

Eco-friendly finishing and dyeing of jute with direct and mordant dye method

■ HARBINDER KAUR AND NAMRITA KOLA

Received: 20.10.2011; Revised: 05.01.2012; Accepted: 18.03.2012

See end of the paper for authors' affiliations

Correspondence to :

HARBINDER KAUR

Faculty of Fashion Designing,
ALT Training College,
Khokhara, AHMEDABAD,
(GUJARAT) INDIA

Email: dollymehra18@gmail.com

■ **ABSTRACT** : The present study deals with jute fabric, which is considered to be the next eco-friendly fabric of the future. The only drawback of jute is that it is a harsh feel fabric because of which it is many times not able to compete with other natural fabrics. In this study, jute was dyed with turmeric and majeetha using two different application methods direct and mordant. The samples were evaluated for colour fastness. Micro-amino silicon was used in one step dyeing-finishing with turmeric and majeetha dyes. The samples were evaluated for colour fastness. Yellow colour was obtained by turmeric and bisque with majeetha. Best results were obtained by majeetha by using both the dyeing methods; direct and mordant. Turmeric showed poor results in washing fastness and wet ironing fastness. Dyeing-finishing of jute with micro-amino silicon and dyeing with turmeric and majeetha have also resulted in appreciable results. Jute was dyed finished in bright yellow colour with a complex of micro-amino silicon and turmeric extract was dyed in bisque colour with a complex of micro-amino silicone and majeetha. Appreciable colour fastness results were also obtained. Thus, results are improving smoothness of jute along with saving of important recourses like time, labour and energy.

■ **KEY WORDS** : Durrie, Jute, Fabric, Dyes

■ **HOW TO CITE THIS PAPER** : Kaur, Harbinder and Kola, Namrita (2012). Eco-friendly finishing and dyeing of jute with direct and mordant dye method. *Asian J. Home Sci.*, 7 (1) : 19-22 .

The textile industry has been facing innumerable challenges, which have intensified during the past decade. There has been a growing awareness of the ecological implications in chemical processing and dyeing of textiles. This has been coupled with increased strict legislation on industrial effluents and has thus led to the search for non polluting process and use of natural products.

Use of natural dyes and fibres to some extent can solve environment problem. Natural dyes serve dual purposes of catering to fashion trends as well as being environmental friendly. These dyes cannot completely replace synthetic dyes but to some extent can be used in order to reduce environmental pollution (Gulrajani and Gupta, 1992).

In India, the use of natural dyeing and printing goes to the pre-historic periods. Natural dyes comprise those colorants (pigments and dyes) that are obtained from animals or vegetable matter without chemical processing. They are

mainly mordant dyes, although some vat, solvent, pigment, direct and acid types are also known.

In the present era of natural and eco-friendly products, jute is the right choice as it is eco-friendly, biodegradable and helps to protect the environment. The growth potential and the growing popularity of jute in the domestic and international market is indisputable and this is expected to offer jute a unique opportunity for acceptance in market as a textile material.

Any fabric would appear very dull if it is not ornamented. Various ornamentations are done in textile designing, among these dyeing and printing are important one.

Finishing is given to fibre, yarn or fabric either before or after weaving or knitting to change the appearance, the handle and performance. A finish adds minimally to the cost of the textile material and results in a much greater value addition.

Hence, the present study aims at dyeing of jute with eco-friendly dyes.

Objectives of the study :

- To study application of turmeric and majeetha on jute at 5 per cent and 30 per cent shade to obtain variety of shades with relatively good colour fastness.
- To obtain a large variety of shades on jute using turmeric and majeetha using different methods of applications. (Direct and mordant)
- Application of eco-friendly finish: micro- amino silicon in one step dyeing and finishing with turmeric and majeetha.

■ RESEARCH METHODS**Pre- treatment of fabric :**

Scouring: scouring was done on fabric to remove dirt or dust particles or excess finishing material used during manufacturing process. 100 per cent jute fabric was scoured by treatment with 2g/lit. of soap solution for 45 minutes. The material to liquor ratio 1:30, the temperature was maintained at 60° to 65° C, occasional stirring was done. After scouring, fabric was thoroughly washed in running water and air dried.

