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## **Design and Development of Infant Bed Using Bamboo and Bamboo Charcoal Fabric**

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DOI: <https://doi.org/10.55248/gengpi.2022.3.10.35>

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### **ABSTRACT –**

The aim to produce infant bed by using bamboo and bamboo charcoal fabrics. This baby bed will be highly Anti-Microbial smooth, soft, herbal smell and back rest material will be having the cooling property and fragrance with more comfortless for the babies. Baby bedding is also known as bed cloths, is the material laid above matters for warmth, protection of matters and it is washable and comfort for sleeping. It improve more absorbency and implement natural printing and antimicrobial finish. The treated fabric will be analysed by comfort properties like air permeability and wicking property. The finished fabric is tested, further to develop the end product and the result shows that end product is more comfortable for the usage.

**Key Words:** Infant bed, Bamboo fabric, Natural finish, Antimicrobial finish .

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### **1. INTRODUCTION**

Babies' bed made of bamboo and bamboo charcoal fabric which has much medicinal property. This baby bed will be highly Anti-Microbial smooth, soft, herbal smell and back rest material will be having the cooling property and fragrance with more comfortless for the babies. Baby bedding is also known as bed cloths, is the material laid above matters for warmth, protection of matters and it is washable and comfort for sleeping. This aim is to improve more absorbency and implement natural printing and antimicrobial finish.

The Wicking property is improved by using Bamboo and Bamboo charcoal fabric. Bamboo is natural fabric which has high wicking property, breathability, fast dry behaviour and also has good tensile strength. The natural pigment (Basella Alba) is used to design the pattern onto the fabric surface and treated with curing method. Herbal finishing is natural finishing inhabiting the growth of bacteria and microbes. Neem is the most promising source of Components with insect control, antimicrobial and medicinal properties. The treated fabric will be analysed by comfort properties like air permeability and wicking property. The finished fabric is tested, further to develop the end product and the result shows that end product is more comfortable for the babies.

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### **2. MATERIALS**

Materials we are selecting according to the results we are intended to yet. The selected materials are

- ❖ Bamboo fabric
- ❖ Bamboo charcoal fabric

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### **3. METHODOLOGY**

*Flow Chart*

**Scouring of bamboo and bamboo charcoal yarn**



**Knitting of fabric**



**Finishing for bamboo fabric**



**Printing of bamboo fabric**



**Testing**



**Construction of bed**



**End product**

### **3.1 Bamboo yarn**

Bamboo yarn is made of 100% bamboo pulp fibre. It is characterized by its good wicking property, excellent permeability, soft feel and moisture absorption. The bamboo yarn was purchased from Sri Angaal fancies

#### **3.1.1 Bamboo Charcoal Yarn:**

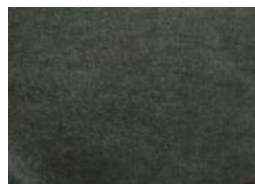
Bamboo charcoal is extracted from burned bamboo pulp at temperature ranging from 800 to 1200 degree which has activated carbon. The yarn was available local market in Tiruppur. The yarn was purchased in Sri Angaal fancies.

### **3.2. Knitting of fabric**

Bamboo knit fabric is the ultimate in comfort and softness. These bamboo and spandex knit fabrics are super popular for both high fashion and casual apparel.

The knitting of fabric was done in circular knitting machine. The fabric type is single jersey, the number of gauge used is 16 and the Dias is 36.

Bamboo Charcoal fabric was knitted by three thread circular knitting machine. The fabric was blended in the ratio of 50:50 proportions. It is of three kinds of threads to combine yarn. They are bamboo charcoal and cotton yarns. This structure was manufactured on special single jersey circular knitting machine with 20 gauges. It has 96 feeders with total number of needles equal to 1872. The loop length was kept constant at 3.97mm for all face and binding yarns, and at 1.59mm for all fleecy yarns.



**Fig -1:** Bamboo charcoal fabric

### **3.3 Antimicrobial Finishing**

This finish prevents the growth of bacteria and products finished in it have been proved environment friendly and health protecting, preventing diseases. It also prevents garments from unpleasant odour. In this research, subjective evaluations of antimicrobial finish applied fabrics are analysed

#### **3.3.1 Neem Extractions**

Neem (*Azadirachta Indica*) products are well known for their antifungal and antibacterial property. The neem extract obtained from the trees leaves when fixed on the woven fabric with fixing agents, it shows some interesting physical and antimicrobial properties.

### 3.3.2 Process

Fresh leaves of neem were shadow dried and made into a fine powder and the methanolic extracts of herbal powder were obtained by treating it with room temperature Methanolic extracts of neem were applied to bamboo fabric by dipping in dye bath at material to liquor ratio of 1:10. The fabric was then dried at 80 degree for 15 min in drier to remove the moisture.



**Fig -2:** Neem Extraction

### 3.4 Printing

Basella Alba commonly known as Ceylon spinach used in India. Dark blue fruits having red-violet flesh are potential source of natural colorants. Ceylon spinach fruits was collected from the local area. A moderant which is known as the alum salt used for the fixing of the pigment on the fabric. The collected samples have been found economically viable and eco-friendly.



**Fig -3:** Basella Alba

#### 3.4.1 Pigment Preparation

The fruit is extracted from spinach then grind it and filter the juice of the fruit add 100 gm. of tamarind powder and colorants in 1 litre of boiling water and stir it to avoid the lumps. Cook till the fine paste is ready cool it and filter the content. Now the pigment is ready for the printing process.

