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Original Article

The Evaluation of Bougainvillea Dye Source on Textile and Paper Material

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Abstract

The natural dyes extracted from bougainvillea plant part are applied on cotton as textile material and card sheet as paper material. In this research the fastness properties of bougainvillea dye were determined. Then lab grade mordants such as Potash alum, CuSO4, and SnCl2 were used during dying of this cotton as textile material and card sheet. To find out the quality and effect of this dye 'and mordants on the textile material and card sheet as paper material, the fastness properties of this given dye is evaluated for the selected textile material and paper material. This properties for Cotton as textile material and card sheet as paper material were evaluated by using standard methods. The colour strength of the dye content obtained through bougainvillea flower part is also determined. Some impotent factors such as extraction and filtration method, extraction time and medium, Pretreatment of fabric material, concentration of mordant and dye solution, etc. are involved in this textile material and paper material dying research work. The given fastness properties for this textile material and paper material are based on the type of mordent used. The suitable mordent and dye combination was determined by fastness properties and strength of the bougainvillea dye on the textile and paper substrates.

Keywords: *Bougainvillea dye, Mordants, strength, fastness, textile, paper material*

Introduction

The use of natural dye is increased due to allergic effects and environmental effect of synthetic dyes. The natural dyes are able to give wide range of natural colors. These natural dyes are used for coloring of different substrates such as textile, paper, and food [1]. These colors are obtained through different parts of plants source such as fruits, bark, leaves, flowers and roots [2]. The dye obtained from natural source are good for natural dyeing on the natural material. The mordanting material are able to improve the fastness properties of that dye during the dyeing of some substrate. The metals salt is used in that mordanting process [3]. The natural reddish dyes extracted from bougainvillea source can be applied to textile and paper material. In this research work the dye extracted from bougainvillea source is applied on cotton as textile material and card sheet as paper material. The fastness properties of this given dye was determined for different mordents.

Materials:

Dye source from bougainvillea plant, cotton fabric of 130 GSM, soap, H2O2 Solution, NaOH solution, mordant such as CuSO4, SnCl2 and Potash alum.

Methods:

The dye source form bougainvillea plant ware collected from local gardens. This natural dye source is easily available. This source was stored in the dry place. Then dye solution of bougainvillea is prepared under the room temperature. About 10 g of textile and paper sample is taken for this evaluation. The blender machine is also used for crushing the dye source.

Extraction medium:

The bougainvillea dye was extracted by using pure water medium. About 50 grams of dye source was added separately in 150ml of pure water medium.

Extraction method:

The water medium is used for extraction of the dye from bougainvillea dye source.

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This extraction was performed for 30 min. by adding 50 grams of dye sources in 150ml of distilled water.

This given source of dye is then heated under 80^0C temperature for about 1hr. The extract which obtained by this process was filtered and then the filtrate was kept for cooling.

Pre-treatment method:

The 20g cotton as textile sample is then mixed in dil.H_2O_2 and 0.5 N NaOH solution. Then this given textile sample is boiled for 20 min. to remove impurities from that fabric textile sample.

Method of mordanting:

The mordanting method was performed on the given textile and paper sample. During this process the mordant such as Potash alum, $CuSO_4$, and $SnCl_2$ were used on this given textile and paper sample material. The concentration for all selected mordant solutions were almost same. The 25% mordant solution in pure water was prepared during this method. Pre-mordanting method was performed for all these of selected mordants.

Duration for dyeing:

The given textile and paper sample was carefully dyed by bougainvillea dye bath. This textile dyeing process was performed in the dyeing machine for 1 hr at 50^0C. The 10 g cotton as textile material is dyed in 100 ml of dye solution. Thus, material to liquid ratio was taken as 1:10. The paper sample was directly dyed in presence of mordants.

Testing methods:

By using CIELAB method the colour coordinate values are determined on data colour machine. The parameters such as Lightness and darkness, Chroma, Hue, Yellow and blue axis, Red and green axis are involved in this given evaluation. The colour strength of this textile material and paper material was performed by using K/S values. This is the Relative strength of that given dye on textile material and paper material. The K/S value was calculated by using kubelka -munk equation. This equation represents the coefficient of absorbed light and scattered light and the decimal fraction of reflectance by fiber. The washing fastness was determined by using ISO-105 C03. The rubbing fastness was determined by ISO-105A03.The colour change was determined by using ISO-105A02. The gray scale was also used during this analysis. The perspiration fastness in acidic and basic medium was determined on ISO-105E04.

Result and Discussion:

The bougainvillea dye on the textile and paper material in presence of mordanting agents is also taken for visual appearance. The bougainvillea dye on the textile and paper mordanted material by this alum shows good grayish shade. The bougainvillea dye shows greenish shade on $CuSO_4$ mordanted textile and paper sample material. The brownish shade is obtained on mordanting by the $SnCl_2$ mordant.

Table.1: K/S values for dyes

Material	Mordants	K/S value
Textile material	Potash alum	3.97
	$CuSO_4$	3.78
	$SnCl_2$	2.84
Paper material	Potash alum	3.24
	$CuSO_4$	2.97
	$SnCl_2$	2.14

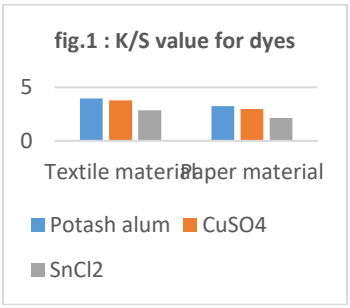

fig. a: K/S value for dyes

Table.2a: Colours coordinate values for given textile material

Mordents	L	a	b	c	h
Potash alum	85.9	3.6	49.2	51.8	91.5
$CuSO_4$	74.9	3.1	48.6	49.7	83.6
$SnCl_2$	64.8	2.9	30.7	31.4	76.2

Table.2b: Colours coordinate values for given paper material

Mordents	L	a	b	c	h
Potash alum	73.9	2.7	38.1	39.3	83.7
$CuSO_4$	62.8	2.1	35.2	35.8	78.2
$SnCl_2$	51.3	1.8	28.5	29.2	65.8

Conclusion:

The bougainvillea dye on the textile and paper mordanted material dye source was suitable for dyeing. The textile and paper mordanted material which is pre-moderated by alum and copper sulphate mordents have good fastness properties and strength for bougainvillea dye. This alum and $CuSO_4$ are good mordant to get acceptable fastness by bougainvillea dye on the textile and paper material. For this bougainvillea dye the brightness of the grayish shade was good in presence of alum mordant. The washing and rubbing fastness of these dyes in alum mordent and in $CuSO_4$ mordant on textile and paper were showing good colour strength. The alum is good mordant than $CuSO_4$ and $SnCl_2$ mordents. The water can be used for extraction of dye from bougainvillea source.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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