

# Development of Cradle by Using Natural Dyed Bamboo Fabric

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**ABSTRACT**-The development of a cradle utilizing bamboo fabric represents an innovative approach to merging traditional craftsmanship with sustainable materials. The essential aspects of the project, focusing on the creation of a safe, comfortable, and environmentally conscious cradle. Bamboo's natural attributes, including strength, flexibility, and hypoallergenic properties, offer a foundation for crafting a comfortable and safe environment for infants. The cradle incorporating natural bamboo fabric and a comfortable bed represents a complete approach to sustainable and ergonomic childcare solutions. construct a cradle using bamboo fabric dyed with natural colors. this study contributes to the ongoing discourse on sustainable product development.

**Keywords:** cradle, bamboo fabric, hypoallergenic properties, natural dyed.

## I. INTRODUCTION

The development of a cradle using bamboo fabric that has been naturally dyed represents ecological awareness. This project is a unique research project into the development of a childcare product that integrates both traditional wisdom and modern needs in a world in which sustainability is becoming more important and traditional practices are being recognized for their beauty. Due to its lower environmental impact compared to synthetic dyes, the use of natural dyes extracted from plant sources to colour textiles has become very popular. Along with enhancing the effort's eco-friendliness, combining these natural dyes with bamboo fabric—a material known for flexibility and quick regeneration highlights the potential for creatively combining nature's gifts. Textiles have become very popular.

The normal infant care cradle acts as a basis for this creative work. The strength, lightness, and antimicrobial qualities of bamboo are

combined with other qualities that are appealing to create a material that adds another dimension to the cradle's functional qualities. This approach also fits with the emerging movement to embrace modernity and accept our roots while preserving cultural practises.

This introduction fundamental components, including the selection of bamboo fabric, the method of natural dyeing, the ergonomic design of the mattress, and the project's broader implications in the context of environmentally friendly product development. The rest of the sections explore each component in more detail, explaining the subtleties and motives behind the combination of natural dyes and bamboo fabric to produce a cradle that represents both efficiency and creativity.

## II. LITERATURE REVIEW

The physical characteristics of woven fabrics made from 100% bamboo include a smooth and soft texture, similar to silk. Bamboo fabrics are also known for their excellent breathability and moisture-wicking properties, making them ideal for hot and humid climates. Additionally, bamboo fibres have natural antibacterial properties, making the fabric resistant to Odors and allergens. The bamboo fibres have the mechanical properties of superior tensile strength, excellent UV protection, antibacterial and biodegradable characteristics, high moisture absorption, and softness. These properties make bamboo fabrics not only comfortable to wear but also environmentally friendly. The biodegradable nature of bamboo fibres ensures that the fabric has a minimal impact on the environment compared to synthetic materials. The demands on fabrics have changed with developments in technology and rising living standards. Now the requirement is not only style and durability but also clothing comfort, which

includes psychological, sensorial, and thermo physiological comfort.

Automatic E-Baby Cradle Swing Based on Baby Crying The Automatic E-Baby Cradle Swing is a revolutionary solution that is designed to respond to a baby's crying. It utilizes advanced technology to detect the sound of a baby crying and automatically starts swinging to soothe and comfort the baby. With adjustable swing speeds and soothing music options, this innovative cradle swing provides a convenient and hands-free way for parents to calm their babies. Additionally, it also includes safety features such as a secure harness and sturdy construction, ensuring the utmost safety for the baby while using the E-Baby Cradle swings naturally when an infant cries; for this, it has a cry breaking framework that distinguishes the child's cry voice, and in like manner, the support swings till the infant quits crying. The speed of the cradle will be reduced. The system has an inbuilt alert system that indicates two conditions: first, when the mattress is wet, and second, when the baby does not stop

crying within a stipulated time, which alerts the parents or the user that the baby needs attention. This innovative feature ensures that parents are promptly notified of any discomfort or needs their baby may have, allowing them to provide immediate care and comfort. Additionally, the E-Baby Cradle's cry breaking framework not only soothes the baby but also helps promote healthy sleep patterns by gradually reducing the swinging speed once the crying stops.

