Vol-06 Issue 05, May -2022 ISSN: 2456-9348
Impact Factor: 5.004

iJETRM
International Journal of Engineering Technology Research & Management

DEVELOPMENT OF HOME TEXTILE PRODUCT USING BANANA AND BAMBOO FABRICS

Priyanka J [1], Malarkodi M [2], Sowmmiya S[3]
[1,2]UG Scholar, Department of Fashion Technology, Bannari Amman Institute of Technology, Sathyamangalam
[3]Assistant Professor, Department of Fashion Technology, Bannari Amman Institute of Technology, Sathyamangalam

ABSTRACT
In today's world, customers expect higher levels of comfort, durability, and functionality from their clothing. These expectations have resulted in significant opportunities for the textile industry. Water and stain/oil repellent finishing, in particular, can give repellence without sacrificing the natural feel of the materials in home textile finishing. We used a nonfluorocarbon-based chemical derived from an inorganic compound of Silver nitrate as a finishing treatment for water and stain repellent finishing in this research. Organic fabrics, such as banana and bamboo, minimize heat resistance, softness, and cooling effects on the human body. The experiments were done in the first was to apply reactive dye for both banana and bamboo fabrics and water repellent chemicals on banana dyed fabrics. Dyeing process can be done in dye path method. The research work includes chemical concentrations such as 60g/L, 15g/L, pick up ratio 80%, drying temperature 120°C, curing temperature 160°C and curing time 1 minute. The second was to evaluate the water repellence and oil/stain repellence by drop test and spray test and Breathability test of the air Permeability test. The physical properties of the fabric were determined through GSM and thickness before and after dyeing process. According to the standard testing AATCC and ASTMD method procedures. In accordance with the design developed home textile product of an apron are generally engaged in water, oil and dust during playing on a kitchen activity.

Keywords:
Banana and Bamboo fabric, Reactive dye, silver nitrate finishing

INTRODUCTION

In today's world, customers expect higher levels of comfort, durability, and functionality from their clothing. These expectations have resulted in significant opportunities for the textile industry. Home textile is one of the important sectors in the textile industry. Kitchen textiles fall into the category of home textiles. A wide range of innovative products is available in the category of kitchen textiles. Products which are primarily used in our kitchen both for functional purposes as well as decorative purposes. This project represents the idea of functional innovation in natural fabrics by the development of a home textile product. Functional innovation and value-added are achieved by introducing water and stain repellence finish in the home textile product. Banana and bamboo fabrics are utilizing an environmental sustainability product development. Natural fabrics have been used as an alternative to synthetic ones for the greener character; banana and bamboo fabrics have the advantage of coming from an agricultural residue. Bamboo is the fast-growing grass as made its mark as an eco crop in the textile world. Banana grows easily as it sets out young shoots and it's most commonly found in hot tropical climates. Banana and bamboo organic fabrics have good characteristics to wear clothing. Banana and bamboo fabrics are eco-friendly, chemical-free, non-toxic, and odor-free. A dyeing process is an important part of the aesthetic property. A dyeing process interaction of a dye with fiber, as well as the movement of dye into the fiber's interior. In general, dyeing involves adsorption (the transfer of dyes from an aqueous solution to the surface of the fiber) and diffusion (dyes diffused into the fibers). Reactive dyes form a strong covalent bond with the cellulosic fiber. Banana and bamboo fabrics are made of cellulose fibere and are typically dyed with reactive dyes. Reactive dyes are anionic nature water-soluble dyes good washes (4-5) and light fastness (16) properties, low-cost dyes, simple dyeing method, good reproducibility, ability to produce bright shade and all kinds of shades to be found. The dyeing process can be done with the dye bath method.

iJETRM
International Journal of Engineering Technology Research & Management

Sodium carbonate(soda), sodium chloride (salt), and reactive dye (turq blue, violet) are the chemicals are added to the dyeing process., Silver nitrate, excl binder, and wetting oil are the chemicals are used to finishing process for stain/oil and water repellent finishes. Silver nitrate has the characteristic of high 9 water repellent. At last, to evaluate the water repellence and oil/stain repellence by drop test and spray test, and Breathability test of the air Permeability test .The physical properties of the fabric were determined through GSM and thickness before and after the dyeing process. According to the standard testing AATCC and ASTMD method procedures. In accordance with the design developed home textile products of an apron are generally engaged in water, oil and dust during playing in kitchen activities.

MATERIALS AND METHODS

Raw material

Fabrics source

Weave fabrics (Banana and bamboo) were purchased from Suvetah textiles

S:NO	FABRCS	QTY
1	Banana fabric	2m
2	Bamboo fabrics	2m

Banana fabric

The outer lining of banana peels is used to make banana cloth. This fabric is one of the most luxuriously to own since it is soft on the inside and rigid on the outside, making it ideal for creating pleasant, long-lasting, and high-quality clothes, decors, and accessories. The fabric has high breathability and moisture-wicking capabilities, in addition to being environmentally friendly. As a result, the outer layer of our product is made of banana cloth.

