

# Natural Dyes and Colour Fastning

## Abstract

Selective, simultaneous mordanting and natural dyeing of bleached mercerized cotton fabric was carried out using mordants (aluminum sulphate, ferrous sulphate, copper sulphate, potassium dichromate ) with different percentages (20,40,60%) and extract of onion skin and mango bark mixture as dyeing agent, under varying dyeing condition to optimize the dyeing process variables. It was found that dyed pieces offered over all good colour fastness to washing and rubbing.

**Keywords:** Dyeing Cotton, Mordants, Natural Dyes, Onion Skin, Mango Bark

## Introduction

Manufactured synthetic dyes are metallic components of inorganic and organic origin these are used in dyeing industries, the dyes are non-degradable toxic as well as allergic.

Natural dyes derived from plant sources on the other hand are non toxic and biodegradable These dyes from natural sources do not pose effluent problems. Natural dyes are safe ecologically.

This has influenced the need to develop eco friendly technologies to produce dyes from natural resources which come from leaves, stems, roots, flowers, bark etc. natural dyes, now have improved fastness property and good compatibility.

The present study assesses the fastness property of natural pigment of onion skin and mango bark mixture dye. Simultaneous dyeing are similar to Verma and Venkatachalam (2002) for ferrous sulphate and with other mordants similar method to Gurumalles and Senthilkumar on silk (1998).

## Objective of the Study

1. To study the colour fastness of the dye by combining the extract of onion skin (*Allium cepa*) and mango bark (*Mangifera Indica*) on cotton material.
2. To study the colour fastness of the dye prepared by onion skin and mango bark pigment mixture on cotton material on rubbing.

## Hypothesis

1. After dyeing with the prepared dye, cotton material will have good colour fastness to washing.
2. After dyeing with the prepared dye, cotton material will have good colour fastness to rubbing.

## Material and Methods

### Materials

Following materials were used in the study:- Mill mercerized bleached plain weave cotton fabric was used.

1. Onion skin and outer most shell of the mango (bark) were used.
2. Mordants, aluminum sulphate, ferrous sulphate, copper sulphate, potassium dichromate were used for mordanting purpose.
3.  $\text{Na}_2\text{CO}_3$ ,  $\text{H}_2\text{O}_2$ ,  $\text{Na}_2\text{SiO}_3$ , detergent were used for scouring and bleaching purpose.

### Method

#### Pretreatment of Cotton Material

The process is subjected to remove natural impurities dust and dirt. cotton fabric samples were scoured in standard conditions using the following ingredients.

M L R : 1:50  $\text{Na}_2\text{CO}_3$ : 5gpl

Detergent : 2gpl Tem: 40-45°C (room temperature)

Time : 30min.

After scouring the cotton fabric samples were washed thoroughly in treated water and dried at room temperature. Bleaching with hydrogen peroxide ( $\text{H}_2\text{O}_2$ ), using the following ingredients.

M L R : 1:30  $\text{H}_2\text{O}_2$  : 2-3 gpl.

Tem: 70°  $\text{Na}_2\text{SiO}_3$  : 1-2gpl

Time : 60min. pH : alkaline



**Shailja Kumari**

Assistant Professor,  
Deptt. of Home Science,  
S.P.R.C. P.G. College,  
Haridwar



**Nasreen Rahman Sheikh**

Professor,  
Deptt. of Home Science,  
Govt. Girls P.G College,  
Barwani, M.P.

After bleaching each sample was washed thoroughly in normal water and dried at room temperature.

#### Extraction of dyes

Dye preparation was done for dyeing of samples. Onion skin was dried in natural way and then powdered for the purpose of obtaining the dye. Second natural source mango bark was cut into small chips then. was used for the purpose of obtaining the dye.

1. Ten gm onion skin powder was added in 100ml. water and extracted at 100°C for one hour then cooled and filtered. 25gm mango bark chips were soaked in 100ml cold water for twenty four hours then boiled for two hours in same water and water bath was maintained, the solution was cooled, filtered and used.
2. After extraction the samples were dyeing with 50-50% mixture of onion skin and mango bark dye solution.

#### Mordanting

Mordant is an integral part of the natural dyeing process to improve the affinity.

In the experiment, four different mordants aluminum sulphate, ferrous sulphate, copper sulphate and potassium dichromate were used with 20, 40, 60% concentration.

Simultaneous Mordanting : The mordant was added in the dye bath it self.

#### Application of dye

For the dyeing purpose, fabric was dipped in 50-50% mixture of the extracted dye by onion skin and mango bark, in the same dye bath with material liquor ratio of 1:50 for 60 minutes at 90°C for mordants (aluminium sulphate, ferrous sulphate, copper sulphate and potassium dichromate) and pH of dyeing solution was changed to alkaline medium by used sodium carbonate. In case of ferrous sulphate, 45 min. and temperature 50°C. were used. After dyeing sample was washed with cold water and dried in shadow.

#### Results and Discussion

The study was carried out to determine the effect of application of onion skin and mango bark dye mixture on cotton material to observe was washing and rubbing fastness with mordant at different percentages and results was obtained.

Dyed pieces of using dye combination of onion skin and mango bark with different mordants than fastness to washing and rubbing were tested. Five readings of each piece were recorded and after taking reading of every piece their average mean value was calculated (Table no-1)

**Table 1- Colour Fastness to Washing and Rubbing of Cotton Pieces Dyed with Onion Skin and Mango Bark Dye Combination using Different Mordants**

S. No.	Mordant	Mordant Concentration Owf %	Washing Fastness Rating (Mean Value)		Rubbing Fastness Rating (Mean Value)	
			numerical rating for change in colour	numerical rating for staining of the fabric	numerical rating for dry condition	numerical rating for wet condition
1.	Aluminum sulphate	40%	3	5***	4/5**	4/5**
2.	Ferrous sulphate	20%	4*	4/5**	4*	3/4
3.	Copper sulphate	20%	4/5**	4/5**		¾
4.	potassium dichromate	40%	4/5**	4/5***	4*	4/5**

\*\*\*No staining , \*\*Very slight staining , \* Slight staining

From the above table (table no. 1) was clear that the color fastness obtained by using aluminium sulphate(40%),and potassium dichromate(40%) have good color fastness to washing and rubbing and then ferrous sulphate (20%) and copper sulphate (20%) showed moderate fastness. Verma C. and Venkatachalam V.L. (2002) also had tried the mango bark natural dye used for jute cotton union fabric with different mordants, result was found moderate to good washing fastness. Similar other results, fair to good rubbing fastness observed by kalyaini and jacob M (1998) with Mesta calyx on cotton fabric.

#### Conclusion

Traditionally natural dyes were used to colour to colour cotton fabric. The advent of chemical dyes and

its colour fastness quality replaced the use of natural colour pigments. Considering the impact of chemical dyes on environment and its toxic nature. Going back to natural dyes is sensible option and colour fastness can be achieved by using mordants as the present study shows.

#### References

1. Katyaini VKLT and Jacob M. (1998) Dye from Mesta calyx, *The India Textile Journal*, January, pp. 86-89
2. Verma C. and venkatachalam V. (2002), *Effect of mordants on Mango (bark) dye for dyeing of jute cotton union fabric*, *Colourage*, pp. 49-54.