A COMPARITIVE STUDY WITH TWO DIFFERENT MORDANTS IN THE PROCESS OF NATURAL DYEING ON REGENERATED CELLULOSIC FIBRE

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ABSTRACT

This review is to highlight the use of mordants and natural dyes in the textile industry, both covering the commercial and research process in the vast industrial field. Chemicals have been used for the process of bleaching since last centuries; enzymes have been used in the formulation for many years. New developments now show major role with mordant and natural dyes without the use of chemicals in the process for making an eco-friendly product, these processes techniques provide possibilities for making new developments and more effective environmental friendly approach in the textile industry.

Keywords: Enzymes, Eco-friendly, Natural dye, Mordant.

INTRODUCTION

Natural dyes are dyes or substance extracted from plants, bark or minerals. The major type of natural dyes are vegetable dyes from plants and plant parts like - roots, berries, bark, leaves, and wood—and other biological sources such as fungi and lichens. Dyeing with dye substance from plants, barks and insects has been used for more than 5,000 years, the dye material that has to be dyed is put in a vessel of water and the dye is then added to the vessel, which is later heated and stirred until the color is dissolved in the water. Natural dyes require the use of chemicals called mordant’s to bind the dye evenly to the textile fibers surface for a betterment and an eco-friendly textiling this process is also done using natural mordants like common salt, natural alum, vinegar in the early stage for dyeing.

To enhance the colour of the dye substance mordants play an important role by acting as an base coating or layer before the settlement of the dye over the fibre material, here we use Quercus Infectoria and Cocos nucifera as the two natural mordants with the extraction of the natural dye Chrysanthemum.
OBJECTIVES

1. To investigate whether the use of natural dyes and mordants in a truly sustainable alternative for chemical dyes
2. To learn new techniques and applications of natural dye
3. To use the technique and skills for an eco-friendly environment

MATERIALS AND METHODOLOGY

Dyes, they are substances mostly used to color textiles, paper, leather, and other materials. The natural dye extracted from the plant species Chrysanthemum that is commonly grown in cold chill areas Chrysanthemum are from the Composite family and are available in a wide range of brilliant colors, shapes and sizes. They were first cultivated in China over the 6 centuries ago; this type of daisy was initially grown as an herb in many places. The natural dye selected was dried and its extraction was applied to the regenerated cellulosic fiber “Bamboo” which has to be naturally dyed or colored. To make the method more eco-friendly natural mordants are used. Many natural dyes require the usage of mordants to achieve durable and long lasting colors. Mordanting prepares the fibers to bond along with the natural dyes for even dye appearance.

DYEING METHOD

Pre-treatment:

The natural mordants Quercus Infectoria and Cocos nucifera are taken in 20grm quantity each and added into two separate vessels with soft water in the (material: liquid ratio) M: L 1:40 ratios. Water ratio is taken in the measured quantity and poured to the vessels, stir until the mordant is evenly dissolved in the water. Add the weighed (regenerated fibre)Bamboo fibre into both the vessels that contains the mordant solution, allow the mordant to spread evenly in the fibre equal interval of stirring is applied., with the following above process 2 different mordant samples are kept ready for the dyeing process.

Dye Process:

First sample (Vessel 1) Add 30ml water to the vessel that contains the mordant and the fibre in it along with it add 20ml of natural dye Chrysanthemum to the vessel ,set them aside in room temperature 27°C for good absorbs ion later keep them in the water bath that set with 50°C and later raised to 75°C for the dye to fix on the fiber surface ,stir in even intervals to gain better result and even spread of the dye throughout the fiber and avoid patchiness. The same process is followed with the Second sample (Vessel 2). The samples are then removed washed under cold running water to remove the excess dye in the fibre and shadow dry the samples.
OBJECTIVE EVALUATION

Objective based approach related outcomes to pre-specify judgment was made with their attainment. The result and discussion for the topic “A comparative study with two different mordant in the process of natural dyeing on regenerated cellulose fiber” has been resulted below:

The two samples with different mordant in the process of natural dyeing is obtained using the physical tests and the results are mentioned below:

COLOUR FASTNESS:

Color fastness is the resistance of color to fade or wash away the dye that is dye dyed on the material or fiber yarn. It is important to measure the quality of the dyed product with the following tests.

