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Exploring the Application of *musa acuminate* Dye and *musa cavendish* Printing in Natural Fabric

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Abstract

Preventing environmental pollution is the main reason for extracting dyes from natural plant sources. Due to the present concern about the use of eco-friendly and biodegradable products, several studies on the use of natural dyes in the textile industry are being done worldwide. Synthetic dye effluent is a problem not only because of its use in the textile industry but also because of its manufacturing and possibly the synthesis of additional raw materials and intermediates. Natural dyes were used much less for textile dyeing once synthetic dyes were developed in 1856. The use of naturally occurring dyes has significantly increased in place of synthetic dyes. Artificial coloring agents and associated manufacturing processes. The act of dying is bad for our health. Using natural dyes can lower the risk associated with synthetic dyes. Since indigo is a chemical that occurs naturally, people have been using it to dye fabrics for thousands of years. This study will investigate a range of raw materials utilized in the extraction process of various natural dyes, in addition to analyzing the characteristics of fabric colored with those dyestuffs. In tests, the majority of natural dyes demonstrated good fastness properties. Many different materials, such as trees, bark, leaves, flowers, and more, can be used to extract dyes. The majority of natural dyes have unique qualities, such as UV protection, reduced toxicity, and anti-microbial qualities.

Keywords: *Natural dye; Eco-friendly; Extraction Process; Properties; Fastness*

1. Introduction

Plants, minerals, or crustaceans can be used to make pigments for natural dyes. Most natural colors are made from vegetable dyes produced from plants, such as berries, roots, bark, leaves, and wood, as well as other biological sources like fungi. Natural colors are made without the use of chemicals by processing plant or animal materials directly. They originate from a variety of sources, such as flowers, leaves, insects, bark roots, etc., however they must be removed and aren't always present. In the past, natural colorants were usually obtained from roots, bark, berries, and blossoms. They were applied to the fiber without the fabric or color being prepped beforehand. Natural color use began to decline in the middle of the nineteenth century with the invention of synthetic dyes. Natural dyes are still used in some historical artistic forms, though, such as kalamkari. Natural colors are coming back into vogue. As the detrimental effects of synthetic dyes on human health and the environment become more widely known, more farmers, designers, and textile producers are returning to time-honored methods for dying fabrics. Natural hues are safer and better for the environment, and they can enhance our wellbeing by bringing us back into contact with nature. For thousands of years, people have used local, natural resources to create colorful textiles. Insect and mineral sources are found less frequently than plant components such as roots, berries, bark, leaves, and wood, which account for the majority of natural hues. By the middle of the 19th century, the discovery of synthetic dyes had virtually rendered natural colors useless. Synthetic dyes are more suitable for mass production and can be used to color synthetic materials. They are also more reasonably priced. Natural dyes can be used in a mix-and-match fashion to create a wide range of hues. It is difficult to create wholly new colors with synthetic dyestuffs, but you can

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achieve a wide variety of colors or even entirely new hues with a slight variation in the dying process or the use of different mordants with the same dye (polygenetic type natural dye).

2. Materials and Methods

2.1. SELECTION OF FABRIC

Only natural fibers; synthetic fibers cannot be dyed using natural or botanical materials. That is to say, materials composed of cotton and wool as opposed to plastic (derived from petroleum) like nylon or polyester. Synthetic fibers can be used with an indigo vat, but don't use them and don't recommend using them (unless you can locate them at op-shops, as second-hand material, or occasionally weaved as the second ply / weave through another fabric).

2.1.1. LINEN FABRIC

Compared to cotton, linen dries faster and is more robust and absorbent. These qualities make linen valued for use in clothing and comfortable to wear in warm weather. Flax plant fiber can be used to make yarn, weave, and knit fabrics that are made of linen. It also has other unique qualities, most notably a propensity to wrinkle. Despite being natural fibers, it takes a lot longer to harvest than a material like cotton. Weaving it is also more challenging than with cotton.

2.1.2. BAMBOO FABRIC

Any fabric, yarn, or apparel made of bamboo fibers is referred to as bamboo textile. Bamboo fiber was formerly mainly utilized for structural components like bustles and corset ribs, but new technologies have made it possible to use the material for a variety of textile and fashion uses.

2.2. SELECTION OF HERBS

Herbal dyeing, or more accurately, the impregnation of natural extracts into textiles, is a component of the 5,000-year-old Vedic medical system that upholds the central idea of Ayurveda's natural healing through clothes. These textiles have an ayurvedic medicinal solution (kashayam) incorporated into them, which gives the fabrics long-lasting health advantages. Herbal textiles are a unique fabric that combines the rich Indian culture with health advantages, making them the ideal combination of fabric and wellbeing.

2.2.1. MUSA ACUMINATE

Upholding the core principle of Ayurveda's natural treatment through clothing, herbal dyeing, or more correctly, the impregnation of natural extracts into textiles, is a part of the 5,000-year-old Vedic medicinal system. These fabrics include an ayurvedic medicinal solution called kashayam, which provides them with long-lasting health benefits. Herbal textiles are a special kind of fabric that blends the benefits of good health with the rich cultural heritage of India, giving them the perfect blend of fabric and wellness. A type of banana indigenous to Southeast Asia is called Musa acuminata. Although some are hybrids with Musa balbisiana, this species produces the majority of the edible dessert bananas grown today.From the trunk, the inflorescence develops either obliquely or horizontally. The individual flowers are negatively geotropic, meaning they grow upward and away from the ground, and range in color from white to yellowish-white. A single inflorescence contains both male and female flowers. Male flowers are found at the point of the top-shaped bud between the female flowers, which are near the base (and turn into fruit).

