IJRAR.ORG E-ISSN: 2348-1269, P-ISSN: 2349-5138

INTERNATIONAL JOURNAL OF RESEARCH AND ANALYTICAL REVIEWS (IJRAR) | IJRAR.ORG

An International Open Access, Peer-reviewed, Refereed Journal

A Comparative Study On Fastness Properties Of Natural Dyed Fabrics

P. Dhanalakshmi[1] ., Dr.R.I.Sathya[2]

Research scholar [3], Department of Home Science, The Gandhigram Rural Institute -Deemed To Be University, Gandhigram, Dindigul District-624302,Tamil Nadu.

Professor[2], Department of Home Science, The Gandhigram Rural Institute -Deemed To Be University, Gandhigram, Dindigul District-624302,Tamil Nadu.

Abstract

The increased significance in natural materials and renewable resources has come to the forefront, which motivates the investigation of natural dyes. Annatto Bixa orellana dye is basically a red orange pigment known as Bixin, extracted from the seed coat of Sinduri, contains carotenoid of various types out of which cisbixin alone accounts for 82% chemistry and performance of annatto colors is essentially of the bixin. Bixin is highly unsaturated compound. This study was aimed to extracts the selected source with suitable mordants coated khadi and silk fabrics. The surface morphological study was done by Scanning Electron Microscopic.The dyed fabric was assessed in terms of fastness properties of washing, rubbing in dry and wet condition, perspiration and light fastness in accordance of ASTM standards and it was rated using standard grey scale.

Keywords: Natural dye, Annatto Bixa orellana, Khadi and silk fabric, Mordant, Fastness properties, grey scale.

1.1 Introduction

Textile materials find substantial application in day to day life. The usage of natural dyes for the textile coloration has been raised due to their recently discovered deodorizing ,antimicrobial(1),anti feedant(2),UV protection(3) properties. In adding to that there is moderate and elegant shades on the different shades of fabrics. Globally , significant research work has already been done on the evaluation of natural dyes, colorimetric and fatness properties.(4,5,6,7)

Annatto Bixa orellana is a small tree belonging to the family Bixaceae. The tree is known for the yellow orange dye obtained from its seeds. It is extensively used for the dyeing of cotton, wool, and silk and also used for coloring butter, cheese, and the like. The pulp is rich in tannin. The alkali extraction method is used for extracting dye at boiling conditions. It produces reddish orange shades on cotton, wool, and silk. (Ashis Kumar Samanta, 2011)

Annatto dye is basically a red orange pigment known as Bixin, extracted from the seed coat of Sinduri, contains carotenoid of various types out of which cisbixin alone accounts for 82% chemistry and performance of annatto colors is essentially of the bixin. Bixin is highly unsaturated compound. The Bixin dissolves in vegetable oil, undergoes isomerization and degradation reactions when heated. (S. Subhashini, et.al, 2009) The purpose of this research is to extract the dyes from the selected source and assess the fastness properties of khadi and silk samples.

2.1. Selection Of Source And Material

Bixa orenella (Annatto) is a type of food colouring prepared from the seeds of the achiote tree. Though it may not be well known, an estimated 70% of natural food colours are derived from it. The powered form of source is 350g were purchased from the herbal shop in Madurai district Tamil Nadu. Khadi and silk fabrics were chosen for this study and it was purchased from khadi Bhavan, Madurai.

2.2 Selection Of Mordant

Aluminium sulfate (Alum) and myrobalan were selected for this study. They were chosen for the different color shades. It helps in binding of dyes to the fabric and makes natural dyes less likely to wash off.

2.3 Mordanting And Dyeing Of Material

In mordanting, pre mordanting, methods were used for this study. Alum and myrobalan chosen as suitable mordants. About 1-2% of the mordant has been taken for 30 mints at 90^{o}C with material to liquor ratio 1:30.Among three mordanting methods, the pre mordanting methods were identified to give better shade. Pre-treated khadi and silk fabric were dyed with optimized conditions such as concentration of dye at 6%, dye extracted time at 90 mints, temperature 110^{o}C and material to liquor ratio is 1:30.