Bamboo fabric

Bamboo is a sustainable and environmentally friendly plant that was originally grown because it requires no pesticides to mature and biodegrades quickly. It has long-lasting resilience, blends readily with cotton and hemp, provides UV protection, is naturally hypoallergenic, destroys odor-causing germs, is extremely moisture and water absorbing, and dries quickly. As a result, we use bamboo cloth for the inner layer of our product.

Methods:

Dye bath preparation

- To take ready for dyeing fabric both banana and bamboo fabric
- To weight the fabric
- To take liquor ratio of 1:20
- To calculate the water for dyeing process
- To calculate the reactive dye %
- To calculate the Nacl(60 gpl)
- To calculate the Na2co3 (15 gpl)
- Based on calculation values to take reactive dye(hot brand color dye), sodium chloride (Nacl),sodium carbonate (Na2co3)
- Based on calculation to take water for dyeing process

Dye bath preparation for banana fabric

- The weight of the banana fabric is 100 grams
- To take liquor ratio of 1:20
- The required water for dyeing is 2000ml
- To take the dark shade of reactive dye 4 % of 4 grams
- To calculate the Nacl(60 gpl) of 120 grams
- To calculate the Na2co3 (15 gpl) of 30 grams

Dye bath preparation for bamboo fabric

- The weight of the banana fabric is 160 grams
- To take liquor ratio of 1:20

iJETRM
International Journal of Engineering Technology Research & Management

- The required water for dyeing is 2000ml
- To take the dark shade of reactive dye 2 % of 3.2 grams
- To calculate the Nacl(60 gpl) of 192 grams
- To calculate the Na2co3 (15 gpl) of 48 grams

Dye bath process for banana fabric procedure

To begin with, the chosen recipes are water-soluble (to take the required ml of water to soluble recipes). After that, the RDY Banana fabric was given a hot wash to let the dye absorb better, and the fabric was dried for 30 minutes at 60°C. After drying, make a dye bath with 2000ml water and the soluble violet C4R reactive dye solution. Switch on the induction stove and set the timer for 1 hour at 80°C. Insert the dry banana fabric and give it a hot wash for 20 minutes. After 20 minutes, add the soluble NaCl solution and give it a hot wash for 20 minutes. After 40 minutes, add the soluble Na2Co3 solution and give it a hot wash for 20 minutes. Finally, the dying process is completed. Taking the fabric out of the dye bath the coloured fabric is then dried at 120 degrees Celsius.

Dye bath process for bamboo fabric procedure

To begin with, the chosen recipes are water-soluble (to take the required ml of water to soluble recipes). After that, RDY Bamboo fabric was given a hot wash to let the dye absorb better, and the fabric was dried for 15 minutes at 60°C. After drying, fill a dye bath with 2000 mL of water, then add the soluble reactive dye (T.blue). Set the induction stove to 1 hour, 80°C, and insert the dry bamboo fabric for a 20-minute hot wash. After 20 minutes, add the soluble Nacl solution for a 20-minute hot wash, and after 40 minutes, add the soluble Na2Co3 solution for a 20-minute hot wash. Finally, the dying process is over. To remove the fabric from the dye bath. The colored fabric is then dried at 120 degrees Celsius. Then Curing separately: 1min at 160 °C

Finishing preparation

- Adjust pH of water bath with acetic acid to between (4.0 –5.5).
- If using combined with extenders, fillers, or additives, dilute each and add to the water bath.
- Silver nitrate solution with an equal amount of cold water, and add to the bath last.

Dye bath preparation for banana fabric

- PH of the prepared bath: Between (4.0 and 5.5)
- Typical padding liquor pick-up of approximately (80) %, based on the fabric
- Silver nitrate solution 100ml
- Wetting oil 50 ml
- Exl binder 35 ml

Finishing process procedure

To begin, combine the chosen recipe solution with the liquor ratio water and well mix. The dye bath is loaded with dyed banana fabric. 30°C for 15 minutes in the bath. Finally, the process is completed. In a hot oven dryer, dry at 120°C for 40 minutes. Then separate and cure for 1 minute at 160°C. The dyeing and finishing process has become completed.

