

The Art of Natural Dyeing Using Terra Rosa in Knitted Cotton T-Shirt

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Abstract: Creating a cool-feeling, skin-protecting summer garment using mud colour is the major objective of this project. The study's objective is to determine cotton fabric's ability to absorb colour after dyeing by using natural materials like vinegar and alum. The process generates a saleable, environmentally beneficial product that is fully sustainable. The kind of mud used here is a little different from others. Terra rossa is a reddish clayey to silty soil that is common in the Mediterranean region. The name comes from the Italian word for "red soil". The reddish color of terra rossa is due to the presence of iron oxides. Synthetic dyes are derived from petrochemicals and have the potential to be hazardous to human health and the environment. Mud-dyeing is an incredible process. The rocks' iron oxide is what gives the soil its red colour. The fertility of red soil is derived from its high quantities of organic matter and nutrients

Keywords: Alum, Vinegar, Cotton, Mud dye, Natural dye.

1. INTRODUCTION

Plants, minerals, and invertebrates are the sources of pigments used in natural dyes. Most natural colors come from plant-based dyes, such as those found in roots, berries, bark, leaves, and wood, as well as other biological sources like fungi. Natural colours are derived without the use of chemicals from plant or animal materials. Although they can be found in a variety of places, such as flowers, leaves, insects, bark roots, etc., they must be extracted and are not always readily available. In prehistoric times, berries, flowers, bark, and roots were common sources of natural colorants. Without first preparing the cloth or colour, they were put into the fibre. Natural colour 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 colours 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 dyeing fabrics. Organic hues can improve our well-being by re-engaging us with nature and making us safer and kinder to the environment. People have coloured textiles using natural, nearby resources for thousands of years. Natural colours were largely rendered obsolete with the development of synthetic dyes in the middle of the 19th century. Synthetic dyes can be used to colour synthetic materials and are more affordable and appropriate for mass production.

OBJECTIVE

- To develop the Natural dye using red soil.
- To study the vibrant range of colors using red soil. To develop the Natural dye using tie and dye method
- To understand the need for natural dyeing methods.
- To obtain a sustainable print with a natural base.
- To observe the color fastness of the natural dye print.

2. SELECTION OF RAW MATERIAL IN KNITTED COTTON:

Selecting the right raw material is essential in producing high-quality knitted cotton fabrics. The choice of raw material impacts the fabric's texture, durability, and overall performance. Here are the key factors to consider when selecting raw materials for knitted cotton fabrics:

1. Cotton fiber quality: Staple Length: Longer staple cotton fibers (such as Egyptian or Pima cotton)

are preferred for knitting as they are stronger and result in smoother, more durable yarn.

2. Cotton Fiber Type: Organic vs. Conventional: Organic cotton is grown without the use of synthetic pesticides or fertilizers, making it a more environmentally friendly choice. Consider the environmental impact and consumer demand for organic products.
3. Blend or pure cotton: Pure Cotton: Fabrics made from 100% cotton provide natural breathability and comfort, making them ideal for many applications, including apparel. Blends: Cotton can be blended with other fibers like polyester, rayon, or elastane to enhance specific properties, such as stretch, durability, or moisture-wicking capabilities. The choice of blend depends on the intended use of the fabric.
4. Yarn Count: Yarn Thickness: The yarn count (thickness) affects the fabric's weight, texture, and breathability. Fine yarns create lightweight and soft fabrics, while thicker yarns result in heavier, more durable fabrics. The choice of yarn count depends on the desired characteristics of the final product.
5. Color and Dyeing Properties: Natural vs. Dyed: Consider whether natural or dyed cotton fibers are needed for the specific design. Dyed fibers should have good color fastness and resistance to fading during washing and exposure to light.
6. Cost Consideration: Budget: Consider the budget constraints while balancing quality and cost. Cheaper raw materials might save costs initially but can compromise the quality and longevity of the end product.

2.2 SELECTION OF MINERAL DYE TERRA ROSA FOR DYEING :

Selecting the right dye for mineral dyeing, especially using red soil as a mordant or color modifier, requires careful consideration of both the dye source and the soil's mineral composition. Red soil, rich in iron oxide, offers unique possibilities for natural dyeing. Here are some points to consider when selecting a dye for mineral dyeing with red soil.

