

# Sustainable Application of Natural Dyes with Traditional Art Form in Children Garment

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**Abstract:** A form of art that is ingrained in a community's culture and whose knowledge and abilities are transmitted from master craftsmen to apprentices over many generations. Art created using actual physical media, as opposed to art created digitally. Mandala art and Madhubani art are two distinctive traditional forms rooted in India culture, both rich in symbolism, philosophy, and aesthetic appeal. Mandala art, originating from ancient India and Buddhist traditional. Madhubani art hails from the Mithila region in Bihar, India and embodies folk narratives and local culture. Both Mandala art and Madhubani art are perfect combo to mix-match each other. This Study deals with the development of children garment (A-Line frock, Yoke frock, Jabla) using Natural Dye and representing the mix-match of Mandala and Madhubani art by the method of Hand printing. The Dye derived from the fruit of *The Indian Tulip Tree (Thespesiapopulnea)*. The physical testing assesses the dye's resistance to washing, sunlight, and perspiration, ensuring that the garment stays vibrant and safe for young skin.

**Key Words:** Traditional painting, Kids clothing, The Indian Tulip Tree, Eco-Friendly Natural dye.

## 1. INTRODUCTION

Natural dyes can vary widely in color and can be sourced from various parts of plants. They are more environmentally friendly, hygienic, user-friendly, and durable compared to synthetic colorants. Recently, there has been an increased interest in using natural dyes for textiles, driven by global environmental consciousness. This growing awareness is leading to a reduction in the use of synthetic dyes, which create significant waste and undesirable colors, posing health risks and contributing to environmental pollution and ecological imbalances. The presence of toxic chemicals in finished textiles, especially those that come into contact with skin, has raised alarming health concerns and introduced new challenges for

the textile industry stated (S.Sashikala , et.al 2024). Cotton fiber historical records indicate that the Egyptians were the pioneers in cotton cultivation. In Babylon, cotton was referred to as "White Gold." This fiber is derived from the cotton plant, which opens its pods once the fruit matures. The raw cotton, which consists of both fiber and seeds, is collected at designated points and sent to a cotton gin, where the fiber is extracted from the seeds. It is produced from the fibers that envelop the seeds of cotton plants, which develop into soft, round tufts as the seeds mature stated (Durga.P 2022). The use of natural dyes in textiles is old practice that not only supports sustainability but also preserves traditional knowledge. This project explores the development of natural dye extracted from The Indian Tulip Tree (*Thespesiapopulnea* ).The fruit of the Indian Tulip tree is used for dye extraction. By using hand painting the Mandala and Madhubani art are integrating to create a fusion of tradition , and eco-friendly fashion. Creating a kids clothing ( Jabla , A-Line frock , Yoke frock )

## 2. MATERIALS AND METHODS

### 2.1 SELECTION OF FABRIC

#### 2.1.1 COTTON

Cotton is a soft and fluffy fiber that develops in a protective casing, called a boll, surrounding the seeds of cotton plants from the *Gossypium* genus, which belong to the mallow family, Malvaceae. This fiber is primarily composed of cellulose, with small amounts of waxes, fats, pectins, and moisture. In their natural state, cotton bolls help in spreading the seeds.



Fig.01 Cotton fabric

### 2.2 PRE-TREATMENT PROCESS

Desizing is the process of removing size (starch, PVA, CMC, or other sizing agents) applied to cotton fabric during weaving to improve its strength and reduce breakage. This step is essential before further wet processing like scouring, bleaching, and dyeing. Here the Hydrolytic method of desizing by boiling the water and adding soap solution and dip the fabric into the water and leave it for 30min. It is an environmentally friendly process.



Fig.02 Desizing process

### 2.3 SELECTION OF NATURAL DYE (*Thespesiapopulnea* fruit)

The Indian Tulip Tree (*Thespesiapopulnea*), also known as Portia Tree or Milo, is a fast-growing evergreen tree native to coastal and tropical regions of India and Southeast Asia. It belongs to the Malvaceae family and is valued for its timber, medicinal properties, and ornamental beauty. Height: Grows up to 10–15 meters. Leaves-Heart-shaped, glossy green. Flowers-Yellow with a dark maroon centre, resembling a tulip. Fruits-Round, woody capsules containing dark seeds. Bark- Grayish-brown, rough-textured.



Fig.03,04 The Indian Tulip tree (*Thespesiapopulnea*)