Fig 1.1

iJETRM
International Journal of Engineering Technology Research & Management

METHODOLOGY

- Fabric selection(Banana and bamboo fabrics)
- Sample preparation
- Before and after the dyeing process test the fabrics properties
- Select the reactive dye(hot brand color)
- Dyeing process for both banana and bamboo fabric
- Water and stain/oil repellent finish For banana fabric (silver nitrate)
- Result analysis (stain repellency test, water- repellency test, Breathability test)
- Finally ,to make a home textile product of an apron

RESULTS AND DISCUSSION

GSM

Before process tested result for bamboo fabric
Fabric GSM= 160
After process tested result for bamboo fabric
Fabric GSM =165
Before process tested result for banana fabric
Fabric GSM = 100
After process tested result for banana fabric
Fabric GSM =120

FABRIC THICKNESS

Before process tested result for bamboo fabric
Fabric Thickness = 0.07mm
After process tested result for bamboo fabric
Fabric Thickness =0.10mm
Before process tested result for banana fabric
Fabric Thickness = 0.5mm
After process tested result for banana fabric
Fabric Thickness =0.20mm

WATER REPELLENCY TEST

Table 1-Water repellency test

Water Repellency *AATCC 22 : 2017*	Finished banana fabric
Water Repellency	**50**

100 - No sticking or wetting of upper surface, 90 - Slight random sticking or wetting of upper surface, 80 - Wetting of upper surface at spray points, 70 - Partial wetting of whole of upper surface, 50 - complete wetting of the whole of the upper surface,0 - Complete wetting of the whole of upper and lower surface

iJETRM
International Journal of Engineering Technology Research & Management

OIL REPELLENCY TEST

Table 2-Oil repellency test

Oill Repellency *AATCC 22 : 2017*	Finished banana fabric
Oil Repellency	**B**

A = Passes; clearwell - rounded drop B = Borderline pass; rounding drop with partial darkening C = Fails; wicking apparent and / or complete wetting D = Fails; complete wetting

AIR PERMEABILITY TEST

Sample tested at :R.H.65%±2% and temp 21 Degree C± 1Degree C

Table 3-Air Permeability

AIR PERMEABILITY *(As per ASTMD 3737-481)*	Finished banana fabric
Air permeability	**43.7**

Test pressure-125 pa-test area 38cm²

PRODUCT DEVELOPMENT

Fig 1.2
Kitchen Apron

CONCLUSION

We used the Silver nitrate chemical to achieve a good water repellent finish on banana cloth in this research. We used Banana fabric that had been dyed with Reactive Dye before being finished. The functionality benefit to the garment wearer is that we use the second layer of bamboo fabric apron to insulate our bodies from heat. To assess the results of the water repellency, oil repellency, and breathability tests, and other physical tests such as the GSM

test and thickness, physical tests were conducted to assess the performance of the before and after treated fabrics. For these tests, we employed AATCC and ASTM test methods. The result of utilizing Silver nitrate chemical to achieve a moderate water-resistant resistant finish in banana fabric. The scope of this study is vast area, and we went to great lengths to determine the best results using our simple technique processes.

REFERNCES

1. *P05 Water Repellency Project (November 2012),"Durable Water and Soil Repellent Chemistry in the Textile Industry" – A Research Report [1].*
2. *Hastbacka, Mildred, "Non-fluorinated Omniphobic Coatings for Stain Resistant Textiles", February 29, 2016.*
3. *Marino S. Basadur, Cincinnati, "Process for imparting renewable soil release finish to polyester-containing fabrics", Oct. 12, 1976*
4. *Erik Kissa, "Mechanisms of Soil Release"August 1, 1981*
5. *Sahin B, Fluorochemicals in textile finishing, International Textile Bulletin- Dyeing/ Printing/ Finishing, 1996, 42(3), 26-30*
6. *Singh O P, Stain removal characteristics of fabrics and stain- resistance/ release finishing, Textile Dyer & Printer, 1987, 20(25), 24- 27.*
7. *Kurz E, AusrüstungausorganischenLösungsmitteln, Textilveredlung, 1969, 4, 773-786.*
8. *Nassl W, Sahin B and Schuirer M, Functional finishing of sports and leisure wear, Chemiefasern/Textilindustrie, 1992, 42/94, 137-J. E. Booth, Principles of Textile Testing, Butterworth Heinemann Ltd. (U.K.), Third Edition, 420-423.*
9. *Kissa E, Handbook of Fibre Science and Technology, Vol II, Chemical Processing of Fibres and Fabrics. Functional Finishes, Part B, Levin M and Sello S B (eds), (New York, Marcel Dekker), 1984, 159-172.*
10. *W. D. Schindler and P.J. Hauser, Chemical Finishing of Textiles,Woodhead Publishing Limited, (Cambridge, England), 2004, 76-80.*
11. *Impact of water repellent finish on different fabric shree laleitha. g[1], rajesh kumar. s[2], suresh. k.t[3], sundar. t4, shabarish kumar. s5*
12. *Environment friendly water repellent and soil release finish with fluorine-free solutions "sutapa chowdhury1, md. mahamudul hasan2, kawser parveen chowdhury3 , rasheda begum dina4 & md. kamrul hasan5 ".*