Non woven fabric using the combination of Banana fiber, Tulsi extract and Cotton fiber

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Abstract—Banana fibers which are concentrated in the outer surface, are extracted by the process of hand scraping, By using chemically it can be done by retting, or using raspadors. They can also be extracted by boiling leaf sheaths in sodium hydroxide solution. Hand-stripped fibers are generally better quality than obtained by raspador. Cotton fiber is the natural fibers under the genus of Gossypium which *is* made up of cellulose . Many studies have reported on surface modifications of cotton fibers to further enhance their performances, introduce new features, and also to make compatibility with other surfaces. To produce Non-woven fabric for using banana fiber and cotton fiber.

INTRODUCTION

Cotton is the most important natural textile fiber, as well as cellulosic textile fiber in the world.The natural fibers are renewable, non-abrasive ,bio degradable , excellent mechanical properties and are inexpensive.Due to the shortage of cotton fiber we are in the need of natural alternate for cotton fiber.

Most of the properties of banana fiber is prior to cotton fiber. It can be used as a alternative for cotton.Banana fiber is also a cellulosic fiber. these fibers can be obtained easily without additional cost.So the properties of cotton and banana fibers are combined together while blending these two fibers.

OBJECTIVES

- To make the nonwoven fabric with the combination of banana and cotton fibres.
- To compare the properties of cotton and banana fiber (moisture absorption, strength, permeability, softness, tensile behavior, elasticity, comfortable etc).
- To find out the end use of the product with the result of property study.

COTTON

Cotton is the most widely produced natural fiber. Other natural fibers include silk, made from the cocoons of silkworms; wool, made from the fur of sheeps; and linen, made from fibers in the stems of flax plants.

Cotton fibers come from cotton plants.Usually, they grow from the seed coat—the outer layer of the plant's seeds. Before they can be turned into sheets or t-shirts, the cotton seeds must first be separated from the plant, and then the fibers from the seeds. Cotton is a soft, fluffy staple fiber that grows in a protective case, around the seeds of the cotton plants of the genus. The fiber is almost pure cellulose, and can contain minor percentages of waxes, fats, pectins, and water. In natural conditions, the cotton bolls will increase the dispersal of the seeds.

BANANA FIBER

Banana fibers that are concentrated near the outer surface, are extracted by hand scraping, chemically, by retting, by using raspadors. They can also be extracted by boiling leaf sheaths in sodium hydroxide solution. Hand-stripped fibers are generally have better quality than those obtained by raspador. In the monsoon the stalks are usually plentiful. The extraction of the fiber from the stripped leaf sheath are cut to a size of 0.3–0.4 m long and 0.07 m wide.This is done by hand scraping using blunt blades which have 0.15 m long on a soft wooden plank. The pith is then removed continuously until the fibers appear clean. This method of extraction is carried out by artisans in the cottage industry sector. Fiber extraction by machine has not been successful in terms of fiber quality. The fibers extracted from the stems after harvesting the banana fruits are found to be stronger.

During fiber extraction, two or three of the outer sheaths are rejected due to the coarse nature of the fibers . The innermost two or three sheaths are rejected since these contain more pulpy materials which make the good quality fiber.

After extraction the fibers are washed thoroughly and hung up in sunlight to dry when they are stripped. The drying period depends on quality of the pulpy material adhering to the strips. When it is cleaned, about 5 h is required for drying on normal dry day. These fibers are bright in luster and white in color. Insufficient cleaning and washing, and drying cause degradation of the fibers due to chemical and biological action,then they lose strength and luster.. Any delay results in poor fiber quality.

TULSI:

Tulsi (*Ocimum sanctum* Linn) is preeminent, and scientific research is now confirming its beneficial effects. There is mounting evidence that tulsi can address physical, chemical, metabolic and psychological stress through a unique combination of pharmacological actions. Tulsi has been found to protect organs and tissues against chemical stress from industrial pollutants and heavy metals, and physical stress from prolonged physical exertion, ischemia, physical restraint and exposure to cold and excessive noise. Tulsi has also been shown to counter metabolic stress through normalization of blood glucose, blood pressure and lipid levels, and psychological stress through positive effects on memory and cognitive function and through its anxiolytic and anti-depressant properties.

TULSI EXTRACT:

Tulsi extract for the study was obtained by finely powdering the dried leaves. Then the powder was macerated with 100% ethanol followed by filtration. Eighteen grams of tulsi extract (residue 6% w/w) was obtained by dissolving 300 g of tulsi powder in 1 l of ethanol.

NON-WOVEN:

Non-wovens are fabrics that are produced by mechanical, thermal and chemical processes.It is made without being woven and without the need of converting the fibers into yarn, fiber webs are bonded together as a result of the inherent friction from one fiber to another fiber

Innovations in nonwoven fabrics are growing as rapidly as the demand for them, with almost unlimited possibilities for a wide variety of industries which are,

- Agricultural coverings
- Agricultural seed strips
- Apparel linings
- Automotive headliners
- Automotive upholstery
- Carpeting
- Civil engineering fabrics
- Hygiene products

USES OF NON-WOVEN:

- Apparel and clothing
- Medicals
- Personal hygiene products
- Industrial usage
- Home furnishing
- Automotive industry
- Construction fields
- Geotextiles
- Filtration
- Agriculture

EXPERIMENTAL DESIGN:

After the good understanding of the existing research, design the experiments for the further process. The key aspects to consider that includes:

- Combination of Fibers: To decide on the proportions and techniques for combining banana fiber, cotton fiber and Tulsi extract.
- Extraction & Treatment of Banana Fiber: consider how the extract and preparing of the banana fibers for use in the non-woven fabric.
- Tulsi Extract: Decide whether to infuse the fibers with the Tulsi extract or add it to the fabric during the non-woven manufacturing process. Also check how Tulsi extract can enhance the fabric properties (e.g., antimicrobial, odor resistance).
- Fabric Formation: Choose a method for creating non-woven fabric, such as needle punching, hydroentangling or spunbond.
- Fabric Testing: Take tests for the mechanical properties (e.g., tensile strength, elongation),

durability, antimicrobial efficacy (for Tulsi), and environmental impact of the resulting fabric.

EXPERIMENTAL WORK AND DATA COLLECTION

It is necessary to carry out the experimental work based on design, and record data.

- Physical Properties: Strength, flexibility, texture, and other mechanical tests.
- Antimicrobial Tests: Standard antimicrobial tests like the zone of inhibition method to test the effectiveness of Tulsi extract against common pathogens.
- Environmental Impact: Conduct lifecycle analysis to evaluate the sustainability of the fabric compared to conventional textiles.

RESULTS AND DISCUSSION

Analysing the data and comparing the results:

Effectiveness of the Combination:

- To test whether the addition of Tulsi extract provides significant antimicrobial benefits andh how the combination of fibers affects the physical properties

Sustainability:

- Collection of the environmental impact of using Banana fibers, Cotton and Tulsi in textiles.
- To find the fibers is biodegradable or recyclable.

Innovations in Non-Woven Fabrics:

- Examine the work advances the field of non-woven fabrics, particularly in terms of health, sustainability, and functions.

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