2.2.2. MUSA CAVENDISH

One popular and significant Cavendish cultivar is the dwarf Cavendish banana. Rather than the fruit, the term "Dwarf Cavendish" refers to the height of the false stem. The leaves of young plants exhibit spots of maroon or purple; as the plant ages, these blotches rapidly disappear. Along with Grand Nain, it is one of the Cavendish group's most widely cultivated types and the primary source of Cavendish bananas used for commercial purposes. Throughout the mordant procedure, the ideal temperature and duration for mordanting were investigated. Additionally, the extraction of fresh banana peels' total phenolic content was examined. Pre-mordanting, post-mordanting, and meta-mordanting were the three distinct mordanting techniques used in this study.

3. DYEING PROCESS

3.1. DYEING IN MUSA ACUMINATE PETAL

• Cut the Musa acuminate petals into little pieces after removing them.
• Gather liters of water and flowers.
• Bring to a boil, then strain and store in a glass jar to keep for a week.
• After a week of seeing the color change, remove the cloth from the jar and let it dry in a shaded area of the sun.

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Fig:1. **Extract of *Musa acuminate* petal**

3.2. PRINTING IN MUSA CAVENDISH STEM LIQUID

• Apply the Musa Cavendish liquid on fabric, dipping it into various leaf forms; do not remove.
• After that, iron the fabric on low heat while the leaves are on it.
• After that, it will gradually become khaki in tone.
• The cloth is now prepared for the garment.

Fig.2. ***Musa Cavendish*** **stem liquid**

4.COLOUR FASTNESS DUE TO SUNLIGHT

4.1. SUNLIGHT FASTNESS

The ability of dyed textiles to not fade in direct sunlight is known as light fastness. Exposure to sunlight affects the sample's behavior under real-world usage circumstances, however it takes time.
The standards and sample are mounted with half of them exposed to daylight and the other half covered. The specimen and standards ought to be exposed to sunlight for a full day or until adequate fading occurs.
The sample and standards have opaque cloth covering 25% of them. As a result, it is exposed until standard-I fades and becomes equal to standard-4 when the color shifts to grayscale.
Next, use a different sheet to cover one-quarter of the sample and standards that were previously exposed. As a result, it is exposed until standard-4 fades and becomes equal to standard-4 when the color grayscale changes.

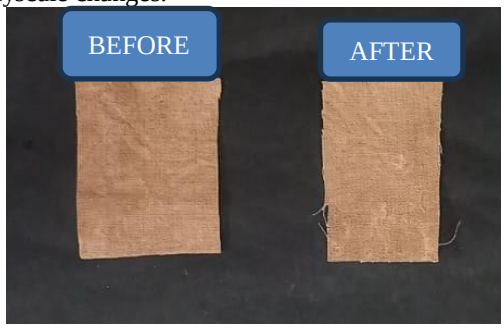

Fig.3. **Color Fastness sample of musa cavendish**

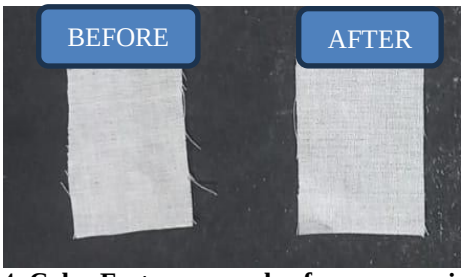

Fig.4. **Color Fastness sample of musa acuminate**

6.RESULT AND DISCUSSION

6.1.COLOUR FASTNESS FOR WASHING

Fig.5. **Color Fastness sample**

The color fastness test resulting from washing and sunshine is depicted in this image. The fabrics made of bamboo and linen have a strong ability to see pigment and dye. These color adjustments are not necessary; the scene should look mostly the same.
Depending on how textile items are designed and intended to be used, color fastness testing may be more significant. Color fastness to soap, water washing, and other special circumstances are tested for in standards. The conclusion was that, after four washings and four days of exposure to sunshine, the color fastness of Musa acuminates and Cavendish in linen and bamboo fabrics is excellent.

5 Conclusions

With a few exceptions, most natural colors are safe for the environment. Certain natural hues have the added benefit of having therapeutic benefits for the skin and are more than just skin-friendly. They are also environmentally safe. The chemistry of these natural hues and their associated medical benefits

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must be understood by textile dyers. The misdescribed product of the consumers for the future is the use of an appropriate binary of similar or compatible natural dyes to color natural eco-friendly textiles in a range of calming / unusual tones with eco-friendly mordants and finishing agents. Numerous researchers' persistent efforts in thunderous have helped to partially resolve issues like low colorfastness and non-reproducibility. We can see from the project's results section that the dyes used to color the fabric passed the fastness test with flying colors. The color remains the same without the use of any additional mordants to preserve the original hue. Therefore, in order to employ natural dyes in industry, both consumers and companies must stand up and start using natural colors more and more in place of synthetic ones.

Fig. 4. **Final Garment (Linen fabric)**

Fig . 5. **Final Garment (Bamboo fabric)**

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