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Analyzing the Dyeing Property of Salvia leucantha Flowers

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Abstract

Throughout history, people have dyed their textiles using common, locally available materials, but scarce dyestuffs that produced brilliant and permanent colors such as the natural invertebrate dyes. The current study focused on the isolation colouring molecule from the plant Salvia leucantha which is an ornamental plant with brilliant purple flowers. The flowers were extracted for dye and tested with cotton fibers. The source of pigmentation is identified as betacyanins belongs to the group of Betalains. It provides range of red shade to the cotton fiber.

Keywords: Salvia Leucantha, Dye Extraction, Betalains

Introduction

Nature expresses itself in a wide spectrum of colours all around us. The alchemy of colours started from an early time. The art of dyeing is as old as our civilization. Dyed textile remnants found during archaeological excavations at different places all over the world provide evidence to the practice of dyeing in ancient civilizations. Natural dyes were used only for coloring of textiles from ancient times till the nineteenth century. As the name suggests, natural dyes are derived from natural resources. Coloring materials obtained from natural resources of plant, animal, mineral, and microbial origins were used for coloration of various textile materials. Different regions of the world had their own natural dyeing traditions utilizing the natural resources available in that region.

Nature has gifted us more than 500 dye-yielding plant species. Historically, plants have been used for the extraction of a majority of natural dyes. Various plant parts including roots, leaves, twigs, stems, heartwood, bark, wood shavings, flowers, fruits, rinds, hulls, husks, and the like serve as natural dye sources. Natural dyes produce an extraordinary diversity of rich and complex colours that complement each other.

Indians have been forerunners in the art of natural dyeing. The advent of synthetic dyes caused rapid decline in the use of natural dyes, which were completely replaced by the former within a century. Earlier understanding of dyeing techniques and their applications was empirical and was not backed by scientific reasoning. Natural dyeing

had developed essentially as a folk art. However, in recent times the dyeing technique is interpreted on sound scientific principles, and the interaction between the dye and the dyed material is well understood.

Salvia leucantha Cav. is a perennial ornamental shrub belongs to the family Lamiaceae, commonly known as Mexican bush sage. Salvia leucantha is native to Central America, Mexico and worldwide in distribution. In India it is available in Tamil Nadu, Kerala, Karnataka and Uttarahkand. The genus Salvia is one of the largest genera from the Lamiaceae family which comprises 1000 species. The flowers are spikes or terminal inflorescences with the length of 10 - 30 cm. The coloration range from light pink to reddish-purple. It flowering period is from September to November.

Materials and Methods

Dye Extraction

The collected plant materials used for extraction dye. The cleaned samples (50g) were crushed, dissolved in deionized water (500 ml) and then boiled for 2 hours in a hot water bath for quick extraction. At the end of 2 hours, the total color was extracted. The solution was then double filtered and used to carry out our study.

Dyeing Materials

Cotton yarns were used to test the dyeing ability of extracts.

Potassium Dichromate as Mordant

The extracts obtained were filtered and used for dyeing textile material. The textile materials used for dyeing was first washed with water. Then the threads were transferred to 0.2% potassium dichromate and allowed to boil for one hour at 60 0C. After this the threads were transferred to dye bath for one hour and then dried in sunlight. The sun dried threads are further evaluated for its colour and wash fastness. Wash fastness was tested by washing with soap water (10% w/v).

Collection of plant materials: Salvia plant is collect from Doddabetta hills, Western Ghats of Nilgiris. The collected flowers were cleaned, shade dried and pulverized into fine powder in a mortar pestle, the powder was kept in small plastic bags with proper labeling

Dye Extraction

The powdered flower is used for extraction dye. The cleaned samples (50g) were crushed, dissolved in deionized water (500 ml) and then boiled for 2 hours in a hot water bath for quick extraction. At the end of 2 hours, the total color was extracted. The solution was then double filtered and used to carry out our study.

Dyeing Materials

Cotton, jute and woolen yarns were used to test the dyeing ability of extracts.

Potassium Dichromate as Mordant

The extracts obtained were filtered and used for dyeing textile material. The textile materials used for dyeing was first washed with water. Then the threads were transferred to 0.2% potassium dichromate and allowed to boil for one hour at 60 0C. After this the threads were transferred to dye bath for one hour and then dried in sunlight. The sun dried threads are further evaluated for its colour and wash fastness. Wash fastness was tested by washing with soap water (10% w/v).

Analysis of Pigment Type

Test for Betalains

1ml of extract with added few drops of 1N NaOH. Yellow colour indicates the presence of betalains.

Results and Discussion

The global consumption of textiles is estimated at around 30 million tonnes, which is expected to grow at the rate of 3% per annum. The colouration of this huge quantity of textiles needs around 700,000 tonnes of dyes which causes release of a vast amount of unused and unfixed synthetic colourants into the environment (Rungruangkitkrai and Mongkholrattanasit, 2012). Synthetic dyes are substituted by natural colour additives and growing at round 2 % annually. Natural colours are easier to metabolize than synthetic counert parts (De-Carvalho et al., 2014).

In the present study, the flowers of Salvia leucantha found to possess betalains and produced red shades on cotton fibers studied and showed moderate fastness. There are lots of literatures available for mordanting prior to normal dyeing and the effects of mordants on colour fastness properties, shade development and other physical properties when applied singly (Fatima & Paul, 2005) or in combination (Yu et al, 2005) on cellulosic, protenic and synthetic fibres.

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