



Printing of Cotton/ Jute Union Fabric with *Annona Squamosa* Linn. Leaf Extract and Its Assessment towards Sunlight and Wash Fastness

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Abstract

The present study was undertaken with aim to print cotton/Jute Union Fabric with leaf extract of Annona squamosa linn. Cotton & Jute both Fibers are biodegradable in nature; ultimately environment friendly on the other hand worldwide consumer prefer eco-labels because clothing remains in contact with human skin for most part of the day. As consumer is becoming more health conscious they are moving towards the fabric with eco-labels. Traditional printing method was used-Dyeing with Annona squamosa linn. Leaf extract was followed by mordant printing, Alum, Stannous chloride, Ferrus sulphate were used for printing as metal mordant & banana bark was used as natural vegetable mordant. Printed samples were evaluated for printing effect and their fastness towards sunlight & washing printing results were good with good to excellent sunlight & washing fastness.

Keywords: Cotton/Jute Union Fabric, *Annona squamosa* linn. leaf extract, Printing, Sunlight & Wash fastness.

Introduction

Protection of environment has now become a challenge for the chemical industry. The textile industry in particular process houses, consume large quantities of energy, water and chemicals auxiliaries/ dyestuff. Careful judicious selection and optimum handling of these inputs must be a primary objective. It may be emphasized that cleaner industries require collective long-term enthusiasm, willingness and commitment on the part of manpower. According to Mehra et.al. 1995 chemical treatment giving due consideration to ecological problems will also ensure lower air/ water pollution in the producing country and satisfy the requirements of ISO 9000 which is becoming a prerequisite for future exports.

Natural dyes have the ability to produce wide range of tints and shades, with the same dye material. The present eco-consciousness has shifted the researcher's attention to the use of natural dyes for dyeing textile materials Kumarsen et.al.2010. Jute is natural eco-friendly and biodegradable fiber. Jute as a natural fiber has many inherent advantages like luster, high tensile strength, low extensibility moderate heat and fire resistance long staple lengths it has many advantages over synthetic. Protect the environmental and maintain the ecological balance. Cotton is the oldest and most important since historic times cotton has been used for apparel purposes because of its well-known advantages, viz. ability to take up a wide range of dyestuff, low cost of production and comfort during wear. Cotton is backbone of the



world's textile trade. Many of our everyday textile fabrics are made with blend of cotton. (www.wigglesworthfiber.com). **Datta et. al.2001** has designed a coordinated product range of Table linen using natural dyes. Lac, Harda, Cutch, Gall Nuts, Dolu, Madder with block printing on cotton and silk. Printed cotton and silk were also assessed towards color fastness properties. The present study deals with the printing of cotton/ jute union fabric with *Annona squamosa* Linn. leaf extract. *Annona squamosa* linn. belongs to Family: Annonaceae, English name: custard apple. A large evergreen straggling shrub or small tree, 7m in height introduced in India, found wild and cultivated in various parts, up to an altitude of 900m. Leaves, oblong lanciolate or elliptic, pellucid-dotted, peculiarly scented 5-15cm x 1.9-3.8cm. **Anonymous 1985. Gaur 2007** reported that *Annona squamosa* linn. is a dye yielding plant fruit produce yellow dye. **Soni et.al.2011** isolated flavonoid in *Annona squamosa* linn. leaves in aqueous extract with lead acetate and chromium test. Flavonoides were also reported in methanol and chloroform extract, they also reported tannin in aqueous extract. **Yusha's et.al.2011**, carried out phytochemical screening and observed presence of alkaloids & flavonoids reducing sugars in chloroforms fraction. **Shukla et.al.2003** reported Dyeing with the combination of extract of *Accacia pennata* and banana stem has also been carried out and improvement in depth of colour without altering the tone observed. The dyeing with *Accacia pennata* bark and banana stem extracts together shows better fastness levels as compared to dyeing with *Accacia pennata* alone. However in the combination dyeing, the fastness level do not improve further on mordanting. Thus it seems that the use of banana stem extract itself act as good mordanting agent. An overview of literature on printing with natural dye suggests the use of newer dye source for value addition in printed fabrics. Therefore attempt has been made to dye from *Annona squamosa* leaves extract for printing.

1. Materials and methods

Source: custard apple leaves (*Annona squamosa* linn.) were collected in the month of February.

Textile substrate: Cotton /Jute union fabric

Mordants:

Natural mordants: Banana bark extract, harda fruit (*Terminaliachebulia* linn.)

Metal mordants: ferrous sulphate (*Iron*), Stannous chloride (*tin*), Alum.

Natural gum: Babool gum, (gum arabic)

2.1 Methods:

2.1.1 Scouring of cotton /jute union fabric: The grey cotton/ jute union fabric was scoured in a bath containing 2% caustic soda (NaOH), 1% T. R. O. & 1 percent soda ash (Na₂CO₃) for 3 to 4 hours at boiling temp keeping M: L as 1:20. After processing, it was washed thoroughly in hot water & then in cold water. The scoured fabric was dried in air for 48 hours.



2.1.2 Tannin treatment: tannin treatment was given to cotton/ jute union fabric with 10% (owf) harda powder with 1:30 M: L ratio for 30 minutes at room temperature. Treated fabric was shade dried for two hours and used for printing.

2.1.3 Preparation of printing paste: Printing paste was prepared with gum arabic and each mordant viz. alum, ferrous sulphate, stannous chloride and banana bark separately. Block printing method was adopted. SuiTable blocks for the design placement of Table linen set were selected. Printing was carried out on scoured cotton/ jute union fabric with previously prepared printing separately for each mordant. Printing was followed by steaming.