2.4Assessment of Color fastness

Fastness to light test helps to match the color consistency of textile fabrics and yarn by visual assessment in the specimen. It is working under different light sources to evaluate the color variations of the specimen. This test carried out under ASTM- D1776 – 90 standard practices for testing with. Fastness to rubbing test carried out as per standard relative humidity of 65 ± 27% at 27 ± 2°C of temperature has been maintained. The Launderometer is used for determining colour fastness of textile materials to washing of textiles fabrics and leather using a rotating washing machine. The standard of two separate AATCC 61 methods test different

washing conditions. AATCC 61 1A simulates the repeated hand laundering at low temperature. The perspirometer test help to determine the fastness of colored textiles to the effects of perspiration under the standard ISO 105-E04

Grey scale ratings as per standard

- 5- Negligible rate of colour change or transference
- 4-Very little rate of colour change or transference
- 3-Little rate of colour change or transference
- 2-Appreciable rate of colour change or transference
- 1-Objectionalble rate of colour change or transference.

2.5 **Surface Morphological Studies using Scanning Electron Microscopy (SEM)**

The scanning electron microscope (SEM) uses a focal point beam of high-energy electrons to make a variety of signals at the surface of solid specimens. The signals attained from electron-sample interactions expose information about the specimen as well as external crystalline formation , morphology (texture), chemical composition, direction of materials making up the specimen. Mostly in SEM applications data are collected over a chosen area of the surface of the specimen, and a 2-dimensional image is created that displays spatial variations in these properties. Approximately areas range from 1 cm to 5 microns in width can be imaged in a scanning mode by conventional SEM techniques (magnification ranging from 20X to approximately 30,000X, a spatial resolution of 50 to 100 nm). The SEM is also competent in performing analyses of selected point locations on the sample

III Results and Discussion

3.1 Assessment of fastness properties

From this table, the data reveals that the colour transference by washing in both of the dyed fabrics. Among the unmordanted and alum khadi and silk dyed fabrics were shown to the value of 4.5,4 which indicates that "Negligible rate of colour transference" and "very little rate of colour transference" respectively. In myrobalan mordanted dyed fabrics were shown the value of 4 which indicates that "very little rate of colour transference".

From this table, the data reveals that the colour transference by perspiration in both of the dyed fabrics. Among the unmordanted and khadi and silk dyed fabrics were shown to the value of 4 which indicates that "very little rate of colour transference".The value of 4.5 indicates the "Negligible rate of colour transference" of the alum mordanted khadi dyed sample and 4 value indicates that "very little rate of colour transference" of the alum mordanted silk dyed sample.Both of the myrobalan mordanted samples were shown the value of 3 which

indicates that the "little rate of colour transference".In fastness properties of perspiration condition in the dyed samples myrobalan mordanted dyed were shown the poor value that the other mordanted dyed samples.

Table no :3.1Fastness properties of dyed fabrics

Samples	Mordant	Washing		Perspiration		Rubbing		Light
		Change in color	Staining	Change in color	Staining	Dry in condition	Wet in condition	
ASDKF	Without mordant	4.5	4	4	4	5	4	5
	Alum	4	4	4.5	4.5	4.5	4	4.5
	Myrobalan	4	4	3	3	4	3	4
ASDSF	Without mordant	4	4	4	4	5	4	5
	Alum	4.5	4.5	4	4	4	3	4
	Myrobalan	4	4	3	3	3	3	3

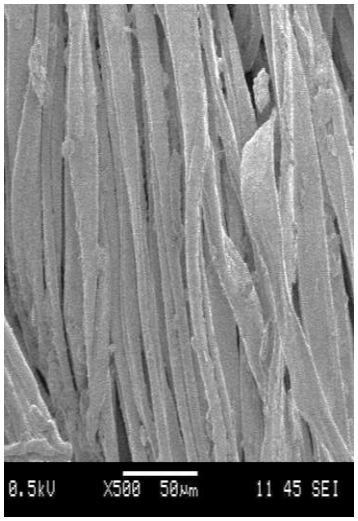
(ASDKF) Anatoo seed dyed khadi fabric (ASDSF) Anatoo seed dyed silk fabric

