

## “DEVELOPMENT OF FRAGRANCE FINISHED KIDS KNICKERS WITH BAMBOO/COTTON BLENDED KNITTED FABRIC”

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### ABSTRACT

The present study focus on the development of kids knickers with bamboo/cotton blended knitted fabric. Fragrance was given to the fabric by using *Lavandula spica* L. essential oil by applying microencapsulation technique and pad dry-cure method. Various parameters of the fabric like elongation & tenacity, abrasion, and bursting strength were evaluated. Moreover the fabric quality was tested for washing property up to 20 washes and the quality of the fabric was also assessed. Results revealed that the blending property of Bamboo/cotton was good when compared to any other fibres. Further as an application part knitted fabric was also designed for kids, which showed a good compatibility and dermally safe product. This study pays a way for the usage of eco-friendly and dermatologically safe knitted fabrics from Bamboo/Cotton.

**KEYWORDS:** Bamboo/Cotton, *Lavandula Spica* L., Microencapsulation, Knitted Fabric

### INTRODUCTION

Clothing is one among the most important three basic needs in every human life. It protects our body from various climates and gives us a good appearance (Vimala and Ramalakshmi, 2008). Nowadays people are looking forward for more comfortable cloths, hence new sources of fibres are being invented which provide comfort. One step in this context is the invention of Bamboo fibres, which are obtained from bamboo plant. Bamboo fibres have special properties like good moisture absorption, anti-bacterial properly and elasticity. Therefore it can be successfully be used in the production of apparels and home textiles. In the present project Bamboo and Cotton materials are compared on techno economic basis and knitted materials are developed. Consumers are becoming very much conscious to environmental friendly consumer goods and much concerned about the green activities. This tendency for eco friendly come into contact with the skin for a prolonged period of the time (Dharani *et al.*, 2010).

Textile fiber reinforced composite materials are important class of engineering materials. They offer outstanding mechanical properties, unique flexibility in design capabilities and ease of fabrication. Composites using high strength fibers such as graphite, aramide and glass are commonly used in broad range of applications from aerospace structure to automotive parts and from building materials to sporting goods (Shanmuga sundharam, 2009). Regenerated cellulose bamboo fibre was first manufactured in 2002 by Hebei Jigao Chemical Fibre Co Ltd in China. Bamboo fibre is obtained from bamboo pulp, which is extracted from the bamboo stem and leaves by wet spinning, including a process of hydrolysis-alkalisation and multi-phase bleaching that is quite similar to that of viscose rayon fibre (Erdumlu & Ozipek, 2008).

### **The Present Work was Framed with the Following Objectives**

- To select natural and Regenerated cellulosic fiber
- To blend the selected fibers - Bamboo/Cotton (65:35)
- To Prepare the knitted fabric (40s Count)
- To finish the fabrics with Lavender fragrance
- To test the physical properties and quality aspects of the knitted fabric.
- To develop a Re-usable knitted kids knickers.

## **EXPERIMENTAL PROCEDURES**

### **Selection of Fiber**

The 100 percent natural cotton, regenerated bamboo fibers are selected for the study.

### **Selection of Blending**

Bamboo and Cotton fibers are blended with the ratio of 65:35.

### **Selection of Yarn**

40's count is selected for the study

According to Mahajan (2000), from variety of yarns that are made commercially, it would appear that there is no limit to the number of functional and aesthetic design possibilities and to the number of distinctly different yarns. Natural, regenerated fibers are processed in a multitude of blends.

### **Selection of Fabric Formation**

Knitting is the method used for fabric formation. The knitted fabric has the advantage of stretch ability which provides fit and comfort. It also gives warmth. At the same time, they are porous and provide breathing comfort. It is light in weight and wrinkle-resistant. One of the most important aspects of clothing is comfort. Properties like thermal resistance, air permeability, water vapor permeability and liquid water permeability are critical for the thermal comfort of a clothed body. Comfort plays a vital role in the selection of apparel.

It is considered as a fundamental property when a clothing product is evaluated. The comfort provided by clothing depends on several factors. One of them is thermal comfort; other factors include softness, flexibility, moisture diffusion, etc. The thermal comfort properties of textile materials have come into sharp focus in the textile research work of recent times.

