

Application of natural dyes for printing of cotton fabric

■ Mamta Agrawal, Saroj S. Jeet Singh and N.M. Rose

Received: 19.02.2018; Revised: 06.05.2018; Accepted: 23.05.2018

See end of the paper for authors' affiliations →

Mamta Agrawal

Department of Textile and
Apparel Designing, I.C. College
of Home Science, C.C.S. Haryana
Agricultural University, Hisar
(Haryana) India

Email : mamtaagrwal.agrawal@
gmail.com

■ **ABSTRACT** : For present study, colour fastness properties of printed samples with catechu, double coreopsis and mango bark were evaluated. The results depicted that all the dyes have very good to excellent washing and sunlight fastness. Hence, recommended for upholstery items like curtains, bed covers, cushion covers etc. The colours obtained using mordants were soft, lustrous and natural. The use of these dyes is eco- friendly and can be used successfully by textile industry and may be exported.

■ **KEY WORDS**: Dyes, Colour fastness, Mordants, Eco- friendly

■ **HOW TO CITE THIS PAPER** : Agrawal, Mamta, Singh, Saroj S. Jeet and Rose, N.M. (2018). Application of natural dyes for printing of cotton fabric. *Asian J. Home Sci.*, 13 (1) : 409-412, DOI: 10.15740/HAS/AJHS/13.1/409-412. Copyright@ 2018: Hind Agri-Horticultural Society.

Printed fabrics are defined as fabrics decorated by motif, pattern or design. The embellishment of fabric with design and colour is a form of artistic expression that gives pleasure (Goel and Goel, 1997 and Kaur, 1995). In ancient times, there were only natural dyes which are colourants extracted from vegetable matter, animal residues and minerals. With the growing national and international awareness of environment, ecology and pollution control, natural dyes appear to be ideal choice, since they are non- toxic and can be handled very easily and safely. The most fascinating aspect of natural dyes is their glow and charming variability.

All these natural dyes create a harmonious combination of colours which is difficult to achieve with modern synthetic dyes (Bhattacharya *et al.*, 1998). However, the method of extraction of these dyes from natural sources and subsequent process of application to textile material is lengthy. Hence, the use of natural dyes for printing of textiles is very limited. The non-availability of standard printing paste, specific ways of

application and standard norms are also responsible for limited use. Keeping the above in mind, an attempt has been made to print cotton fabric with natural dyes.

■ RESEARCH METHODS

The dyes selected for present study are:

Catechu bark (*Acasia catechu*)

Double coreopsis flowers (*Coropsis tinctoria*)

Mango bark (*Mangifera indica*)

Flowers and bark were dried and ground to make powder.

Pure cotton fabric used for the study was scoured in a solution containing (2 g/l) detergent and (1 g/l) soap at boiling temperature for 1-2 hours to remove all impurities, washed thoroughly and squeezed. Guar gum was used as a thickener to prevent the rapid diffusion of dyestuff through the boundaries of design.

The dyes were extracted using optimum dye material concentration for optimum extraction pH. Optimum dye material concentration and optimum extraction time were

Sr. No.	Optimum conditions	Catechu	Double coreopsis	Mango
1.	Dye material concentration (%)	6	6	10
2.	Extraction time (min.)	60	30	60
3.	Extraction pH	9	9	8
4.	Dye paste (ml)	5	7.5	5
5.	pH of guar paste	6	6	6
6.	Dye paste and guar paste ratio	1:4	1:5	1:4
7.	Fixer concentration (%)	1.5	1.5	1.5
8.	Mordants	Copper sulphate Ferrous sulphate	Alum Copper sulphate	Alum Copper sulphate
9.	Mordant concentration (%)			
	Alum		10	5
	Copper sulphate	3	3	5
	Ferrous sulphate	5		

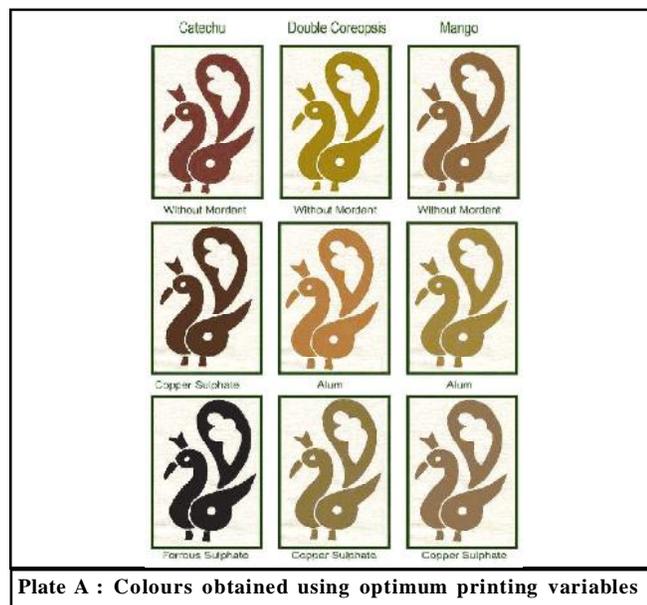
taken from review papers. The dye solution obtained after extraction was concentrated to optimum dye paste (Table A).

To prepare the printing paste, dye paste and guar paste was taken in a definite ratio and fixer (acrafix) and mordants were added to this paste. The mixture was stirred vigorously to produce a uniform paste.

Screen printing technique was used to apply printing paste. The printed samples were dried for 24 hours, steamed at 100°C for 24 hours, rinsed in cold water and dried.

Printing pastes were prepared using both the mordants with each dyes. The colours obtained using optimum variables are given in Table B (Plate A).