From this table, the data reveals that the colour transference by rubbing in dry and wet conditions in both of the dyed fabrics. Among the unmordanted khadi and silk dyed fabrics were shown to the same value of 5,4 in dry condition as well as wet conditions. The values were indicates that the "Negligible rate of colour transference" and "very little rate of colour transference".In alum mordanted kadi dyed sample value of 4.5 which indicates that "Negligible rate of colour transference" in dry condition.In wet condition alum mordanted khadi dyed sample value of 4 which indicates that "very little rate of colour transference". In alum mordanted silk dyed sample value of 4 which indicates that "very little rate of colour transference" in dry condition. In wet condition alum mordanted silk dyed sample value of 3 which indicates that "little rate of colour transference"In myrobalan mordanted khadi sample value of 4 has been shown in dry condition which indicates that "very little rate of colour transference".In wet condition the value of 3 shown which indicates that the "little rate of colour transference". In myrobalan mordanted silk sample has been shown the same value of 3 in dry condition as well as in wet condition which indicates that "little rate of colour transference".

From this table, the data reveals that the colour transference by light fastness in both of the dyed fabrics. Among the unmordanted khadi and silk dyed fabrics were shown to the same value of 5 which indicates "Negligible rate of colour transference". In alum mordanted khadi and silk dyed fabrics were shown to the value of 4.5,4 which indicates "Negligible rate of colour transference" and "very little rate of colour transference" respectively. Myrobalan mordanted khadi and silk dyed fabrics were shown to the value of 4,3 which indicates that "very little rate of colour transference" and "little rate of colour transference".

3.2 Scanning Electron Microscopy

The surface morphology of the fabrics has been studied using Scanning electron microscopic analysis .The surface morphology of the treated khadi and silk fabrics were studied using SEM (JEOL-JSAL 6360). It is clearly seen that the treated sample is shown a very less smoothie surface which was possibly one of the procedure of dyeing on the khadi and silk sample. According to the above images there is a flat and cylindrical formation of the fabric surface has been obtained in the khadi and silk dyed samples.



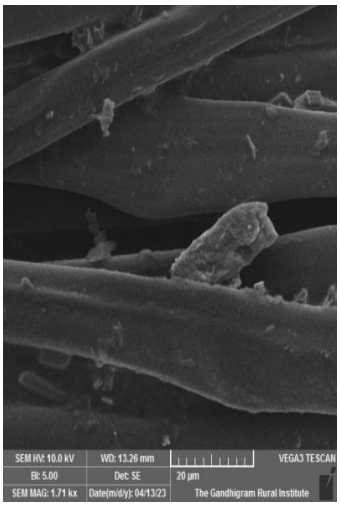


Figure-1Treated Khadi fabric **Figure-II Treated silk fabric**

4.1 Conclusion

From this study concluded that the Bixa orenella (Annatto) source are successfully extracted and dyed on khadi and silk fabrics . Both of the samples were found to be better fastness properties with alum mordanted samples and the most of fastness properties were rated the value of 4.5,4 which indicated that "Negligible rate of colour transference" and "very little rate of colour transference" than the myrobalan mordanted samples.

Reference:

1.Lee Y .Hwan E.Kim H. ,Colorimeteric assay and antibacterial activity of cotton,silk,wool fabric dyed with peong,pomegranate,clove,chinenis and gallnut extracts materials, 2:10-21,2009.

2.Kato H,Hata T,Tsukuda M.,Potentialities of natural dyestuffs as antifeedants against varied carpet beetle,Anthrenus verbasci.JARQ, 38(4):241-51 2004,.

3.Grfoni D,Bacci I,Zipoli G,Carreras G,Baranti S,Sabatini , Laboratory and outdoor assessment of UV protection offered by Flax and hemp Fabrics dyed with natural dyes,photochemical photobiol, 85,313-20,2009.

4.Gulrajani ML,Srivastava RC, Goel M.,Color gamut of natural dyes on cotton yarns.Color tech;117:225-5.Samanta AK,Agrawal P. , Application of natural dyes on textile,Indian J.Fibre,Textile research, 34:38,384-99,2009.

6. Cardome JM, Proteolytic activity aspergillus flavus on wool.AATCC Rev., 2:10-212002.

7.Singh R,Jian A,Panwar s,Gupta D,Khar SK, Antimicrobial activity of some natural dyes.Dyes pig., 66:99-102,2005