

COLOURANT POTENTIAL OF *RICINUS COMMUNIS* L. ON SILK AND COTTON CLOTH

Rupali Deshpande and Alka Chaturvedi

P.G.T.D. of Botany, RTM Nagpur University, Nagpur (MS) India
deshpanderups@gmail.com**ABSTRACT**

A castor bean plant *Ricinus communis* L., a member of family Euphorbiaceae is a well known oil yielding plant. India is the world leader in Castor bean production. Whole plant body is utilised in Ayurvedic field, Present investigation is an effort to yield a Natural dye from different parts of Ricinus plant. Aerial parts of plant (Fruit coat, Leaf) were found to be good source of natural dye for cotton as well as silk Cloth. With different mordant Green, brown and yellow shades were on cloth. Excellent fastness property of dye was observed. A smart green shade was observed on Cotton cloth with mordant CuSO_4 . The dye extraction method is non hazardous and economically viable. The synthetic dyes created pollution in environment which can be avoided by using Natural dye. But still Natural Dye is unpopular in the market because of the higher price tag and lack of dye resource knowledge, being a dominant and widely spread species, a dye from *Ricinus* may be useful to solve the above problem.

Key words: Natural dye, aerial parts, fastness, non hazardous, pollution.

INTRODUCTION

A member of family Euphorbiaceae *Ricinus communis* L. is a highly prolific and precocious producer of toxic seeds, very adaptable to different environments and has been widely distributed by man. It is reported invasive or weedy in many countries particularly in the tropics and since dense thickets shade out native flora it is able to have negative impacts on biodiversity.

The castor bean plant a fuel crop is an erect, tropical shrub or small tree, grows up to 30 feet tall. As an annual in the cooler zones, it grows up to 15' tall. It is a very fast growing plant. The joints of the hollow stem, stalks and leaves are reddish to purple. The leaves are 6 - 11 lobed, palmate with uneven serrated edge (Singh *et al.*, 2001).

The plant has various medicinal properties and uses like purgative, galactagogue, emmenagogue and emetic. It is also used for the treatment of scrofulous sores, boils and rheumatic swellings, skin diseases and leprosy (Kota Chaitanya Sravanthi *et al.*, 2011; ayurvedicmedicinal plants.com). Aqueous leaf extract reported excellent insecticidal activity against *Callosobruchus chinensis* L. (Upasani Shripad *et al.*, 2003)

With such medicinal property of Ricinus plant, an additional potential of this plant as a

Natural dye has been investigated. Aerial parts of plant (Fruit coat, Leaf) were found to be good source of natural dye for cotton as well as silk Cloth.

In recent years much concern is expressed for saving the environment by avoiding pollution at various levels. Chemical dyes were found a tremendous source of pollution to environment; Natural dyes being eco-friendly and biodegradable are much preferred as the dyes of the current millennium. During present investigation the fresh / dried plant materials were used for dyeing cotton and silk cloth. The dyeing was carried out in optimizing dyeing conditions namely dye material, extraction time and using various combinations of mordant.

Cotton, a natural cellulose fiber is mostly used in the textile world because of its comfortable soft touch, good absorbency and easy to handle and sew quality.

Silk is yet another word for elegance and is the strongest natural protein [Fibroin] fiber which has its own luster. Silk absorbs moisture, which makes it cool in the summer and warm in the winter. Because of its high absorbency, it is easily dyed in many deep colours.

MATERIALS AND METHODS

Selection and preparation of plant material and fibers: Fresh plant parts like leaf, fruit coat were collected from the campus of RTM Nagpur University and dried in shade. Dried materials were grounded well to finely powder which is used in extraction of dye.

Cotton and Silk cloth was purchased from local markets and washed with detergent soap and rinsed thoroughly with hot water to remove traces of detergent and starch.

Extraction of dye:

5 gm powder was boiled in 500ml water for one hour to extract dye. Filter the solution by muslin cloth. Collect residue and again boil in 200ml water for one hour and filter again. Mix above two filtrate dye solution.

Dyeing of fabrics:

The dyeing process was started initially at 40°C and the temperature was gradually raised up to 85°C and put constant up to 45 minutes. After dyeing, cloths were taken out and wash thoroughly with tap water.

Mordating Technique:

Various mordant were used in present investigation like Alum, Sodium hydroxide, Sodium chloride, Copper sulphate, ferrous sulphate, Potassium Chromate. Simultaneous mordant method is used for dyeing (Agarwal *et al.*, 2007, Shrivastava, 2006, Debasish Das *et al.*, 2008). Different combination of mordant was used during present study. viz. Copper sulphate + sodium hydroxide, Copper sulphate + potassium chromate, Copper sulphate + Ferrous sulphate and Ferrous sulphate + sodium hydroxide.

RESULT AND DISCUSSION

In present investigation good result was found in Simultaneous mordant method. With the use of mordant various shades were obtained on silk as well as Cotton cloth. The shade ranges from green, brown to yellow colours. Intensity of the shade was depending upon the nature of fibre.

Green dye was extracted from leaf of plant, which gave cream, yellow, light brown muddy brown, black brown and dull black colour on cotton and silk cloth with mordant (Table 1 The shades in this investigation were renamed with the reference of catalogue of Asian paints).

From pink fruit coat, pink dye was obtained which gave cream, light green, dark green, creamy Brown shade on both types of cloths with mordant (Table 2, The shades in this investigation were renamed with the reference of catalogue of Asian paints).

