ISSN 2348-1218 (print)
International Journal of Interdisciplinary Research and Innovations ISSN 2348-1226 (online)
Vol. 3, Issue 3, pp: (35-38), Month: July - September 2015, Available at: www.researchpublish.com

EXTRACTION OF ECO-FRIENDLY NATURAL DYES OBTAINED FROM ALOE VERA, GREEN CHIRAYTA AND INDIAN WHITEHEAD LEAVES AND THEIR APPLICATION ON COTTON FABRIC

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Abstract: **A natural dye implies those colorants that are obtained from animal or vegetable matter without chemical processing. In recent years attempts are being made to review the old art of dyeing with vegetable dyes due to carcinogenic nature of synthetic dyes and their intermediates. With the present nature and international awareness of environmental ecology a lot of interest is being generated in recent year to use eco-friendly fibers and natural dyes. A study was under taken to find out the effect of selected herbs namely Aloe Vera, Green Chirayta and Indian Whitehead. on cotton with different. Color fastness of dyed fabrics was assessed. Depth of shade and evenness of dye was also evaluated.**

Keywords: **Natural dye, Eco-friendly, Cotton, herbs etc.**

1. INTRODUCTION

Today, dyeing is a complex, specialized science. Nearly all dyestuffs are now produced from synthetic compounds. This means that costs have been greatly reduced and certain application and wear characteristics have been greatly enhanced. But many practitioners of the craft of natural dying (i.e. using naturally occurring sources of dye) maintain that natural dyes have a far superior aesthetic quality which is much more pleasing to the eye. On the other hand, many commercial practitioners feel that natural dyes are non-viable on grounds of both quality and economics. In the West, natural dyeing is now practised only as a handcraft, synthetic dyes being used in all commercial applications. Some craft spinners, weavers, and knitters use natural dyes as a particular feature of their work.

In many of the world`s developing countries, however, natural dyes can offer not only a rich and varied source of dyestuff, but also the possibility of an income through sustainable harvest and sale of these dye plants. Many dyes are available from tree waste or can be easily grown in market gardens.

2. METHODOLOGY

The present study was conducted to dye cotton fabric with natural dye extraction from Aloe Vera, Green Chirayta and Indian Whitehead with different mordants.

2.1 Collection of raw material:

Raw material includes the woven Cotton material, Aloe Vera, Green Chirayta, Indian Whitehead Alum, Ferrous Sulphate and Copper Sulphate used for the study.

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2.2 Selection of fabric:

Cotton is a natural fiber and is used in a wide variety of clothing and home furnishings. Cotton fabrics are generally used for natural dyeing. Characteristic of cotton fabrics are absorbs up to 27 times its own weight in water and so commercially available cotton fabric is selected for the study.

2.3 Selection of herbs for dye extraction:

The medicinal herbs used for the study is shown in table 1 and in plate 1

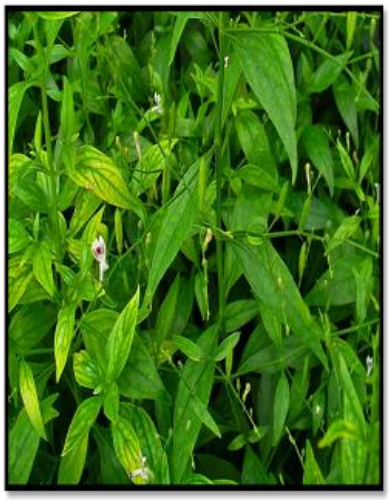
Table 1: Selection of Herbs

S.No	English Name	Common Name	Botanical Name	Part Used
1	Aloe Vera (A)	Lily of the Desert	*Aloe barbadensis*	Leaf
2	Green Chirayta (G)	Nilavembu	*Andrographis paniculata*	Leaf
3	Indian Whitehead (I)	Vellarugu	*Enicostema axillare*	Leaf

The details of the herbs with its common name, botanical name and parts used for dyeing are shown in above table 1

Plate 1: Selection of Herbs

1. a. Aloe Vera



1. b. Green Chirayta

1. c. Indian Whitehead

2.4 Selection of Mordants:

Three different natural mordants are selected for this study. The details were given in table 2.

Table 2: Selection of Mordant's

S.No	Name	Molecular formula
1	Alum (A)	A12SO4
2	Ferrous sulphate (F)	FeSO4
3	Copper sulphate (C)	CuSO4

Mordant selected for dyeing cotton fabric along with its molecular formula are shown in above table 2.