- WASHING COLOUR FASTNESS
- RUBBING COLOUR FASTNESS

WASHING COLOUR FASTNESS

In the washing test, the change in color of the fibre A 10 strand lea of yarn was taken for the pilot study testing for the test was taken and the wash test was followed.

The solution for the washing is prepared to the required temperature for washing. The liquor material ratio is 50:1 was prepared. After soaping treatment, remove the sample, rinse in cold water and then with running cold water under a running tap. Squeeze it and shadow dry at a temperature not more than 60°C. The change in color of the yarn dye is evaluated with the help of a Grey scales and the changes are noted, this method can be followed for more wash efficiency tests like 2 wash, 4 wash, 6 wash etc.

RUBBING COLOUR FASTNESS:

Rubbing color fastness refers to the ability to sustain of original color of dyed yarn when rubbing. Dry rubbing color fastness mention the fading of dyed fabric when rubbed with a standard white cloth.

There are 2 types of rubbing techniques

- Wet rubbing
- Dry rubbing

Wet rubbing color fastness refers to the situation of fading of dyed yarn when rubbed with a standard white cloth which is wet with the help of water. The main aim of Rubbing color fastness depends on the staining of white cloth. After testing, the white cloth is compared to staining sample cards to measure the fastness. Rubbing color fastness, same as washing color fastness that is divided into 5 grades and 9 files, among which grade 5 is the best and grade 1 is the worst. The friction makes the fading of yarn with dye fade off by method of friction. Wet rubbing is influenced by both external force and water, so it is about one level lower than dry rubbing. On
the other hand dry rubbing is the method of rubbing with the help of a standard white cloth which is kept dry and the same method is followed for the test and they are recorded.

RESULT AND DISCUSSION

Sample 1: *Quercus Infectoria*

<table>
<thead>
<tr>
<th>S.No</th>
<th>Test Name</th>
<th>Grade</th>
<th>Rating</th>
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<tbody>
<tr>
<td>1</td>
<td>Washing test</td>
<td>4</td>
<td>Good</td>
</tr>
</tbody>
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Table: 1

<table>
<thead>
<tr>
<th>S.No</th>
<th>Test Name</th>
<th>Dry Grad</th>
<th>Wet Grad</th>
<th>Dry Rating</th>
<th>Wet Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rubbing fastness</td>
<td>3</td>
<td>4</td>
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Table: 2

Sample 2: *Cocos nucifera*

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>3</td>
<td>Very Good</td>
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Table: 3

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<thead>
<tr>
<th>S.No</th>
<th>Test Name</th>
<th>Dry Grad</th>
<th>Wet Grad</th>
<th>Dry Rating</th>
<th>Wet Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rubbing fastness</td>
<td>2</td>
<td>4</td>
<td>very good</td>
<td>good</td>
</tr>
</tbody>
</table>

Table: 4
Sample 1:

![Bar chart for Quercus Infectoria](image1)

**Figure 1**

Sample 2:

![Bar chart for Cocos nucifera](image2)

**Figure 2**

Overall result:

<table>
<thead>
<tr>
<th>Sample</th>
<th>Mordant</th>
<th>Grades</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Quercus Infectoria</td>
<td>3</td>
<td>Good</td>
</tr>
<tr>
<td>2</td>
<td>Cocos nucifera</td>
<td>4</td>
<td>Very good</td>
</tr>
</tbody>
</table>
The Figure: 1 and 2 the grades value for both the wash test and the rubbing (dry & wet test) below shows the pictorial graph representation of the dye fixation difference of the 2 samples that has been prepared and Figure 3 shows the grades for both the mordants on the fibre sample.

**SUMMARY AND CONCLUSION**

Bamboo fiber is a lustrous regenerated fiber with good shine. The feel that is softness, comfort, in fiber material. Natural dye comprise of color obtained from the plant, animal and mineral substances without any chemical process. Natural dyeing is a traditional process of India, the concern of the green eco-friendly environment with public awareness on the living with nature. Thus, the samples with the usage of Cocos nucifera had a little better fixation with the dye on the fibre than Quercus Infectoria that acted as a mordant. Both are compared and the best result dye was obtained.

- The cellulosic fiber that has been dyed using the natural extracted dye resulted with a soft and lustrous fiber
- Natural dye used was truly sustainable alternative for chemical dyes which makes it eco-friendly
- The usage of natural mordants as a fixative agent makes the process more efficient
- The absorption level is more in the secound sample which makes the dye fixation better

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