1. Understanding Red Soil: Iron Oxide Content: Red soil is rich in iron oxide, which can significantly influence the final color. Consider how the iron oxide in the soil interacts with the chosen dye. Acidic Nature: Red soil is often acidic.

2. Compatible Dye Sources: Natural Dyes: Choose natural dye sources that can interact positively with the iron oxide in the red soil. Some natural dyes, like madder root (red and orange shades) and weld (yellow shades), can produce beautiful colors when combined with iron-rich soil.
3. Mordanting and Modifying: Mordant Selection: Experiment with different mordants, including red soil itself, to see how they interact with the chosen dye. Alum and iron mordants can be particularly interesting when working with red soil due to their compatibility with iron oxide.
4. Modifier Dyes: Certain dyes, like logwood or cutch, can be used as modifiers to alter the color obtained from red soil. These modifiers can create a range of shades, including grays and blacks, when combined with iron-rich environments. Ph Levels: Experiment with the pH levels of the dye bath. Adjusting the pH using substances like vinegar or washing soda can affect the color outcomes, especially when working with red soil.
5. Traditional Knowledge: Local Expertise: If possible, consult with local artisans or experts who have experience with mineral dyeing using red soil. Traditional knowledge can provide valuable insights and techniques specific to the region.
6. Ethical and Sustainable Practices: Sustainable Dyes: Consider using natural dyes sourced sustainably to ensure eco-friendly practices. Ethical sourcing of dye materials contributes to the overall sustainability of the dyeing process.

3. PROCESS OF DYEING BY DYE&TIE METHOD:

Dyeing using tie-dye techniques involves tying or binding sections of fabric to create interesting patterns and designs. The tied areas resist the dye, creating vibrant and unique patterns.

MATERIALS NEEDED:

- White or Light-Colored Cotton Fabric: Tightly woven natural fibers like cotton work best.
- Rubber Bands: Various sizes for different patterns.
- Fabric Dye: Choose from fabric dye kits available in various colors.
- Plastic Gloves: To protect your hands from dye.
- Plastic Bags or Plastic Wrap: To wrap and store dyed fabric.

- Buckets or Containers: For dye baths.
- Plastic Spoons or Stirrers: For stirring the dye.
- Protective Covering: Plastic or old sheets to cover your work surface.
- Optional: Droppers or squeeze bottles for precise dye application.

1. Alum: 50 ml
2. Vinegar: 25 ml
3. Rock salt: 300 grams
4. Red soil: 1 kg

BOILING PROCESS

Boil 4 litres of water till it turns into 1 litre within 45 mins.

MEASURES INCLUDED

4. RESULT AND DISCUSSION

COLOUR FASTNESS TEST:

WASH: 1



Fig – 01

WASH: 2



Fig- 02

WASH: 3



Fig-03

The color-0 fastness test has been done on cotton cloth.

4.1 WASH FASTNESS:

Performing a water fastness test helps assess the fabric's ability to retain its color when exposed to water. Here's a detailed procedure for conducting the test.

MATERIALS NEEDED:

Dyed Fabric Samples: Small swatches of the dyed fabric. Undyed or Original Fabric Sample: A control sample for comparison. Room Temperature Water: For immersion. pH- Neutral Detergent (Optional): To simulate washing conditions. Containers: Non-reactive containers to submerge the fabric samples. Timer: To track the immersion duration. Absorbent Paper Towels: For blotting excess water. PH Testing Strips (Optional) : To check water pH.

PROCEDURE:

1. **PREPARE FABRIC SAMPLES: CUT SWATCHES:** Cut small, uniform swatches from the dyed fabric. Label them for identification. Control Sample: Keep an identical piece of the original, undyed fabric as a control.
2. **IMMERSE FABRIC SAMPLES: SUBMERGE FABRIC:** Submerge the dyed fabric samples and the control fabric piece into the water. Ensure Coverage: Ensure that the fabric samples are completely covered by water.
3. **SET TIMER: TIMER SETUP:** The samples are left submerged for 30 minutes to 1 hour. Extended Testing: For extended testing, samples can be left in the water for several hours or overnight.