The dye required minimum time (1 hr.) to dye cloths with effective colour. As natures of fibres are different from each other (Cellulose and Protein) same mordant and dye combination gives two different shades on both fibres (Photographs in Table 1 and Table 2).

In present investigation chlorophyll is the main chemical constituent of the dye; it is expected to give a green colour on cloth. But chlorophyll is lipid accompanied pigment of plant and insoluble in water (Strain, H. H. 1966). During present investigation the colour retain capacity and fastness property of chlorophyll dye in ethanol solution was checked out and found to be poor. A fixative is needed to fix the dye on cloth. In above study mordant were used as fixative agent.

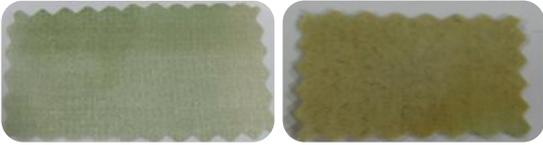
Mordating technology improved the development of shade and to provide a link to colouring substance to fix on cloth. Mordating should also improve the fastness property against light, temperature and washing. (Devi *et al.*, 2006, Agarwal Radhika *et al.*, 2007, Shrivastava A. *et al.*, 2006) Devi *et al.*, 2006 reported creamish green to dark mehandi green shades on silk cloth after dyeing with *Eclipta prosteta* with various mordant and their combinations. Likewise during present investigation pale yellow to grey green to dark green shades were obtained on silk and cotton cloth. Washing and light fastness property of Ricinus dye was also found be good. The dye extracted from fruit carp also showed variety of shades on cloth as above.

Though the seeds are useful in oil extraction the fruit carp is waste material in this case, by using this waste material for dyeing purpose we again add a value to Ricinus plant. Various Micro-organisms which are present in our surrounding deposited and multiply on our body and textile material contact with our skin have a chance to cause some skin disease; as per the reported work the Ricinus leaf is effective against Skin Disease (Mossa *et al.*, 1987).

Table : 1 DYE EXTRACTED FROM LEAF

Silk	Cotton	Silk	Cotton
Alum		Sodium hydroxide	
 Ric Goldilocks	 Ric Pale yellow	 Ric limeN'Honey	 Nocoloration
Sodium chloride		Copper sulphate	
 Ric Summer Noon	 Ric Summer Noon	 Ric Green apple	 Ric pale yellow
Ferrous sulphate		Potassium chromate	
 Ric Shadow Dance	 Ric Grey Stone	 Ric Candle Weak	 No coloration
Copper sulphate + sodium hydroxide		Copper sulphate + potassium chromate	
 Ric Majestic Mountain	 Ric Yellow	 Ric Forest Foliage	 Ric Pale yellow
Copper sulphate + Ferrous sulphate		Ferrous sulphate + sodium hydroxide	
 Ric Mist Flower	 Ric Mettalic Green	 Ric Sand Bed	 Ric Sand Bed

Table : 2 DYE EXTRACTED FROM FRUIT CARP

Silk	Cotton	Silk	Cotton
<p>Alum</p>  <p>Ric Peach Melba Ric Pale yellow</p>		<p>Sodium hydroxide</p> <p>No coloration No coloration</p>	
<p>Sodium chloride</p>  <p>Ric Summer Noon Ric Summer Noon</p>		<p>Copper sulphate</p>  <p>Ric Pale Moss Ric Golden yellow</p>	
<p>Ferrous sulphate</p>  <p>Ric Stone age Ric Stone age</p>		<p>Potassium chromate</p>  <p>Ric Gold Mountain No coloration</p>	
<p>Copper sulphate + sodium hydroxide</p>  <p>Ric Algae Green Ric Yellow Tint</p>		<p>Copper sulphate + potassium chromate</p>  <p>Ric Forest Foliage Ric Pale yellow</p>	
<p>Copper sulphate + Ferrous sulphate</p>  <p>Ric Mist Flower Ric Black Green</p>		<p>Ferrous sulphate + sodium hydroxide</p>  <p>Ric Sand Bed Ric Sand Bed</p>	

The concentrated extract of the *Ricinus communis* leaves showed a better antibacterial activity in comparison with the standard and Bacterial/ fungal species such as *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Salmonella typhimurium*, *Proteus vulgaris*, *Bacillus subtilis*, *Candida albicans* and *Aspergillus niger* (Kota Chaitanya Sravanthi *et al.*, 2011). Ricinus plant has a huge medicinal as well as economical uses, with such uses, Ricinus can also use as a Natural Dye for Silk and Cotton cloth.

Author investigated a potential character of *Ricinus communis* L. as a Natural textile dye, with the help different mordant various shades were produced (except Sodium Hydroxide). Used mordant are not harmful for skin and biodegradable in nature. As the plant widely distributed, ample amount of material is available throughout year. Extraction method is

economically viable and fastness property of dye is good. The uninterrupted availability of different shades from a single source were tried successfully to utilized plant as a potential source of a natural dye, this will help mankind to get such ecofriendly shades from a single source.

From the above discussion it is concluded that instead of using harmful chemical dyes any one can use *Ricinus communis* L. as a Natural Dye for soothing shades. Present investigation is a try to make such kind of textile dye which is useful to make Ayurvedic Vastram which fight against Skin Disease.

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