The last few years have witnessed a growing interest in knitted fabrics due to their simple production techniques, low cost, high levels of clothing comfort and wide product range. Knitting is a process of fabric formation that involves the inter-looping of yarn in a series of connected loops by means of needles. Knitted fabrics are known to possess excellent comfort properties. They not only allow for stretching and ease of movement, but they also have good handling characteristics and facilitate the easy transmission of water vapour from the body.

These attributes make knitted fabrics the commonly preferred choice for sportswear, casual wear and underwear. Knitted structures offer several advantages. Knitted fabrics have therefore long been preferred as fabrics in many kinds of clothing. Efforts have been made to make knitted fabrics more comfortable by incorporating different fibers, altering yarn

parameters, like twist, bulk, count, and finishing treatments, and knitting factors, like stitch length, CPI, WPI and fabric weight, and by adopting new or different finishes.

### **Selection of Knitting Technique**

Single jersey technique was used and it is the simplest form of filling structures. Plain knits are produced by the needles knitting as one set, drawing they loops away from the technical back towards the technical face side of the fabric. It is widely used since it is the fastest method of filling knitting and is made on the least complicated machine.

### **Selection of Essential Oil**

#### **Lavendular Oil**

Lavender is particularly rich in aromatic molecules called esters, which are antispasmodic, pacifying and tonic, while other molecules give it its antiviral, bacterial and anti-inflammatory powers. Of the many therapeutic attributes of Lavender oil, respiratory relief would be one of the most consistently reported benefits. A refreshing note to a tired mind – lavender has been named as one of the most useful of the essences for the relief of anxiety and stress. Good for aches and pains and muscle stiffness and may also help with rheumatic discomfort and joint stiffness.

### **Procedure**

The lavendular essential oil was purchased from Nilgiris. The purchased oil was diluted in the ratio of 1:50 before applying to the knitted garment.

### **Selection of Binder**

The binder is a film forming agent made up of long chain macromolecules which when applied to the textile together with the pigments produces a three dimensionally linked network. The binder should be colorless, odorless, evenly thick, smooth and good adhesion. Citric acid is a good cross linking agent or binder in spite of its low cost, widespread availability and ecological acceptability.

### **Microencapsulation**

The fragrance compound and the essential oil are volatile substances. The most difficult task in preparing the fragrance emitting textile is how to prolong its lifetime of Odor. Micro-encapsulation is an effective technique to solve the above said issue. Microcapsules are minute containers that are normally spherical if they enclose a liquid or gas, and roughly of the shape of then closed particle if they contain a solid. It can be considered as a special form of packaging, in that particulate matter can be individually coated for protection against environment and release the volatile substance from the enclosed capsule as required. This property has enabled microcapsules to serve many useful functions and find applications in different fields of technology.

### **Application of Essential Oil on the Fabric**

The diluted essential oil was applied on the knitted material for fragrance finish using following methods.

#### **Pad Dry - Cure Method**

##### **Padding Mangle (PLATE- I)**

Application of finish by padding is more convenient and many of the problems related to exhaust techniques can be avoided primarily in padding stage. In padding technique, the fabric was passed through two iron rollers revolving at different speed in opposite direction. The solutions were prepared based on the recipe and knitted fabric Bamboo/cotton

was finished with the optimized parameters. The extracted solution was poured inside the padding mangle then the fabric is padded and cured inside the dry oven for 15 minutes for good penetration of the finishing agents. Then the fabric was removed from the curing chamber. Finally the fabric was dried in shade.

**Recipe**

- Diluted essential oil - 10% of the fabric weight
- Material liquor ratio - 1:50
- Temperature - Room Temperature
- Wet pickup - 75% of fabric weight
- Duration - 5 minutes