2.1.4 Extraction of dye: Leaves were washed thoroughly to remove dirt and infection if any and cut in to small pieces. Extraction was carried out with 50% dye material with 1:50 M:L ratio for 2 hours at boiling temperature level was maintained throughout. Extract was filtered and used as a dye.

2.1.5 Dyeing of printed sample: Dyeing of printed samples was carried out for 45 minutes at 90⁰ c with adequate dye liquor movement. Initial temperature of dye bath was 50⁰ c and slowly it was raised up to 90⁰ c. The dyed sample was removed from dye bath, rinsed thoroughly and shade dried. Dyeing was carried out separately for each Experimental sample.

2.1.6 Assessment of wash and sunlight fastness: Wash fastness was assessed using ISO test 2 on laundro meter (IS: 3361-1979) sunlight fastness was assessed using (IS: 686-1985). Results of wash and sunlight fastness are shown in Table.

Table linen set was designed and prepared in cotton /jute union fabric printed with *Annona squamosa* leaf extract. Co-ordinate set of Table linen was displayed and judged by the panel of 5 judges in terms of design, placement of design color combinations, suitability of fabric for the purpose, impression of color and depth of color obtained with different mordants.

2. Results and Discussion

During printing it was observed that different mordants produced different shades. When cotton / jute union fabric printed with alum and dyed with *Annona squamosa* linn. Yellow ocher shade was produced. Banana bark extract when used as a mordant in printing paste it obtained ocher tone on cotton /jute union fabric after dyeing. When printed with stannous and dyed tone of brown was produced. Ferrous produced coffee brown color.

Table reveals that when cotton/jute union fabric was printed with alum and dyed with *Annona squamosa* excellent wash fastness was noted and rated as 5. banana bark, ferrous sulphate and stannous chloride showed very good washing fastness rated 4.5 when dyed with *Annona squamosa* linn. & 5 for staining on adjacent Fabric with excellent rating.

Rating scale: 5-Excellent, 4/5-Very good, 4-good, 3/4-fairly good, 3- Moderate, 2/3- Fair, 2-Poor, 1/2 – Very poor, 1-Extremely poor

Table 1 Wash & Sunlight Fastness of *Annona squamosa* linn.

Mordant	Mordant Concentration % (OWF)	Wash fastness		Sunlight fastness
		Colour change	Colour staining	Colour change
Alum	10	5	5	4
Banana bark	3	4/5	5	5
Ferrous sulphate	3	4/5	5	5
Stannous chloride	3	4/5	5	4/5



Dyed and printed samples when subjected to sunlight fastness, it was observed that sample mordanted with alum exhibited very good fastness, which rated 4.5. Banana bark when used as a mordant in printing paste. Showed very good sunlight fastness rated as 4.5. Ferrous sulphate and stannous chloride showed excellent sunlight fastness rated 5 when dyed with *Annona squamosa* linn. **Rathi and Godbole 1999** have studied dyeing behavior of jute/cotton union fabric with katha and found that it can be successfully dyed with katha using alum mordant. Treatment showed increase in dye uptake and fastness. Dyed fabric is very fast to washing wet and dry rubbing and to acidic, alkaline perspiration.

3. Conclusion:

Jute fiber being eco-friendly, biodegradable and abundantly available at cheaper price, there is ample scope for application. Cotton /jute union fabric has been used to design co-ordinated Table linen set as a value added product. *Annona squamosa* linn. is explored as a source of natural dye. *Annona squamosa* linn. imparted range of color varying from yellow ochre, ochre, tone of brown, coffee brown with very good to excellent wash and sunlight fastness.

Co-ordinated table linen set of Cotton /jute union fabric printed with Custard apple (*Annona squamosa*) linn. leaf extract

Co-ordinated table linen set of Cotton /jute union fabric printed and dyed with Custard apple (*Annona squamosa*) linn. leaf extract

4. References

- [1] Annonimus "*Annona squamosa*". The wealth of India. A dictionary of India raw materials and industrial products raw material. Vol.I.A; pp:284-286. 1985.



- [2] Datta P. Gupta C., Pasricha A. “Designing a co-ordinate product range of Table linen using natural dyes”. In:Gupta D. and Gulrajani M.L. (eds) Convention Proceedings Natural Dyes. Dept. of Textile Technology IIT 17-18 Dwc pp. 161-165. 2001
- [3] Information of Jute, Jute% 20 yarn%20 and %20 Product <http://www.wigglesworthfiber.com>
- [4] Mukharjee, A.K. “Pollution control in man-made fiber industry”. Symposium Proceedings Eco-friendly Textile processing. IIT, Delhi November 6-7,1995) pp151-152. 1995.
- [5] Rathi D. and Godbole K., “Dyeing behavior of jute, cotton and jute/cotton union fabrics with katha”. Book of papers convention of natural dyes. Dept. of Textile Technology IIT, New Delhi. 9Th -11Th December pp 180-185. 1999.
- [6] Soni H, Sharma S, Patel S. S., Mishra K, Singhai A. K. “Preliminary phytochemical screening and HPLC analysis of flavonoide from methanolic extract of leaves of *Annona squamosa*”. International research journal of pharmacy. ISSN 2230-8407. p:242. 2011
- [7] Shukla S. R., Shinde S. C., Banye A.S. and Patil S.M. “Dyeing of wool with *acacia pennata*”. Indian journal of fiber and textile research. Vol.no. 29. Pp:350-352. 2003