4.2 LIGHT FASTNESS TEST:

Sunlight testing, also known as lightfastness testing, is a method used to assess the resistance of materials, particularly textiles and dyes, to fading or colour change when exposed to natural sunlight.



Fig-04

The lightfastness test conducted on the red soil has yielded noteworthy results, affirming its exceptional resistance to color fading when subjected to prolonged light exposure. Throughout the testing period, the material exhibited remarkable color retention, maintaining its vibrancy and richness despite consistent illumination. This lightfastness is indicative of the material's high quality pigments and inherent

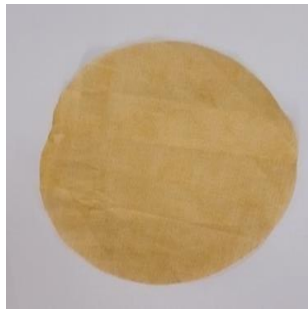


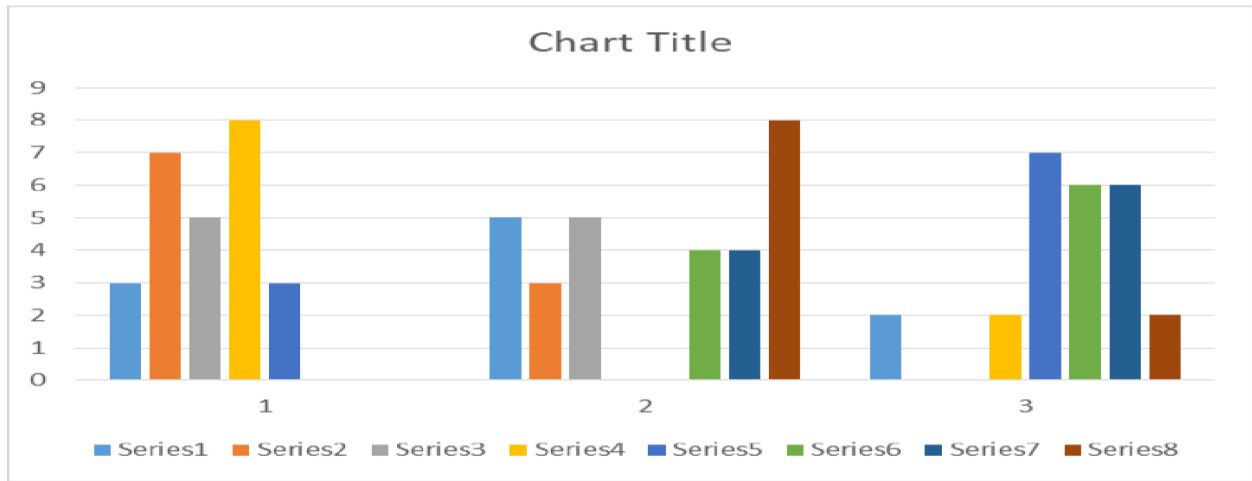
Fig-05



Fig-06

durability, making it an ideal choice for applications requiring enduring visual appeal. As a result, it can be confidently concluded that red soil tie and dye fabric not only met but exceeded the expectations for lightfastness, making it a preferred choice for applications demanding enduring color stability in the face of light exposure challenges.

4.3 SURVEY QUESTIONS:



1. What is your familiarity with natural dyes and tie-dye techniques?
 - A) Very familiar
 - B) Somewhat familiar
 - C) Not familiar at all

2. Have you ever used products dyed with natural dyes or tie-dye techniques?
 - A) Yes, frequently
 - B) Yes, occasionally
 - C) No, never

3. How important is it for you to use products dyed with natural dyes for environmental reasons?
 - A) Extremely important
 - B) Moderately important
 - C) Not important at all

4. What motivates you to choose tie-dye products?
 - A) Unique and artistic designs
 - B) Cultural or fashion trends
 - C) Eco-friendly appeal
 - D) Other

5. Which natural dye colors do you find most appealing?

- A) Earthy tones (browns, greens)
- B) Vibrant shades (reds, blues)
- C) Pastel hues (pinks, yellows)

6. Would you be willing to pay a slightly higher price for products made with natural dyes due to their eco-friendly nature?