**RESULTS AND DISCUSSIONS**

**Objective Evaluation**

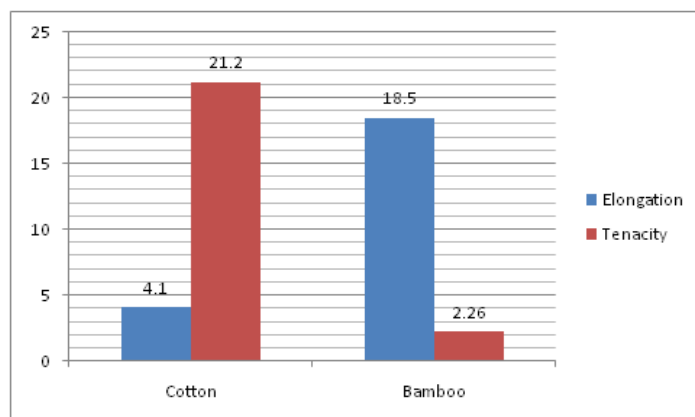
**Physical Properties of the Selected Fibers**

From (Table 1), the following results were obtained for the Elongation and Tenacity properties of the Bamboo and Cotton fibers.

**Table 1: Physical Properties of the Selected Fiber**

S. No	Sample	Elongation%	Tenacity	T- Value
1	Cotton	4.1	21.2	0.02
2	Bamboo	18.5	2.26	

The following results were obtained for the physical properties of the Bamboo and Cotton fibers (Figure 1). The samples Bamboo and Cotton fibers showed different values. Cotton showed higher tenacity when compared to Bamboo fiber. The sample Bamboo showed higher elongation value when compared with cotton.



**Figure 1: Fiber Elongation & Tenacity**

**MECHANICAL PROPERTIES**

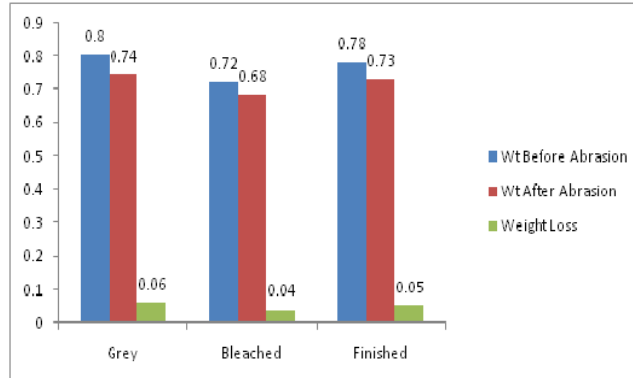
**Abrasion Resistance of the Selected Fabric**

From the (Table 2), the following results of Abrasion Resistance were obtained for grey, bleached and finished samples of Bamboo/Cotton blended fabric.

**Table 2: Abrasion Resistance of the Selected Fabric**

Bamboo/Cotton	Weight Before Abrasion	Weight After Abrasion	Weight Loss
Grey	0.80	0.74	0.06
Bleached	0.72	0.68	0.04
Finished	0.78	0.73	0.05

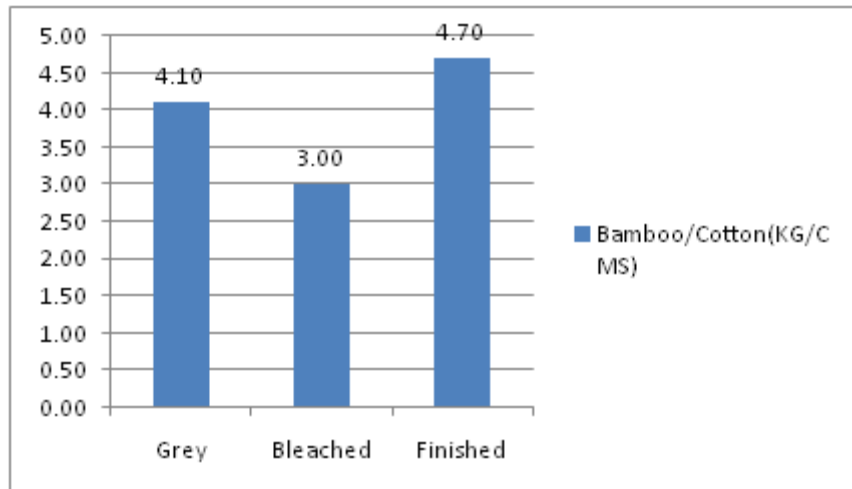
The following results of Abrasion resistance were obtained for grey, bleached and finished samples of Bamboo/Cotton blended fabric (figure 2). The grey sample has greater value when it was compared with bleached fabric.