#### 3.4.2 Printing Method

The screen printing method was used to print the fabric. Here we are going to print the celon spinach extraction on the bamboo fabric. The scree is selected for the required size. Now apply the prepared pigment paste on the screen and squeeze across the screen to fill the mesh. Now the design is fixed on the fabric.

#### 3.4.3 Curing of Printed Fabric

To set the design permanently, the printed fabric was treated by the curing method using curing chamber at 160 degree Celsius for 1 minute.



**Fig -4:** Printed Fabric

### 3.5 Testing

#### 3.5.1 Fabric Mass/Area (GSM)

GSM stands for grams per square meter fabrics; GSM means the weight of one square meter fabric in grams. GSM is also written as gm/m<sup>2</sup>. We can calculate. GSM for knitted fabric using one of the following methods.

By means of instruments

- ❖ Round GSM cutter and
- ❖ Weighting balance



**Fig -5:** GSM cutter and Weight balance

### **3.5.2 WIKING TEST**

Wickability 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 wickability of the test fabric. The measured height of water rise and wickability test fabric absorbency values were calculated .

### **3.5.3 WASHINGFASTNESS(LAUNDROMETER)**

This standard test consists of a series of five washing tests, prescribes a method for determination of colour fastness of the treated fabrics to the action of soap solution at 40 c.

#### ***EVALUATION OF COLOUR FASTNESS FOR WASHING***

The composite specimen containing the specimen is evaluated with the grey scale for,The grey consists of nine pairs of standard grey chips, each pair representing the difference in colour corresponding to the numerical rating. These ratings may be described in qualitative terms are

- ❖ Change in colour and
- ❖ Staining



**Fig -6:** Washing fastness tester (LAUNDROMETER)

### **3.5.4 PRINT DURABILITY TEST**

This method of test is used to assess the durability to washing of applied motifs and print. It may also used to assess the durability of washing of product. Water and Persil biological powder are the reagents.

### **3.5.5 ANTIMICROBIAL TEST**

AATCC TEST METHOD 147: Anti-bacterial activity assessment of textile materials: parallel streak method AATC 147 is a qualitative test used to detect bacterio static activity on textile materials. The test method determines antibacterial activity of diffusible antimicrobial agents on treated textile materials. The test is followed in the case when the antibacterial agent is migratory. Diffusion through the agar.

### 3.6 DEVELOPMENT OF BED

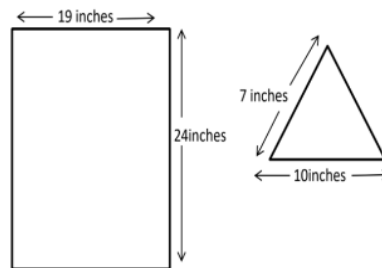
#### 3.6.1 Design

The picture shows the final design of bed. The design looks like a bed with a head cap.



**Fig -7:** Design of bed

#### 3.6.2 PATTERN FOR BABIES BED



The figure show the pattern for babies bed, it contain front, back and head cap.

#### 3.6.3 CONSTRUCTION PROCEDURE

- ❖ To cut the fabric with the pattern size
- ❖ To compile all layers
- ❖ To design a box quilting stitches
- ❖ To attach the cap on the front side
- ❖ Overclock the raw edges
- ❖ Finish the side seam
- ❖ Cover the raw edges

### 3.7 END PRODUCT



**Fig -8:** Babies bed

## 4 Result and Discussion

### 4.1 Colour fastness test

Characterizes a material colour resistance to fading or running. It is specifically used to measure the migration of colour to another fabric when wet or close contact.

**Table -1 Colour Fastness test**

SPECIFICATION	RESULT
Colour fastness to washing	At 40C, 30min Mechanical wash as per ISO 105:C06/2010 method
Colour change	Base : 4
Staining on multifiber	Acetate 4-5 Cotton 4-5 Nylon 4-5 Polyester 4-5 Wool 4-5

### 4.2 Wicking test

Wicking refers to the tendency of yarn or other fibre to draw liquids into the strand through capillary action. Wicking fabrics are designed to create an environment that draws liquid up away.

**Table-2 Wicking Test**

VERTICAL WICKING TEST AATCC 197:2013(After single wash 40' flat dried)		
Average wicking	After 5 min	After 30 min
Length	4.95cm	19.5cm
Width	4.90cm	18.0cm

### 4.3 Water Absorbency test

It is a test method for determining water absorption time and water absorption capacity of all textile fabrics designed to absorb water.

**Table -3 Water absorbency test**

WATER ABSORBENCY	
Absorbency in sec	9 sec

#### 4.4 Antimicrobial test

Anti-microbial susceptibility testes are used to determine which specific antibiotic a particular bacteria or fungus is sensitive to. Results are commonly reported as the inhibitory concentration.

**Antimicrobial evaluation (qualitative) – AATCC 147-2016  
Antimicrobial activity assessment of textile materials:  
Parallel streak method.**

#### 4.5 Wash Durable test

Representation of the durability test procedure. Spin speed, energy consumption and water consumption are measured by appropriate sensors and recorded continuously.

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## CONCLUSIONS

The purpose of this project is to knit the bamboo and bamboo charcoal fabric and to apply natural finishing to the bamboo fabric using as natural finishes extract and application of this bed is of multi purposes. To print the fabric with natural pigment from besalla Alba and the finished fabrics are constructed to become a baby's bedding. This bed could be used for sleeping and it has good absorbency, comfortable and safety for babies skin. According to the test results the treated sample shown good to fastness to washing, colour fastness, print durability, antimicrobial and the end product has good absorbency property.

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