Short Communication (NS-1)

METHANOL EXTRACTS OF ANTHOCYANIN PIGMENT AND THEIR SUITABILITY ON FIBERS

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ABSTRACT

Anthocyanin pigments of *Ixora* flowers are used for dyeing purpose. Anthocyanin pigments are unstable in neutral and alkaline solution but have a quite stability in acidic solution. Extract of natural dye source is prepared by extracting the raw material in methanol containing Hydrochloric acid. In this study we extracted dye from dry powdered form of *Ixora* (red) flower. By applying on cotton and silk fibers we tested suitability and fastness property of dye on fiber. The cloth is dyed in various shades. Shades of dyes are depending on pretreatment of Hirda (*Terminalia chebula*) and type of fibers. Cotton fiber accepted methanol extraction and dyed well where as no coloration was found on silk fiber. On Silk fiber the fastness property of dye is good in pure aqueous medium where as result is not satisfactory in pure methanol medium. Combination of Water and Methanol extraction improve the fastness property of dye on Silk fiber in a small amount but result is poor as compare to Cotton fiber.

Key Words: Anthocyanin, Methanol extract, *Ixora*, Silk, Cotton, Fibre

INTRODUCTION

Natural pigments are known for their use in coloring of food substrate, and natural fibers like wool, silk and cotton. The extraction efficiency of color components present in natural sources (plant/animal/mineral) depends in media type (aqueous/organic solvent/acid or alkali), pH of the media and conditions of extraction, such as temperature, time, material liquor ratio and particle size of the substrate. Anthocyanins are unstable in neutral or alkaline solution; the color may fade slowly due to exposure to light. Therefore Anthocyanin extraction from plants need solvent containing acetic acid or hydrochloric acids. Cotton today is the most used textile fiber in the world. Cotton, as a natural cellulosic fiber, has a lot of characteristics, such as: comfortable soft hand, good absorbency, color retention, prints well, machine-washable, dry-cleanable, good strength, drapes well, easy to handle and sew. Cotton fiber is composed of concentric layers. The cuticle layer made up of Pectin, the primary wall which is composed of cellulosic crystalline fibrils, and the secondary wall consisting of three distinct layers which are made up of cellulose.

Silk is yet another word for elegance and is the strongest natural fiber. 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 colors. Silk retains its shape, drapes well, caresses the figure, and shimmers with a luster all its own. Silk is made up of protein fibroin, a heavy chain which is mainly composed of beta sheets. In this paper an attempt has been made to dye cotton and silk by anthocyanin pigments extracted from *Ixora*.

MATERIAL AND METHODS

Selection and Preparation of dye material

Fresh flowers of *Ixora* (red) were collected to extract dye.

Selection and preparation of fibers for dyeing

White cotton and silk cloth was selected for dyeing. Half of cotton and silk cloth was Pretreated with Hirda (*Terminalia chebula*) powder by boiling...
the material in aqueous medium for half an hour.  

**Extraction of dye and dyeing of fabrics**

Extraction of anthocyanins conventionally carried out under cold condition with methanol containing 1 % conc. acid (Jean-Jacques). According to Feer (1891) pigments can be extracted from finely powdered material in alcoholic medium containing 10 % acid. Whereas Fuleki used a methanol: water: conc. Acid mixture (50/49/ 1) to extract anthocyanins from Cranberries (*Vacinium macrocarpon*). In present investigation various combinations of methanol, water and 1 % acid are used as follows –

1. Only Water.
2. Water + 1% acid
3. Only methanol.
4. Methanol + 1% acid.
5. Methanol + Water.
6. Methanol + Water + 1% acid.

**Procedure**

For extraction in above solution 5gm material was crushed in mortar and pestle. Kept it over night. After filtration 1% Acid was added in solution no. 1, 3 and 5. Silk and cotton cloth pieces were dipped for three hours in each solution. Clothes were washed with cold water, dried in sunlight and shades.

**RESULTS AND DISCUSSION**

The Anthocyanin are the most important and widespread group of coloring matters in plants. These intensely water soluble pigments are responsible for nearly all the pink, scarlet, red, mauve, violet and blue colors in the petals, leaves and fruits of higher plants. The Anthocyanin are all based chemically on a single aromatic structure, that of cyanidin, and all are derived from this pigment by addition and subtraction of hydroxyl groups or by methylation or by glycosylation. There are six common anthocyanidins, the magenta colored cyanidin being by far the most common. Orange red colours are due to pelargonidin with one less hydroxyl group than cyanidin, while mauve, purple and blue colors are due to delphinidin, which has one more hydroxyl group than cyanidin.

In the present study the cloth is dyed in various shades from *Ixora* flower. Deepness of shade depends upon nature of fiber (cotton, silk), pretreatment of Hirda (*Terminalia chebula*) on fiber and proportion of water: methanol. Resulted shades of *Ixora* dye on cloth are mentioned in **Table 1**. Data elucidated that pretreatment of Hirda on cloth improves the fastness property of dye and change the shade of dye.

