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PINK SHADE DEVELOPED ON COTTON YARN FROM *RUBIA CORDIFOLIA* Linn.

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ABSTRACT:

Cotton yarn dyed with the dry root of *Rubia cordifolia* Mordent were used as Alum. $CuSO_4$. $FeSO_4$ and Myrobalan. Mordanting methods were adopted as Premordanting and separate mordanting. Separate mordanting method was adopted for single experiment. Obtained pink and grayish pink shades using different mordents. Dyed specimens were tested for four fastness test. Observed good to very good rubbing, washing and light fastness but perspiration fastness was poor to fair.

KEY WORDS:Pink shade, cotton yarn and *Rubia cordifla*.

INTRODUCTION:

People were using herbal dye until the half of the 19th century (Parkes C. H. 2002 – 2003) for dyed textile material. They were used different parts of the plant to obtain various shades (Bambhadai.1995). Recently, a number of commercial dyers and small textile export houses have started looking at the possibilities of using natural dyes for regular basis dyeing and printing of textiles to overcome environmental pollution caused by the synthetic dyes (Glover B. and Pierce J.H., 1993) In spite of the better performance of synthetic dyes, recently the use of natural dyes on textile materials has been attracting more and more scientists for study (Ashis and Priti, 2009). Manjistin and purpurin are colouring components of *Rubia cordifolia* Linn. which are uses for different hue (S.B.Gokhale et.al., 2004). Agarwal and Gupta (2003) had tried the root extract of *Rubia cordifolia* to dye Australian merino wool.

The present investigation has been emphasized to develop a process for the extraction of colouring materials from dry root of *Rubia cordifolia* (Rubiaceae) by solvent extraction method and their application on cotton yarn.

MATERIALS AND METHODS:

Material: cotton yarn 72 hanks was used as textile material. Root extract of *Rubia cordifolia* was used as dyestuff.

Mordant: Vegetable mordant is Myrobalan and Mineral mordant are used as Alum, $CuSO_4$ and $FeSO_4$.

Experimental method:

Extraction of the dye: extract was dissolve in warm water. The ratio of textile material to dye material was maintained at 1:1 (w/w).

Pretreatment of cotton yarn:

Wetting oil (20g/l) used as castor oil. Yarn was soaked in this solution for 24 hours, then squeezed well and remove natural colorants water, dust and uncellulosic particles. Then the yarn was boiled in 2g/l solution of sodium bicarbonate for 2 hours. The pH of washing bath was nine. Yarn was thoroughly washed and dried in sunlight.

Mordanting:

Pre mordanting: using mordant before the dyeing is known as Premordanting. All specimens have pre mordanting process except Specimen one.

Separate mordanting:

When a mordanting is carried out twice is called separate mordanting.e.g. first mordanting was carried out with $CuSO_4$ for half an hour followed by Alum mordanting for another half an hour on the same textile material before dyeing process.

Dyeing: Pre-mordanted cotton yarn entered in dye bath at 60^oC temperature, gradually increased to 99^oC for 30min.with continuous stirring. Dyeing pH was adjusted at 8 to 8.5 by Na_2CO_3. Remove the dyed specimen from a dye bath, dry it in shade. Aeration deepens the colour. Yarn is than washed with water followed by soap solution at 90^oC for 15 min. to remove unfixed dye as well as hydrolyzed dye. Fabric was finally washed with water and dried in sunlight.

Electrolytes and pH:

NaCl was used as electrolyte at the concentration of 20 gm/liter. The quantity of twenty gram was added in two equal installments. First in the beginning and excess amount added after half period of dyeing. NaCl was used in four specimens only.

$NaHCO_3$, Na_2CO_3 were used for pH adjustment. They were used in eight specimens.

Fastness Test: Rubbing fastness test of the dyed fabric was measured using Crock meter (AATCC, 1961).Washing fastness test of the dyed fabric was measured using Launder-O-meter (Trotman, 1970) (b).The Perspiration fastness of the given fabric was measured using Perspirometer (Trotman, 1975). Light fastness test is carried out in fade-o-meter (Trotman, 1970) (c).

Assessed grade of Fastness (Trotman, 1970): Cc Grade: After completing the test, the tested sample and the control dyed specimen were kept side by side. Both the specimens than were

compared with Cc grey scales. Visual assessment was made as to the fading of colour with reference to the control and standard grey scale.

Cs Grade: After completing the test these samples were also compared with respective Cs grey scales to test the colour staining as above (Table: 3).

RESULTS AND DISCUSSION:

Rubia cordifolia is a spready shrub found in the hilly region of the country. It's roots yield dye. Samanta (2003) had tried the wood of *Rubia tinctorum* to dye cotton with alum mordant and observed good to verygood rubbing, washing fastness, light fastness was observed slight to moderate.

Bhuyan and Saikia (2004) had tried the root of *Rubia cordifolia* to dye cotton, silk and wool with alone as well as along with mordants like $CuSO_4$, $K_2Cr_2O_7$ & $SnCl_2$. Shades obtained were pink, red, brown, dark brown, orange brown and pinkish brown. Observed good to very good washing and moderate to fair light fastness of control. Work lacks for other fastness test.

Mandal *et al.* (2004) had tried the bark of *Rubia cordifolia* to dye silk using mordant as myrobalan and alum. Observed good and very good washing and good light fastness. Work lacks rubbing and perspiration.

