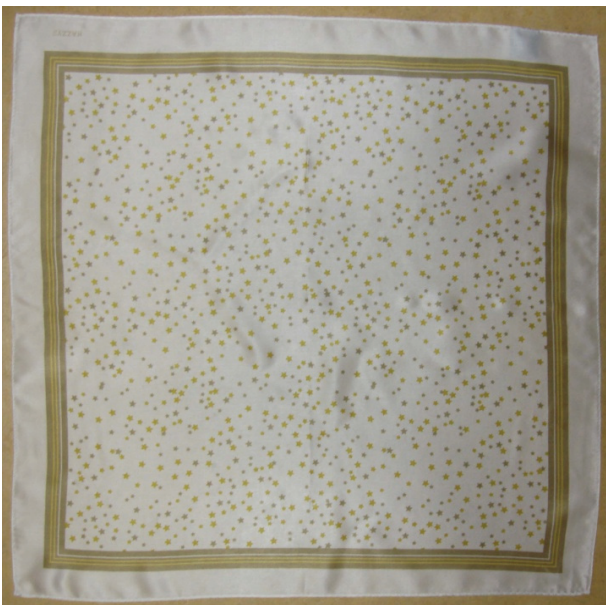
(A) Log wood

(B) Japanese pagoda tree, madder, clove, log wood, gallnut, alder

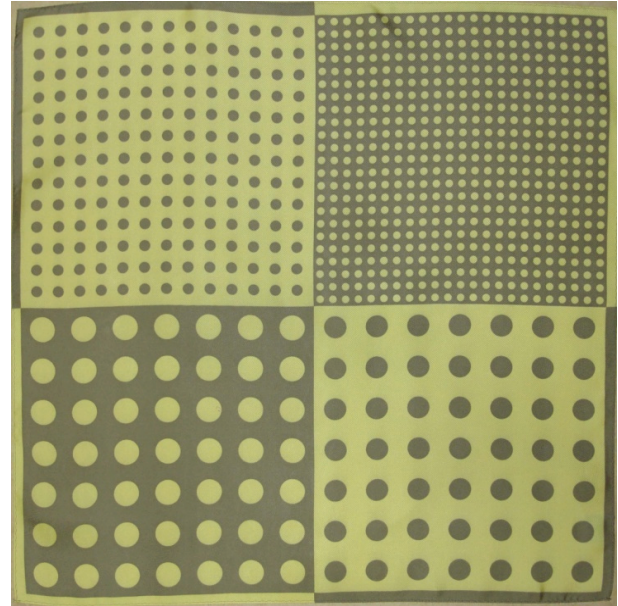
(C) Japanese pagoda tree ;



(A)



(B)



(c)

4. Conclusions

In this study, the optimum screen printing conditions were investigated.

Colorants were 25% methanol-extracted from several natural dyes and freeze-dried to obtain colorants powder.

The screen printing method by natural dye can be obtained elaborate patterns.

Colorfastness to dry cleaning, rubbing and perspiration was good, but light fastness was not good.

5. Acknowledgement

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