- A) Yes
- B) No
- C) Depends on the product

7. In your opinion, which factor is most important when purchasing tie-dye products?

- A) Color vibrancy
- B) Fabric quality
- C) Design uniqueness
- D) Price affordability

5. SUMMARY AND CONCLUSION:

The intriguing art form of natural tie and dye masterfully blends custom, culture, and sustainability. With the use of time-tested techniques and locally available materials, this ancient approach produces gorgeous, one-of-a-kind fabrics. Not only can the binding and dyeing of fabric produce beautiful and complex designs, but it also helps to preserve cultural heritage. Due to its reliance on natural pigments, it is a sustainable substitute for artificial dyes.



6. BIBLIOGRAPHY:

1. Aparna M, Goutham N, Mud Dyeing and Printing Technique on Sustainable Fabrics 5 May 2023.

- 2. 1918 North Parkway Memphis, Cotton: From Field to Fabric.
- 3. The art of designing, fabric pattern by tie-dyeing with natural dyes Chanoknart Mayusoh 05-07 February 2015.
- 4. Bhattacharyya T, Chandran P, Ray SK, Mandal C, Pal DK, Venugopalan MV, Durge SL, Srivastava P, Dubey PN, Kamble GK, Sharma RP, Wani SP, Rego TJ, Ramesh V and Manna MC. 2006, Morphological Properties of Red and Black Soils of Selected Benchmark Spots in SemiArid Tropics of India.
- 5. Comparison of Chemical Properties between Traditional and Commercial Vinegar, Sina Cosmulescu, ORCID, Ana-Maria Stoenescu ,ORCID,Ion Trandafir and Felicia Tuțulescu, 5 March 2022.
- 6. The red soils, their origin, properties, use and management in Greece panel N. Yassoglou, C. Kosmas, N. Moustakas, CATENA Volume 28, Issues 3–4, February 1997, Pages 261-278.
- 7. The long-term effects of reforestation on soil microbial biomass carbon in sub-tropic severe red soil degradation areas Yuanqiu Liu a, Xiaohua Wei b, Xiaomin Guo a, Dekui Niu a, Junxia Zhang a, Xia Gong a, Yumei Jiang c, Volume 285, 1 December 2012, Pages 77-84.
- 8. Novel Approach for Attaining Cotton Fabric with Multi-Functional Properties N.A. Ibrahim, R. Refaie, and A.F. Ahmed, April 6, 2010.
- 9. Cotton Linters: An Alternative Cellulosic Raw Material Axel Sczostak 30 June 2009. The Effect of Pretreatment on the Environment and Dyeing Properties of a Selected Cotton Knitted Fabric, Darinka Fakin, Darko Golob, Zoran Stjepanovič, June 2008.
- 10. Degrading uplands in the rainforest region of Madagascar: Fallow biomass, nutrient stocks, and soil nutrient availability Erika Styger, Erick C. M. Fernandes, Harivelo M. Rakotondramasy & Eric Rajaobelirina, 17 April 2009.
- 11. Comfort and Mechanical Properties of Polyester/Bamboo and Polyester/Cotton Blended Knitted Fabric Uzair Hussain hussain, Farhad Bin Younis, and Faheem Ahmed, June 1, 2015. The effect of a durable flame-retardant finishing on the mechanical properties of cotton knitted fabrics P. Mamalis, A. Andreopoulos, N. Spyrellis, 1 April 2001.

12. Assessing the quality of raw cotton knitted fabrics by their streaming potential coefficients
Thomas Luxbacher, Mirjana Čurlin, Irena Petrinić, Hermina Bukšek & Tanja Pušić, 21 August 2014.
13. Tie-Dye (adire) among the jukun people S
Gausa E Abubakar, Mgbakoigba: Journal of African Studies / Vol. 4 (2015).