Determination of percentage dye extract :

One gram of each dye was taken in different beakers. The dyes were turmeric and majeetha. To each beaker, 25 ml of water was added. The temperature of the beaker was increased to boil; boiling was continued for thirty minutes, after which the solution was filtered through pre-weighed filter paper. The extract collected on the filter paper was dried and the extract along with the filter paper was weighed and noted.

The original weight of the filter paper was subtracted to determine how much dye powder has been solubilized based on this percentage soluble content of the dye was determined from this; the amount of raw natural dye to be taken for dyeing was calculated.

Preparation of stock solution :

The required amount of dye powder was taken *i.e.* turmeric and majeetha in different beakers. 100 ml water was added to the beakers kept for boiling in a sandbath for one hour. Then the extractions were made by adding the required amount of plain water to prepare stock solution M: L=1:100.

Dyeing of fabric by turmeric and majeetha as per direct dye method :

Samples of jute of size 12"x 10" were cut from the scoured fabric of jute. The two natural dyes were extracted in water based on the per cent soluble matter.

Thus, to prepare 1:100 stock solution, the amount of dye powder taken was

4g- Turmeric.

5.65g- Majeetha.

The required quantity of dye was extracted and water

taken, the temperature of the dye was increased to 60°C, the wetted fabric was immersed in the dye bath and the temperature of the dye bath was brought to boil. Dyeing was done for 15 minutes, then the fabric was removed and 10 per cent sodium chloride was added on the weight of the fabric. The fabric was re-entered and dyeing was continued for 30 minutes at boil. The fabric was removed and washed in running water and dried in shade.

Dyeing of fabric by turmeric and majeetha as per mordant dye method :

The stock solution was prepared for both the dyes. Five fabric samples of 12"x 10" were cut. They were first mordanted and then dyed.

For mordanting, jute fabric samples were treated with 2 per cent alum. The required quantity of water was taken in beaker. The fabric was treated with alum soaking at room temperature for 30 minutes. The treated samples were entered in dye bath at 50° to 60° C and boiled for 45 minutes. The fabric was removed and washed in running water dried in shade.

Colour fastness test :

The dyed samples were tested for their wash fastness by AATCC Standard test method 61-1968 test No. 1 (A)

Dry and wet ironing fastness was determined by AATCC Standard test method 133-1976.

Jute dyeing and finishing together :

Micro-amino silicone finish was used for the study (Keskar and Rajadhyaksha, 2002). A ready micro-amino silicone finish was obtained from Britacel silicone Ltd. with brand name of Ultrasof. The finish was diluted in water, 10 g (9.5 ml) of finish was diluted with water to make 1 lit. of concentration 0.1 per cent (dilution, concentration and method of application followed was as recommended by the manufacturer) micro-amino silicone is a positively charged finish.

For extraction, the required amount of the dye powder was taken in 125 ml of water in two separate beakers and boiled on sand bath for one hour then the extracted solution was filtered through filter paper and the loss in water by evaporation was made by adding the required amount of plain water to prepare stock solution.

Two fabric samples of size 12"x 10" were taken. 125 ml of dye extract and 125 ml of finish were mixed together to prepare a dye-finish solution of 1:1 ratio the fabric was entered in the prepared solution and treated for 2-3 minutes then dried on flat surface and ironed, then it was washed in running water and again dried on flat surface and ironed.

■ RESEARCH FINDINGS AND DISCUSSION

The results obtained from the present investigation have been discussed under following heads:

Observation and analysis :

The present study deals with application of turmeric and majeetha dyes on jute using two different dyeing methods and dyeing-finishing of jute in one step with micro-amino silicon.

Preliminary data of the fabric and dyes used :

Preliminary data of the fabric on fibre content, fabric count, weight per unit area, thickness, obtained by standard methods have been given in Table 1 and preliminary data of the natural dyes used, turmeric and majeetha are given in Table 2.

Fibre content	Fabric count		Fabric weight (g/sq. mt.)	Thickness (mm)
	Warp	weft		
100% jute	18	15	232	1.842

Sr. No.	English or commercial name	Indian or local name	Botanical name	Parts used	Colour of raw material
1.	Turmeric	Halda or haldi	<i>Curcuma longa</i>	Dry stem (under soil)	Yellow
2.	Indian maddar	Majeetha	<i>rubia</i>	Dry roots	Deep red

Jute dyed with natural dyes as per direct dye method and mordant dye method :

Turmeric and majeetha when used as direct and mordant method on jute, various shades were produced, these have been listed in Table 3.

