

## Organic Dyes for Cotton Fabrics

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### Abstract

The revival of the use of natural dyes worldwide is primarily due to the increasing environmental consciousness. Their nontoxic, biodegradable properties are making them exceedingly popular. Environment protection and eco-friendliness play an increasingly important part in consumer awareness with textiles being subjected to stringent examination particularly with regard to the chemicals used. The present study made an attempt to dye cotton with marigold flowers and red sander bark dye extract, with different mordants concentrations and to assess the fastness properties. The marigold and red sander dyed cotton in alkaline media, pre, simultaneous and post mordanted samples showed good to excellent colour fastness properties to sunlight, washing and rubbing compared to control sample. Marigold dyed cotton samples produced golden yellow, golden brown and black shades. In the same way red sander dyed cotton samples produced light to medium brown shades.

**Key words:** Colour fastness, Marigold, Mordant, Natural dye, Red sander

### Introduction

Cotton the versatile fibre has its own uniqueness. India is famous for its cotton production. It is the king of natural cellulosic fibre and good conductor of heat. It has dye affinity, strength and abrasion resistance. The revival of the use of natural dyes worldwide is primarily due to the increasing environmental consciousness. Their nontoxic, biodegradable properties are making them exceedingly popular. Environment protection and eco-friendliness play an increasingly important part in consumer awareness with textiles being subjected to stringent examination particularly with regard to the chemicals used.

Natural dyes are obtained from parts of plants namely, root, bark, leaves, fruit, berry, nut, shoot, seed, husk, flowers etc., insects and minerals. Natural dyes are non-toxic, non-carcinogenic, eco-friendly, user friendly and compatible with the nature and no petrochemicals or catalysts are used in Majority of natural dyes need a chemical in the form of metals salts to create an affinity between the fibre and the pigments and colourants. These chemicals are known as mordants. The mordant form a link between the dyestuff and fibre helps to produce faster shades by forming an insoluble compound of mordant and dyestuff within the fibre itself.

Marigold flowers of *Tagetes erecta* variety mainly contain the flavonol quercetagetol, which is a derivative of quercetol. It contains patuletol and some ellagic acid, which serves as a mordant. Quercetol is the colouring principle in marigold. Most of the time Marigold flowers are used for garlands, decorating screens, ritual functions etc and are thrown out later. Such flowers are selected for dyeing and printing. The red sander bark (*Pterocarpus marsupium*) contains l-epicatechin and a reddish brown colouring matter. The bark is occasionally employed for dyeing. The heartwood yields liquiritigenin isoloiquiritigenin, a neutral unidentified component alkaloid and resin. The wood also contains a yellow colouring matter and an essential oil and a semi dyeing fixed oil. The present study made an attempt to dye cotton with marigold flowers and red sander bark dye extract, with different mordants concentrations and to assess the fastness properties.

### Materials and Methods

Dye sources - marigold flowers and red sander bark

Textile substrate - cotton material

Mordents - Potash alum, stannous chloride, calcium chloride, potassium dichromate, copper sulphate and ferrous sulphate

### Myrobolon pretreatment

Preparatory process used for cotton before dyeing were scouring and bleaching. Myrobolon (*Terminella chebula*) pretreatment was given to cotton material used for dyeing. Myrobolon fruits were powdered and soaked in cold water for 24 hrs. prior to dyeing, cotton material were pre treated with 20 percent myroboal solution for two hours at room temperature, squeezed and dried under shade..

### Extraction of dye

Red sander bark and Marigold flowers are shade dried and soaked in water with MLR 1:40 for 24 hours and it are boiled for 45mins. The dye extracts were allowed to cool, filtered and used for dyeing.

### Dyeing

The cotton material was dyed by three mordanting methods used were pre, simultaneous and post mordanting, where mordants were used before, during and after dyeing, respectively.

After dyeing, the solution is allowed to cool completely and the samples are removed from dye bath and rinsed under running water to remove excess dye particles present on the surface and shade dried.

### Color fastness assessment

Dyed samples are subjected to the following colour fastness tests using BIS standard methods.

Color fastness to washing : Test 2 (IS: 3361-1979)

Color fastness to rubbing (IS: 766-1988)

Color fastness to sunlight (IS: 686-1985)

Color fastness to perspiration (IS: 971-1983)

Assessment of colour fastness is done by using grey scale method.

Grey scale for evaluating change in colour (IS: 768-1982).

Grey scale for evaluating staining by (IS: 769-1982).

### Results and Discussion:

The results of the fastness properties of marigold and red sander dyed with different mordants are depicted in Table 1. The marigold dyed samples pre and simultaneously mordanted with potash alum, potassium dichromate, copper sulphate and ferrous sulphate showed excellent sunlight fastness property. Colour change and colour staining to wash was excellent for all mordant treated samples. The rubbing fastness of treated samples was excellent to colour change and good for colour staining for both dry and wet rubbing test. All cotton marigold dyed samples exhibited good to excellent colour fastness to sunlight, washing and rubbing comrade to control sample.

It is observed from Table 1 that, cotton dyed red sander material exhibited excellent to good fastness grades to sunlight test. Pre, simultaneous and post mordanted samples showed excellent fastness to washing. Post mordanted with stannous chloride and calcium chloride

**Table 1: Fastness grades of the Marigold and Red sander dye for cotton**

Method of mordanting	Mordants	Mordant conc. (%)	Marigold dye (6%) fastness properties								Red sander dye (9%) fastness properties									
			sun light	washing				rubbing				sun light	washing				rubbing			
				CC	CS		dry		wet		CC		CS	dry		wet				
				C	S	C	C	C	S	C	S	CC	C	W	C	CS	CC	CS		
Pre	Control	-	5	2	4	4	5	4	5	4	4	5	5	5	5	5	4/5	5	5	
	Potash alum	15	5	5	5	5	5	4	5	3	6	5	5	5	5	5	4/5	5	4/5	
	Pot. dichromate	3	5	5	5	5	5	4	5	4	-	-	-	-	-	-	-	-	-	
Sim	Copper sulphate	1	5	5	5	5	5	4	5	5	6	5	5	5	5	4	5	5	4	
	Ferrous sulphate	1	5	5	5	5	5	4	5	5	-	-	-	-	-	-	-	-	-	
Post	Stannous chloride	5	-	-	-	-	-	-	-	-	4	5	5	5	5	5	5	5	4/5	
	Calcium chloride	2	-	-	-	-	-	-	-	-	4	5	5	5	5	5	5	5	4/5	

Note : CC - colour change CS - colour staining C - Cotton S - Silk W - Wool

samples attained excellent fastness grades to dry and wet rubbing. Overall red sander dyed cotton samples depicted good to excellent grades to colour fastness properties.

### **Conclusion**

The marigold and red sander dyed cotton in alkaline media, pre, simultaneous and post mordanted samples showed good to excellent colour fastness properties to sunlight, washing and rubbing compared to control sample. Marigold dyed cotton samples produced golden yellow, golden brown and black shades. In the same way

red sander dyed cotton samples produced light to medium brown shades. Cotton is the king of fibres since time immemorial that has been face lifted, consecutively to meet the changing consumer needs. Such indigenous resources can be exploited to meet the consumer demand for organic/healthy textiles.

### **Reference**

Mahal G, Sakshi and Sunanda RK 2004 An eco friendly dye for silk - teak leaves. *Man-made Textiles in India*. 57(4): 130 - 134.