**Table 1 : Different Shades of *Ixora* Dye**

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>Extraction medium</th>
<th>Silk Without Hirda treatment</th>
<th>Silk Pretreated with Hirda</th>
<th>Cotton Without Hirda treatment</th>
<th>Cotton Pretreated with Hirda</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Only Water</td>
<td><em>Ixora</em> rose</td>
<td><em>Ixora</em> beige</td>
<td><em>Ixora</em> flesh tint</td>
<td><em>Ixora</em> terracotta tint</td>
</tr>
<tr>
<td>2.</td>
<td>Water + 1% HCl</td>
<td><em>Ixora</em> cream pink</td>
<td><em>Ixora</em> desert ivory</td>
<td><em>Ixora</em> light purple pink</td>
<td><em>Ixora</em> strawberry pink</td>
</tr>
<tr>
<td>3.</td>
<td>Only methanol</td>
<td>No coloration</td>
<td>No coloration</td>
<td><em>Ixora</em> bark brown</td>
<td><em>Ixora</em> bark brown</td>
</tr>
<tr>
<td>4.</td>
<td>Methanol + 10% HCl</td>
<td>No coloration</td>
<td>No coloration</td>
<td><em>Ixora</em> cream pink</td>
<td><em>Ixora</em> subtle pink</td>
</tr>
<tr>
<td>5.</td>
<td>Methanol + Water</td>
<td>No coloration</td>
<td>No coloration</td>
<td><em>Ixora</em> light pink</td>
<td><em>Ixora</em> muddy pink</td>
</tr>
<tr>
<td>6.</td>
<td>Methanol + Water + 10% HCl</td>
<td>No coloration</td>
<td>No coloration</td>
<td><em>Ixora</em> fresh baby pink</td>
<td><em>Ixora</em> fresh baby pink</td>
</tr>
</tbody>
</table>
Silk cloth without pretreatment and with pretreatment show different shades. Good result was found in aqueous as well as in acidic medium but in methanol (organic) medium silk cloth could not retained color. Cloth washed with soap and dried in full sunlight to check fastness of dye (Table 2). Pretreated silk cloth showed good fastness as compare to without treated one. The result was interesting in case of cotton cloth. In without pretreated cotton cloth various pink shades were observed in different extraction medium, deepness of color was found on pretreated cotton cloth. Light fastness and washing fastness of dye was found satisfactory in pretreated cotton cloth. (Fig. 1 and Fig. 2)

Table 2: Fastness of Ixora Dye

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Extraction medium</th>
<th>Silk</th>
<th></th>
<th>Cotton</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Without Hirda treatment</td>
<td>Pretreated with Hirda</td>
<td>Without Hirda treatment</td>
<td>Pretreated with Hirda</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Light fastness</td>
<td>Washing fastness</td>
<td>Light fastness</td>
<td>Washing fastness</td>
<td>Light fastness</td>
<td>Washing fastness</td>
</tr>
<tr>
<td>1</td>
<td>Only Water</td>
<td>4/5</td>
<td>4/5</td>
<td>5/5</td>
<td>5/5</td>
<td>4/5</td>
</tr>
<tr>
<td>2</td>
<td>Water + 1% HCl</td>
<td>2/5</td>
<td>3/5</td>
<td>4/5</td>
<td>4/5</td>
<td>3/5</td>
</tr>
<tr>
<td>3</td>
<td>Only methanol</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4/5</td>
</tr>
<tr>
<td>4</td>
<td>Methanol + 10% HCL</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3/5</td>
</tr>
<tr>
<td>5</td>
<td>Methanol + Water</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4/5</td>
</tr>
<tr>
<td>6</td>
<td>Methanol + Water +10%HCL</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4/5</td>
</tr>
</tbody>
</table>

Fig. 1: Without pretreated Cotton cloth

Fig. 2: Pretreated Cotton Cloth
After comparing the result of silk and cotton cloth we came to conclusion that in methanol medium, dye retention property of cotton fiber is good than silk fiber. Hundred percent results were observed in cotton cloth. But in silk cloth good result was found only in aqueous and acidic medium.\textsuperscript{5,6} (Fig. 3 and Fig. 4)

**Fig. 3**: Without pretreated silk cloth

**Fig. 4**: Pretreated silk cloth

### CONCLUSION

Color fastness in methanol extraction is good on Cotton cloth as compare to silk cloth. The cloth was dyed various pink shades from *Ixora* flower. The remarkable observation of this study was that fastness property of dye changes with the type of fiber. Cotton fiber (In pure methanol extraction) dyed well where as no coloration on silk fiber. On Silk fiber the fastness property of dye was good in pure aqueous medium where as result was not satisfactory in pure methanol medium. Combination of water and methanol and acid gave variation in shades on cotton cloth but the effect was poor on silk cloth. Pretreatment of Hirda on fiber improves the color fastness property of dye and increases the intensity of shade. One more interesting finding of present work is that prescribed methanol solvent for extraction of Anthocyanin pigments is not suitable for dying a silk cloth.

### REFERENCES