Sr. No.	Dye	Color obtained as	
		Direct dye	Mordant dye
1.	Turmeric	Yellowish red	Yellow
2.	Majeetha	Bisque	Saffron

Colour fastness of jute :

Washing fastness of jute samples :

The washing fastness test was administered on jute fabric, dyed with natural dyes. The results of colour change is presented in Table 4.

Dyeing method	Turmeric	Majeetha
Direct	3	4
Mordant	3	4

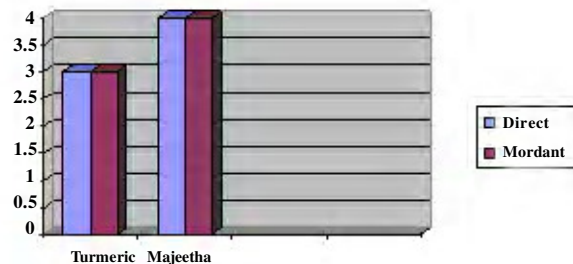


Fig.1: Washing fastness

Classes:

- 5- Negligible or no change
- 4- Slightly changed
- 3- Noticeable change
- 2- Considerably changed
- 1- Much changed

Conditions:

- A- Direct dye method
- B- Mordant dye method

Dyeing method	Turmeric		Majeetha	
	Dry ironing	Wet ironing	Dry ironing	Wet ironing
Direct	5	5	5	5
Mordant	5	5	5	5

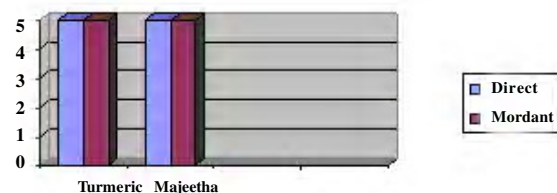


Fig. 2a: Dry ironing fastness of jute samples

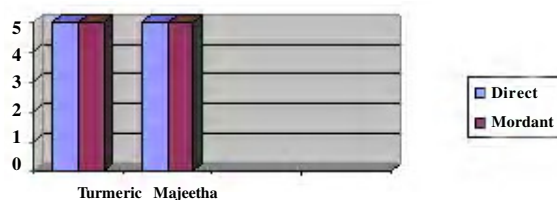


Fig. 2b: Wet ironing fastness of jute samples

Classes:

- 5- Negligible or no change
- 4- Slightly changed
- 3- Noticeable change
- 2- Considerably changed
- 1- Much changed

Conditions:

- A- Direct dye method
- B- Mordant dye method

Ironing fastness of jute samples :***Influence of dyeing-finishing as one-step on jute :***

Dyeing and finishing when done together have resulted in dyeing the fabric evenly, within 2-3 minutes the dye has gone on to the fabric without any application of heat, the finishing-dyeing was done at room temperature. Dyeing finishing together with turmeric has resulted in bright yellow and that obtained with majeetha has resulted in bisque colour. Thus, it can be concluded that dyeing finishing together can result in obtaining even colour on jute fabric saving on time, labour and energy which are important recourses.

The influence of dyeing finishing as one step in jute fabric was evaluated through colour fastness tests on both the samples.

Washing fastness results of the samples revealed that turmeric has become slightly redder in colour due to the presence of soap in the washing solution. While in case of majeetha, slight change in the original shade was observed. No staining was observed in dye-finished sample of majeetha.

Dry and wet ironing fastness results revealed that no change in colour was observed in both the samples and no staining of the undyed samples was seen in case of majeetha.

Very slight staining was observed in wet ironing fastness of turmeric.

Very appreciative results were obtained specially with majeetha. Micro-amino silicone used in one step dyeing finishing with turmeric and majeetha has resulted in giving good, even colour to jute fabric.

Authors' affiliations:

NAMRITA KOLA, P.G. Department of Home Science, Sardar Patel University, VALLABHVIDYANAGAR (GUJARAT) INDIA

■ REFERENCES

AATCC Test methods (1965). Technical Manual of the American Association of Textiles Chemists & Colorist, p. 44.

Gulrajani, M.L. and Gupta, D. (1992). Natural dyes and their application on textiles. Department of textiles technology IIT, New Delhi, pp.1-5.

Keskar, V. H. and Rajadhyaksha, P. B. (2002). Silicone based chemicals in textile application. *J. Textile Assoc.*, **63** (4):195.