### 2.4 DYE EXTRACTION PROCESS

For dye extraction process, the immature fruit of Indian Tulip Tree is used

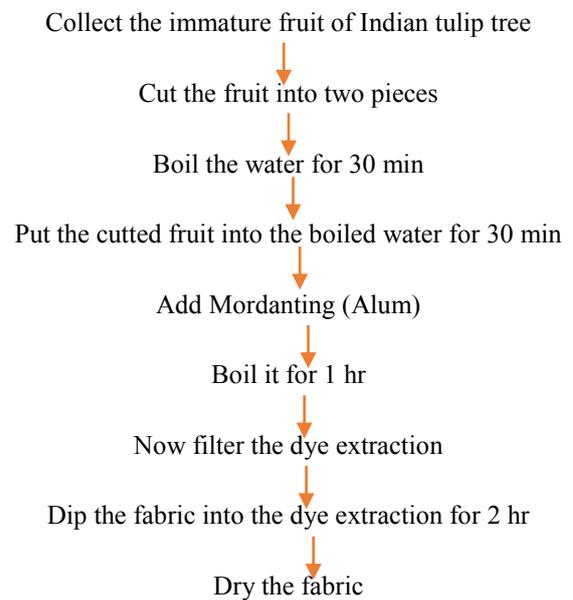


Fig .05 Immature fruit



Fig.06.Cutting process



Fig.07.Dyeing process



Fig.09. Dried fabric



Fig.08. Dyeing process

## 2.5 EVALUATION OF DYED FABRIC

### 2.5.1 CHEMICAL TEST

#### 2.5.1.1 COLOURFASTNESS TO SUNLIGHT

1. Procedure-A dyed textile sample is exposed to light under controlled conditions, and its color change is compared to original fabric.

2. Materials and Equipment Required

- Dyed fabric sample
- Light exposure apparatus
- Grey scale for color change (to assess fading)

3. Test Procedure-Exposure to Light

- Cut the dyed fabric sample to a suitable size 5\*5
- Keep the cutted fabric in the direct sunlight for 7days.
- Check the fabric by keeping gray scale every day.

#### 2.5.1.2 COLOURFASTNESS TO WATER

1. Procedure-To determines the ability of a fabric to retain its color when exposed to water. Evaluates dye stability to prevent bleeding and staining.

2. Materials and Equipment Required

- Dyed fabric sample.
- Soap solution.
- Grey scale.

- Gray fabric.
3. Test Procedure-Exposure to Water
- Cut the dyed fabric sample to a suitable size 5\*5.
  - Keep the Gray fabric between the dyed fabric and stitch.
  - Wash the fabric by using soap solution.
  - Dry the fabric.
  - Check the fabric by keeping gray scale every day.

## 2.6 SELECTION OF ART FORMS DESIGNS

2.6.1 MANDALA ART-Mandala art is a geometric design that holds symbolic meaning in Hinduism, Buddhism, and various spiritual traditions. It consists of intricate patterns arranged in a circular form, representing the universe, balance, and inner harmony.

2.6.2 MADHUBANI ART-Madhubani art, also known as Mithila painting, is a traditional folk-art form from the Mithila region of Bihar, India. It is characterized by intricate patterns, bold colors, and themes depicting nature, mythology, and daily life.

## 2.7 PAINTING

The Art is painted in the dyed fabric using fabric painting.



Plate 3.9. Painted fabric



Plate 3.10. Painted fabric



Plate 3.11. Painted fabric

## 2.8 SELECTION OF GARMENT DESIGNS

2.8.1 JABLA-Jabla is a loose, sleeveless garment worn by infants, usually made from soft cotton fabric to ensure comfort. It is easy to stitch and is designed for free movement.

2.8.2 A- LINE FROCK-An A-line frock is a simple, flared dress that widens towards the hem, creating an

"A" shape. It is comfortable and commonly made for kids or casual wear.

2.8.3 YOKE FROCK-A yoke frock is a stylish dress where the upper part (yoke) is fitted, while the lower part (skirt) is gathered or pleated for a flowy effect. It is commonly made for babies, toddlers, and young girls.

2.8.4 PATTERN

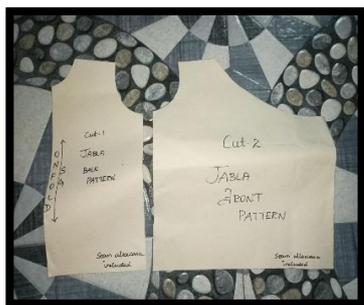


Fig.12 Jabla Pattern



Fig.13 Yoke frock Pattern



Fig.14 A-Line frock Pattern

3. RESULT AND DISCUSSION

COLOUR FASTNESS TO SUNLIGHT

Test Method: ISO

DAYS	1	2	3	4	5	6	7
<i>THESPESIAPOPULNEA</i>	4/5	3/5	3/5	3	3	2	2
RESULT	Good	Slightly Good	Slightly Good	Moderate	Moderate	Poor	Poor

COLOUR FASTNESS TO WASHING

Test Method: ISO 150-C06: 2010

(Procedure No.A2S at Temperature: 40oC)

RESULT: PASS

PARTICULARS	RESULT OBSERVED	CLIENT REQUIREMENT	RESULT
COLOUR CHANGE	Slight colour change was observed.	Grade 2-4 (or) better	Satisfactory
STAINING ON COTTON/ MULTI FABRIC	Staining COTTON-3-4 NYLON-4-5 POLYESTER-4-5 WOOL-3-4 ACRYLIC- 4	Multi fabric staining: Grade 3-4 (or) better	Satisfactory

4. SUMMARY AND CONCLUSION

The integration eco-friendly practices with traditional art forms, preserving cultural heritage while reducing environmental impact. These dyes, derived from plants and minerals, offer non-toxic, biodegradable alternatives to synthetic dyes. Traditional techniques like block printing and hand

painting enhance aesthetic value. Challenges include color fastness and scalability, but advancements in mordanting and eco-friendly offer solutions. Combining natural dyes with traditional art in children’s garments fosters sustainability, cultural appreciation, and safer textile choices, promoting a greener future in fashion.

ANNEXURES



Jabla



A-Line frock



Yoke frock

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