**Figure 2: Abrasion Resistance of the Selected Fabric**

**Bursting Strength of the Selected Fabric**

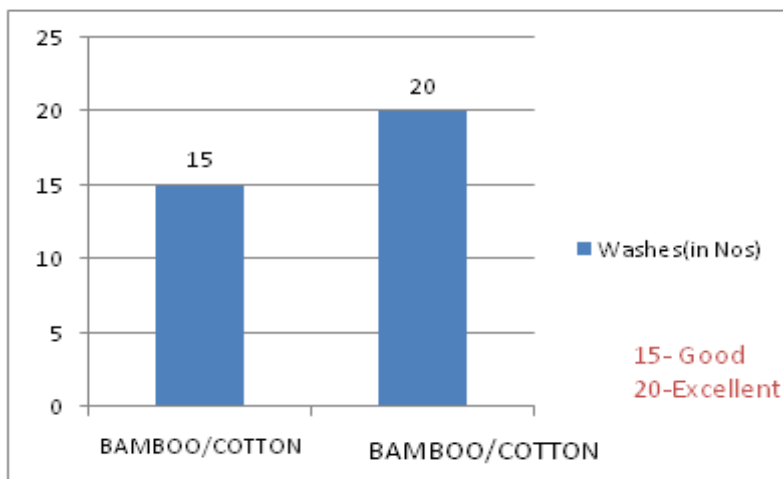
The following results of bursting strength were obtained for grey, bleached and finished samples of Bamboo/Cotton blended fabric. (figure 3). The finished sample bursting strength has greater value when it is compared to grey and bleached fabric.



**Figure 3: Bursting Strength of the Selected Fabric**

**Washing Property of the Selected Fabrics**

The following results were obtained for the performance test of the bamboo/Cotton blended knitted fabrics. After 15 regular washes the fabric fragrance was in a good condition. Even after 20 washes also the fragrance of the fabric was excellent. This shows that the blended Bamboo/Cotton knitted fabric have a good ability to bind with aroma compounds from Lavendular oil and even after repeated washing also the aroma of the fabric remains same with least changes.



**Figure 4: Washing Property of the Selected Fabrics**

## CONCLUSIONS

As there was little data available about the specific nature of skin rashes caused or exacerbated by underwear, this small exploratory study will be valuable in establishing some information, the extent of the problem within certain target and the diverse costs associated with specific conditions. The results from this survey cannot be generalized to the general community but will be representative of the target population i.e., kids. Such kind of research will pay a way for futuristic approach in case of kids knickers.

In padding method, the fragrance lasted comparatively for more number of washes when compared to normally used methods. A little improvement seen in the rating could be due to the use of silicon softener, which is known to the bind the fragrance and reduced its release rate. For the commercial finish, i.e., with microencapsulation technique, the fragrance lasted for even more number of washes than previous methods used normally in this kind of studies. This can be reasoned as that microencapsulation makes the finish particles more securely attached to the internal structure of the fibre and thus released with much slower rate.

## REFERENCES

1. Abhijit Majumdar., Samrat Mukhopadhyay., Ravindra Yadav and Achintya Kumar., Mondal., (2011), "Properties of ring – spun yarns made from cotton and regenerated bamboo fibers", Indian Journal of Fibre & Textile Research, Vol. 36, March, p. 18-23.
2. Alat, D.V and Saraf, N.M., (2005), "Processing of Cotton-Solution Providers-Sarex", Colourage, Vol. LII, November, p.73.
3. Alex Renaud, (2008), "Feenix Gear - Soy as a Textile Fiber", New Green friendly Apparel Journal, August p.46.
4. Ammayappan, L and Jeyakodi moses, J (2007), "Functional for Woolen Textiles", The Indian Textile Journal, October, p.36.
5. Anton Arputharaj, J, 2010, "Eco friendly garment finishes" Trade Literature, fiber2fashion.
6. Benoit Henault and Russ Elms (2001), "New Technologies for fabric care" Giornate CID in Venezia.
7. Chellamani K.P., Debasis Chattopadhyay, M. K. Vittopa, 2006. "Studies on spinning bahaviour, Anti-fungal and thermal properties of Bamboo Fibers" published by the South Indian Textile Research Association in 2006.