Sr. No.	Optimum variables	Colours
1.	Catechu	
	Without mordant	Reddish brown
	Copper sulphate	Coffee brown
	Ferrous sulphate	Black
2.	Double coreopsis	
	Without mordant	Golden yellow
	Alum	Orange yellow
	Copper sulphate	Brownish green
3.	Mango	
	Without mordant	Medium brown
	Alum	Greenish yellow
	Copper sulphate	Chestnut



Colour fastness tests:

Colour fastness is the ability of a dye to retain its colour after exposure to washing, sunlight and rubbing etc. during its processing and use. The importance of the colour fastness is related to the end use of the fabric. Here three fastness tests were carried out.

Washing fastness tests:

This tests was conducted with soap solution (5 g/ lt of water) for 45 minutes at 50± 2⁰ C keeping material to liquor ratio 1:50. The samples were rinsed twice with cold water for 10 minutes, squeezed, dried and compared with grey scales.

Sunlight fastness tests:

The test specimen were mounted on exposure rack and exposed to day light every day from sunrise to sunset,

Table 1 : Colour fastness grades of printed samples

Sr. No.	Dye	Mordant	Mordant concentration* (%)	Washing fastness		Light fastness	Rubbing fastness			
				CC	CS		Dry		Wet	
						CC	CS	CC	CS	CC
1.	Catechu	Copper sulphate	3	5	5	5	4/5	4/5	4	2/3
		Ferrous sulphate	5	5	5	5	4/5	4/5	4/5	3
		Without mordant		1/2	2/3	5	4/5	4/5	4/5	4
2.	Double coreopsis	Alum	10	4/5	4	5	4/5	4/5	4/5	3/4
		Copper sulphate	3	4/5	4/5	5	4/5	4/5	4/5	4
		Without mordant		2/3	4/5	4/5	5	4/5	4/5	3/4
3.	Mango	Alum	5	4/5	4	5	4/5	4/5	4/5	4
		Copper sulphate	5	4/5	5	5	5	4/5	4/5	4
		Without mordant		1	4	4/5	4/5	4/5	4	3

* On the basis of total printing paste.

CC- Colour change

CS - Colour staining

keeping the exposure rack at a angle of 45° facing north east direction.

Rubbing fastness tests:

In this method, the specimen was fixed to rubbing device (crockmeter). A dry undyed piece was fixed over finger of the crock meter and was rubbed to and fro in a straight line along a track of 10 cm, on the printed sample, 10 times in 10 seconds with a downward force of 900 g of the arm and finger. The tests was done for wet rubbing also. The rubbed samples were compared on the grey scale.

RESEARCH FINDINGS AND DISCUSSION

The colour fastness grades of printed samples with all the dyes are presented in Table 1. It is clear from the findings that washing fastness grades for catechu printed samples with both the mordants were excellent indicating no change in colour and staining. It was observed that after washing colour become faster and brighter. Bright shades of coffee brown and black colour were obtained on cotton using copper sulphate and ferrous sulphate as mordants.

Washing fastness grades of double coreopsis flower printed samples were very good for colour change and good to very good for colour staining using alum and copper sulphate as mordants. The colours obtained were orange yellow and brownish green, respectively.

Washing fastness grades of mango printed samples for colour change were very good and good to excellent for colour staining using alum and copper sulphate as

mordants. Greenish yellow and chestnut colours are obtained using both the mordants.

All the three dyes exhibited excellent sunlight fastness grades for mordanted as well as unmordanted samples. This indicates slightly or no change in colour.

The dry rubbing fastness grades of printed samples with catechu and double coreopsis were very good for colour change and staining using both the mordants. The grades were very good to excellent for colour change and very good for colour staining with mango printed samples using mordants.

The wet rubbing fastness grades for catechu printed samples were good to very good for colour change and fair to very fair for colour staining indicating slight staining on un-dyed fabric. The wet rubbing fastness grades for double coreopsis and mango printed samples were very good for colour change. The grades for colour staining were fairly good to good with double coreopsis and good with mango using both the mordants. Similar work related to the present investigation was also carried out by Pankaj (2002); Rao (1997) and Rose (2002).

Conclusion :

It is concluded from the study that all the three dyes have very good to excellent washing fastness and sunlight fastness. Hence, recommended for upholstery items like curtains, cushions, bed covers etc.

Colours obtained were soft, soothing, lustrous and natural using different mordants for all the dyes. These dyes can be successfully used by garment and textile industry.

Authors' affiliations:

Saroj S. Jeet Singh and N.M. Rose, Department of Textile and Apparel Designing, I.C. College of Home Science, C.C.S. Haryana Agricultural University, Hisar (Haryana) India

■ REFERENCES

Bhattacharya, N., Doshi, B.A. and Sahasrabudhe, A.S. (1998). Dyeing of jute fibres with natural dyes. *American Dyestuff Reporter*, **87**(4): 26-29.

Goel, B. and Goel, A. (1997). Printing of silk. *Indian Textile J.*, **107**(11): 60-64.

Kaur, B. (1995). Printing on cotton with natural dyes. M.Sc. Thesis, Institute of Home Economics, Delhi University, Delhi.

Pankaj, (2002). Effect of natural mordants on dyeing wool with natural dyes. Ph.D. Thesis, Punjab Agricultural University, Ludhiana.

Rao, R.T. (1997). Dyeing woolen textiles. *Indian Textile J.*, **107**(11): 54-57.

Rose, M.N. (2002). Application of vegetable dyes on cotton. Ph.D. Thesis, Institute of Home Science, Dr. B.R. Ambedkar University, Agra.

★ ★ ★ ★ ★ 13th Year of Excellence ★ ★ ★ ★ ★