### III. MATERIALS AND METHODOLOGY:

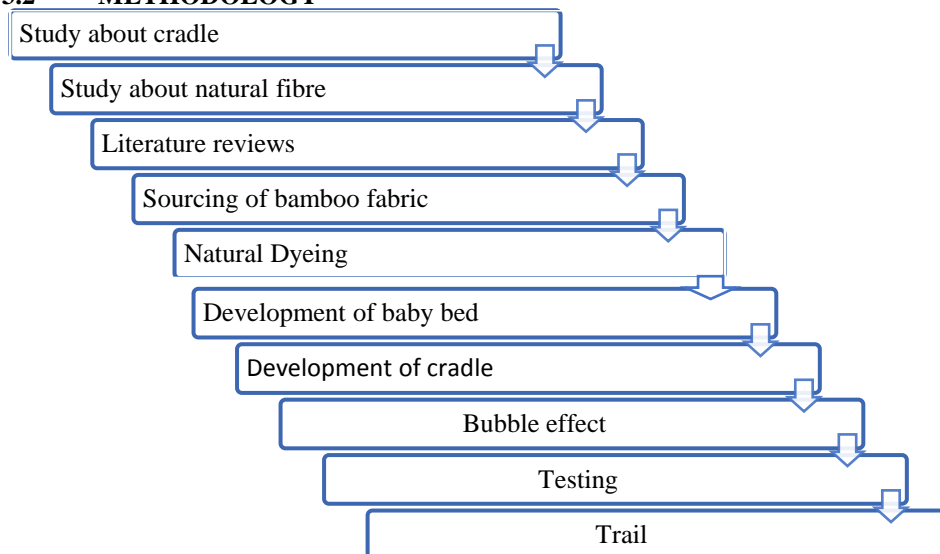
#### 3.1 MATERIALS

The Material we are selecting according to the results we are intended too yet. Fabric and other related materials are collected which suits the project.

The selected materials are

- ❖ Bamboo fabric
- ❖ Beetroot Dyed
- ❖ Starch for Bubble effect

#### 3.2 METHODOLOGY



### 6.1 Souring of Bamboo fabric:

Bamboo is a natural fiber with better moisture absorbency, strength, and durability. Bamboo also has special properties like being non-allergic, non-irritant, antistatic, and antibacterial. Bamboo fabric has several advantages compared to cotton. I purchased the Bamboo fabric from Green Naturals Limited in Delhi, and the fabric's GSM is 120 g.

**Fig1: Bamboofabric**



### 6.2 Natural dyeing :

The natural beetroot dyed bamboo fabric cradle contributes to reducing the environmental impact of the textile industry, promoting sustainable practices, and providing a safe and healthy sleeping environment for babies. The combination of sustainable materials and natural dyeing processes creates a cradle that is both environmentally friendly and aesthetically pleasing. The bamboo fabric is lightweight, breathable, and hypoallergenic, making it the perfect material for a baby's cradle.

### 6.4 Process of Dyeing:

#### Step 1: Preparing the Textile

- Calculate the weight of the fabric and prepare a (5L of water )mordant solution by dissolving of Aluminum Sulphate(500g) in water.
- Heat the pot with the fabric and mordant solution to simmer for about an hour.
- Take the fabric out of the mordant solution, wring out any excess liquid, and let it dry.

#### Step 2: Preparing the Beetroot Dye

- Clean and chop the beetroot into small pieces and grand the beetroot and filter the beetroot juice(3L).

#### Step 3: Dyeing Process

- Wet the pre-mordanted fabric thoroughly before placing it in the dye solution. This helps with even dye absorption.
- Add the 2.5 meter of fabric to the beetroot dye

Solution and bring it to a simmer again.

- Let the fabric simmer in the dye solution for about an hour, or until you achieve the desired color intensity.

**Fig2: Bamboo Dyed fabric**



### 6.5 Construction Procedure:

- ❖ Cut two pieces of fabric for the bedding (mattress and blanket).
- ❖ Sew the two pieces right sides together, leaving a small opening.
- ❖ Turn the bedding right side out, and if desired, insert batting or stuffing for padding.
- ❖ Hand-stitch the opening closed.
- ❖ Position the bedding inside the cradle, adjusting it to fit properly.
- ❖ Sew the ties to the inside of the cradle, near the top edges.
- ❖ Trim any loose threads.

**Fig 3: Bedding construction**



**Fig4: Cradle**



### 6.6 Bubble effect :

Fabrics with bubble effects can be visually appealing and provide a tactile texture that some babies may find interesting. Baby feel more comfortable while sleeping .using industrial starch tying a small ball and dip the tied fabric in starch solution and sundry the fabric for effect.

**Fig 5: Bubble effect**



**Fig7:Water vapor permeability tester(cup method M261)**

### 7.3 Wick ability

Wick ability was testing using the manual method. In this test a strip of fabric is suspended vertically with its lower edge in a reservoir of distilled water. The rate of rise of the leading edge of the water is then monitored at different timings. The measured height of rise in a given time is taken as a direct indication of the wick ability of the test fabric. The measured height of water rise and wick ability test fabric absorbency values were calculated.