Teli *et al.* (2004) had tried extract of *Rubia cordifolia* to dye cotton with alone as well as along with mordant as $FeSO_4$ and tannic acid. Observed similar fastness between pretreated dyed cotton and control dyed cotton.

Katti *et al.* (1996) had tried the mixture of *Rubia cordifolia* and *Tagetus erecta* to dye silk. Fastness observed very good washing, perspiration fastness and fair light fastness of mixture whereas fair washing, perspiration and light fastness of in case of 100g/l *Tagetus erecta*.

The present work includes the extract of *Rubia cordifolia* tried to dye cotton yarn alone as well as along with mordant like alum, myrobalan, $FeSO_4$, $CuSO_4$, mixture of alum and $CuSO_4$. Shades obtained were pink and grayish pink (Table: 1) Fastness observed was good to very good washing and rubbing fastness (Table: 2). Poor to fair perspiration and moderate to fair light fastness. Fastness can improve by using the inorganic substance (Anila et al., 2006).

CONCLUSION:

Some of the herbal dyes were producing single shade with different mordants which are known as monogenetic dye. Thus, *Rubia cordifolia* is monogenetic dye.

It is interesting to know that there is a great potentiality in developing herbs as source of textile dye but it would require great effort to improve the fastness characters of several dyes to bring them in to commercial exploitation.

REFERENCES:

Anila patel, M.N.Reddy & M.H.Parabia(2006): Improvement of perspiration fastness of some herbal dyes, *Colourage* 53(4) p. 52.

Ashis Kumar Samanta and Priti Agarwal(2009): Review article: application of natural dyes on textiles, *Indian Journal of Fibre & Textile Research* Vol.34 p. 384-399, December.

Bambhadai Gokuldas Khimaji(1940): Vanspatishrushti, Navajivan press, Ahmedabad.

Bhuyan, R. and Saikia, D.C. (2004): Natural dyes: Present scenario in North East India. *Colourage* LI (5): p. 27.

Glover, B and Pierce, J. H. (1993): J. Soc. Dyers Color, 109(1) 5.

Katti M.R., Kaur Ramnik and Shrihari N.(1996): Dyeing of silk with mixture of natural dyes, *Colourage* XLIII (12) p.37.

Mondal Subrata, Dutta Chakradhar, Bhattacharya Sanat, Ganguly Debangshu, Ganguly Sujit, Bandyopadhyay Saumya, Chattopadhyay Subhra and Sau Mitrajit(2004): The effect of dyeing conditions on fastness properties of natural dyes on silk fibers. *Colourage* LI (8) p.33.

Parkes, C.H.(2002 – 2003): 'Creating colour in Yarn: An introduction to natural Dyes', Knitter's Review.

S.B. Gokhale, A.U. Tatiya, S.R. Bakliwal and R.A. Fursule(2004): Natural dye yielding plants in India, *Natural Product Radiance* Vol 3(4) July – August.

Samanta, A.K.: Application of single and mixture of selected natural dyes on cotton fabric: A Scientific approach. *Colourage* L (11) p.29, 2003

The American Association colour and chemist (AATCC) *Technical Manual*, p.8. 1961

Trotmen, E.R.(1970): Dyeing and Chemical Technology of Textile Fibers, 4th ed., London. p.590, (c)

Trotmen, E.R. (1970): Dyeing and Chemical Technology of Textile Fibers, 4th ed., London. p.596,597, 1970(b)

Trotmen, E.R. (1975):: Dyeing and Chemical Technology of Textile Fibers, 5th ed., Charles Griffin and Company LTD, London and High wycombe p. 626.

Teli, M.D. (2004): Adivarekar R.V.and Pardeshi P.D.: Dyeing of pretreated cotton substrate with madder extract. *Colourage* LI (2) p.23.

Table 1: ***Rubia cordifolia***

Species	Textile material	Used part	Mordant	Colour	Spe. No.
Rubia cordifolia	Cotton yarn	Extract	Alum, $CuSO_4$	Pink	**1**
			Myrobalan	Pink	**2**
			$FeSO_4$	Grayish pink	**3**
			$CuSO_4$	Pink	**4**
			Alum	Pink	**5**
			Nil	Pink	**6**

Table 2: ***Rubia cordifolia*****: fastness**

Rubbing				Washing		Perspiration				Light	Spe.
Dry		Wet				Acidic		Alkaline			No.
Cc	Cs	Cc	Cs	Cc	Cs	Cc	Cs	Cc	Cs	Cc	
4	4	3	4	3	3-4	1	1-2	1	1-2	3-4	**1**
4	4	3	3-4	3	4	2	2	2	2	4	**2**
4	4-5	3	4	3	4	2	2	2	1	4	**3**
3-4	4	3	3-4	3	3	2	1-2	1	2	4	**4**
3	3-4	2-3	3	3	2-3	1-2	2	1-2	1	3	**5**
3	3	3	2-3	3	2-3	1	1-2	1	1-2	2-3	6

Table 3: Gradation of Perspiration Fastness

Observation of tested White material	Observation of tested Dyed material	Grade No.	Qualitative assessment
No stain	No lighter	5	Excellent
Slight stain	Slight lighter	4	Very good
Moderate stain	Moderate lighter	3	Good
Distinct stain	Distinct lighter	2	Fair
Very much stain	Very much lighter	1	Poor