2.5 Preparatory process:

Scouring was done to prepare the fabric for dyeing and to remove the dirt and natural coloring matter present in the fabric. It also improves the absorbency of the fabric.

2.6 Herbal extraction Method

Fresh plant were collected and washed under running water and later with distilled water. The preparation and method of herbal extraction is shown in fig 1

Herbs were selected

↓

Dried under shade

↓

Grinded into powder form

↓

Weighted

↓

Mixed with distilled water

↓

Boiled at 100°C

↓

Filtered and dye extracted

Fig 1: Preparation and method of herbal Extraction

2.7 Mordanting Method:

Meta-chrome mordanting method was selected for the study. Meta chrome otherwise called as simultaneous method where both mordant and dye was applied simultaneously in the dye bath.

2.8 Dyeing Procedure:

Stage 1: Fabric is weighted by fabric weighing machine.

Stage 2: Fabric was wetting in water and squeezed thoroughly.

Stage 3: 20 liter capacity of vessel bath is taken and poured with 12 liters of water

Stage 4: Rise the temperature up to 50°c .At the stage of boiling temperature add Aloe Vera dye solution and Alum mordant and slowly rise the temperature.

Stage 5: Enter the cotton fabric at the boiling temperature of the solution and continue to dyeing for 1 hour.

Stage 6: In between dyeing the fabric is turned and immersed evenly.

Stage7: The dyeing for 1 hour.

Stage8: After dyeing the fabric is washed with running cold water and squeezed through.

Stage 9: The dyed sample is dried under shade.

Stage10: Same procedure is repeated for other samples.

- Aloe Vera (A) + Alum Mordant (A)
- Aloe Vera (A) + Ferrous Mordant (F)
- Aloe Vera (A) + Copper Mordant (C)
- Green Chirayta (G) + Alum Mordant (A)
- Green Chirayta (G) + Ferrous Mordant (F)
- Green Chirayta (G)+ Copper Mordant (C)
- Indian Whitehead (I) + Alum Mordant(A)
- Indian Whitehead (I) + Ferrous Mordant(F)
- Indian Whitehead (I)+ Copper Mordant (C)

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2.9 Determination of color fastness of the dyed samples:

Color fastness is term used for the degree to which dye holds fast to the fiber or fabrics. A good or high fastness means that they do not bleed or rush in washings, crock or rub off in wear. Following colorfastness was assessed: - Colorfastness to Laundering and Colorfastness to rubbing.

3. RESULTS AND DISCUSSION

The results and discussion obtained for the study is as follows.

Table 3: Colorfastness to perspiration, Laundering and Rubbing

S.No	Dye Name	Change in Colour	Staining	
			Rubbing	
		Laundering	Dry	Wet
1	Aloe Vera (A) + Alum Mordant (A)	3/4	4/5	3
2	Aloe Vera (A) + Ferrous Mordant (F)	3	3 /4	2
3	Aloe Vera (A) + Copper Mordant (C)	3	4/5	3
4	Green Chirayta (G) + Alum Mordant (A)	4	4	3
5	Green Chirayta (G) + Ferrous Mordant (F)	3	4	3
6	Green Chirayta (G)+ Copper Mordant (C)	3 /4	4	3
7	Indian Whitehead (I) + Alum Mordant(A)	4	3	3 /4
8	Indian Whitehead (I) + Ferrous Mordant(F)	3	4	3
9	Indian Whitehead (I)+ Copper Mordant (C)	4/5	4/5	3 /4

Ratings: 5-Excellent, 4- Very good, 3- Good, 2- Fair, 1- Poor

4. FINDINGS AND CONCLUSION

It was found from the study the natural dyes can be successfully used for dyeing on woven cotton to obtain a wide range of bright colors as well as impart soft feel Generally simultaneous dyeing method gives best result. In post mordanting Alum produced shades of light brown and yellow color, ferrous sulphate produced shade of color ranging from yellow to brown and Copper sulphate produced shade of light green to brown.

From the above result table it shows that the color fastness of Laundering and rubbing fastness of the dyed with Aloe Vera, Green Chirayta and Indian Whitehead. has good washing fastness properties. It can be concluded that dyeing with Indian Whitehead + copper sulphate was good.From this study It was found from the study that Dyeing Of Cotton Using Herbs Aloe Vera, Green Chirayta And Indian Whitehead to obtain a wide range of attractive bright colors.

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