## IV. TESTING METHOD

### 7.1 Air permeability

An air tronic tester with model number 3240A and ASTM D737 (figure 3) is used to test air permeability. It has a volumetric counter with a minimum capacity of 50liters per hour and a maximum capacity of 5800 liters per hour. It is also available with different testing areas of 20,20, 10, 5, 2 cm<sup>2</sup>. We tested bamboo fabric that had been treated using a test area of 10 cm<sup>2</sup> with a pressure drop of 100 Pa and readings were recorded

**Fig6: Airtronic tester**



**Fig8: wick ability**

### 7.4 Spray rating tester

A specified volume of distilled water is sprayed onto a test specimen, which has been mounted on a ring and placed at an angle of 45°, so that the center of the specimen is 150mm below the spray nozzle. The spray rating is determined by comparing the appearance of the specimen with descriptive standards on the AATCC photographic scale.

### 7.2 Water Vapor permeability

The testing of fabrics in the Water Vapor Permeability Tester Model M261 (figure4) with the specifications of ASTM E 96 is used with 46ml of water at 20 °C±2 °C in each open dish predetermined from the dimensions of the dish to give an air layer which is 10±1mm deep between the surface of the water and the underside of the supported specimens. The specimens were placed over the turn table and the water vapor permeability readings of different fabrics were calculated.



**Fig9:Sprayrating Tester**

## V. RESULT AND CONCLUSION

### 7.1 Air permeability

The air permeability of the fabric samples was tested and the results are given in (table no 1). It has a volumetric counter with a minimum capacity of 50 liters per hour and a maximum capacity of 5800 liters per hour. It is also available

with different testing areas of 20, 20, 10, 5, 2 cm<sup>2</sup>. We tested bamboo fabric that had been using a test area of 20 cm<sup>2</sup> with a pressure drop of 100 Pa and a measuring volume of 10 liters per minute, and readings were recorded.

**Table-1: Air Permeability of Bamboo Fabric samples**

S.no	Bamboo fabric
1	36.8
2	32.2
3	40.0
4	38.5
5	35.5
Average	36.6

### 7.2 Water Vapor Permeability

The water vapor permeability of the fabric samples were tested and results were given in (table no 2). The weight of specimen of with and without fabric samples is calculated theoretically and reference sample is also taken into account.

This water permeability of fabric depends upon the weave structure, cover factor, pore diameter, etc. Thus, the given sample was tested using water permeability tester under standard conditions and the result is taken.

**Table2: Water permeability of bamboo fabric sample**

s.no	Initial weight(g)	Final weight(g)	Mass difference(g)	Area(m <sup>2</sup> )	WVP(gm <sup>2</sup> /24hr.)
1	141.47	139.0	2.47	0.0054113	2013.5
2	141.42	138.9	2.52	0.0054113	2235.3
3	141.51	139.5	2.01	0.0054113	1744.4
4	141.40	139.42	1.98	0.0054113	1756.3
5	141.60	139.25	2.35	0.0054113	2084.5

### 7.3 Wick ability

The wick ability of the fabric samples was tested, and the results are given in (table no3). Wicking property of the woven fabric is

observed, the distance of water that travels up in the fabric material is measured in various intervals and it is resulted that wicking property, in weft direction is higher than warp direction of the fabric.

**Table3: Wicking property of wrap and weft Bamboo fabric Samples**

Times in minutes	Weft Direction	Wrap direction
1minutes	3 cm	3 cm
3minutes	4.5 cm	4 cm
5minutes	5.5 cm	5 cm

#### 7.4 Spray rating tester.

The spray rate of each fabric (Table 4 ) is tested using spray rating tester. This spray rate is obtained by comparing the fabric absorption and AATCC photographic scale. Water resistance of

fabric depends upon porosity of the fabric surface and contact angle during wetting of the fabric. Thus, the given sample was tested under standard conditions and the result rated as per the ISO standards and reported.

**Table4: Spray rating tester of Bamboo fabric**

S.no	Type of Sample	Observed Rating	INTERFERENE
1	Bamboofabric	50ISO1	Complete wetting of the entire specimen face beyond the spray point

### VI. CONCLUSION

From this study the development of a natural beetroot-dyed bamboo fabric cradle is a step towards a more sustainable and eco-friendly approach to infant care. By using sustainable materials and natural dyes, we can reduce our impact on the environment and provide a safer environment for babies. Furthermore, the beetroot-dyed bamboo fabric cradle offers hypoallergenic properties, making it suitable for babies with sensitive skin. Its breathable and moisture-wicking nature ensures optimal comfort, preventing any discomfort or irritation. The cradle's design and features make it a practical and stylish choice for parents who want to provide the best for their baby.

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