JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

DEVELOPMENT OF BIO DEGRADABLE PRODUCT USING NATURAL FIBER WITH SEEDS INFUSED

Righasshini.c[1] Mrs S.Vijayalakshmi[2] M.Sc.,MBA.,T.Kanimozhi[3] M.Sc.,M.Phil.,

1.UG Student, Department of Costume Design and Fashion, Dr.N.G.P Arts and Science College, Coimbatore.

2.Assistant Professor ,Department of Costume Design and Fashion, Dr.N.G.P Arts and Science College, Coimbatore.

3.Scholar,Department of Costume Design and Fashion, PSG Arts and Science College, Coimbatore.

ABSTRACT

This paper is about the fabrication and testing of banana fiber eco-friendly carry bag. Now a day the government banned the plastics bags by 2019. In our project we try to replace carry bag by handmade paper which is made of banana fiber. This will help to keep the environment healthy and pollution free. By implementing our project, we can reduce the usage of the plastics and keep the world away from the plastics. Natural fibre paper bag are best in both cost savings and low in density when compared to glass fibers. They are grown steadily in many applications. A natural fiber is a resource to synthetic fibers, as reinforcement for polymeric materials for the manufacture is very cheap, renewable and environment friendly.

Keywords: *Environment, Eco-friendly, Banana fibre, Handmade paper, paper bag.*

INTRODUCTION:

Even if production techniques have greatly advanced, paper has been created since before 250 BC primarily with natural fibres and with the same operating units. The history of natural fibres is highlighted in this chapter, as well as how they are used to make paper and boards. Below is a basic description of the processes involved in producing pulp and paper. Following a discussion of the key end-use features, two paper analyses are explained to show the connections between end-use characteristics, raw materials, and applied processes [2].

Vegetable, animal, and mineral fibres are the three basic types of natural fibres. Vegetable fibres are mostly formed of cellulose, hemicellulose, and lignin, with the remainder being made up of pectin, water-soluble chemicals, wax, and inorganic and non-flammable materials that are commonly referred to as ash. The most crucial factors that affect a fibers general characteristics are its structure, micro fibrillary angle, cell size, flaws, and

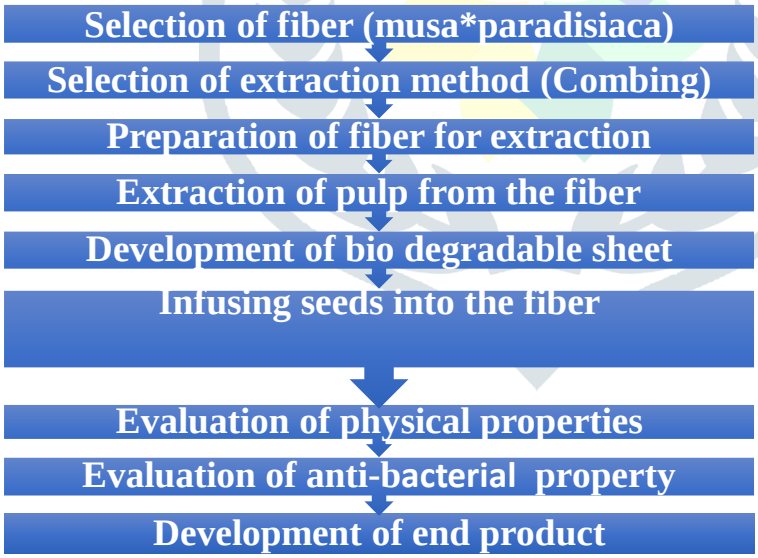
chemical makeup. If the micro fibrils of a plant have a spiral orientation to the fibre axis, the fibre will be very ductile [6]. The structure, micro fibrillary angle, diameters, and chemical makeup of plant fibres are all factors that affect their qualities. These factors include the kind and age of the plant, the type of soil, the environment, the extraction technique, and the plant's size and age.

Ash, cellulose, hemicellulose, lignin, and moisture make up the composition of natural fibres. The cellulose concentration significantly affects the mechanical characteristics of fibre, including tensile strength, Young's modulus, and strain to failure. The most critical natural fibre physical characteristics for creating lightweight composites are density and diameter. Fibber dispersion, fibre matrix compatibility, and reinforcement aspect ratio all play major roles in how well fibre reinforced composites perform mechanically. An essential factor in determining the qualities of polymer composites is the tensile properties of natural fibres, such as tensile strength, modulus, and strain to failure.

OBJECTIVES

- To develop bio-degradable product.
- To choose the natural fibre.
- To examine physical and chemical property of the fibre.
- To develop a bio-degradable bag.

METHODOLOGY



Selection of fiber

Fibrous bananas It is one of the strongest natural fibres and is also referred to as musa fibre. If we anufacture currency notes from this biodegradable natural fibre extracted from the bark of the banana plant, the notes will last for more than a century. Just like it may be used in vehicle tyres, it can be utilised to manufacture saris made of silk. Previously thought of as a complete waste, banana stem is now used to create textile made of banana fibre the has different weights and thicknesses depending on which part of the stem the fibre was extracted from. The softest

fibres are found in the outermost sheaths, whilst the tougher and more durable fibres are found in the interior sheaths. Banana fibre is comparable to natural bamboo fibre in that it is composed of thick-walled cell tissue that is held together by natural gums, although bamboo and ramie fibres have higher fineness and spin ability.

Plate1 musa (banana) fiber

When making handicrafts, quality paper cards, tea bags, string thread, high-quality fabric material, paper for currency notes, and good rope for tying, banana fibres can be used as a natural absorbent, a bio-remediation agent for bacteria in natural water purifiers, and for the production of mushrooms.

Selection of extraction method (combing)

Plate 2 extraction method

Mechanical and automated mechanical extraction techniques are used throughout the banana fibre extraction process. The main stem of the banana plant was first divided into parts, which were then softly rolled to eliminate extra moisture and contaminant

Preparation of fibre for extraction

Plate 3 fibre for extraction

- Cut Fibers into ½ or ¼ Inch.
- Weigh 50g of Fibre and Prepare for Cooking.
- Add 12-15% NaoH Solution.
- Boil the mixture for 1½ Hour.
- Cool for About 1 hour.

- Rinse Cooked Fibre Carefully to Remove Sodium Hydroxide.
- Add About 700ml of Water to Blender.

Extraction of pulp from the fibre

Plate 4 extraction of pulp

- Blend The Fiber Reaches a Pulpy Consistency.
- Pour Pulp Fiber Through a Fine Mesh or Filter.
- Rinse Pulp Thoroughly to Remove Any NaoH Left Over.

Development of bio degradable sheet

- Take a tub having ¾th of water in it and place *musa paradisiaca* pulp mixture on a white cotton cloth . The pulp mixture is strained through the sieve using non -stick spatula and allow water to drain completely. The residue mesh is dried in the shade for two days. The resultant mesh is then subjected for implanting seeds.

Plate 5 bio degradable sheet

Infusing seeds into the fiber

(LYCOPERSICUML., CAPSICUM ANNUUM, HOLY BASIL, BRASSICA NIGRA)

Plate 6 seed infused sheet

Implanting plant seeds into the pulp paper.

Development of end product

Fiber sheet **Stitched bag**

Plate 7 Banana fiber sheet *Plate 8 stitched bag*

RESULTS AND DISCUSSION

ABRASION TESTER – VARIATION BETWEEN BEFORE AND AFTER

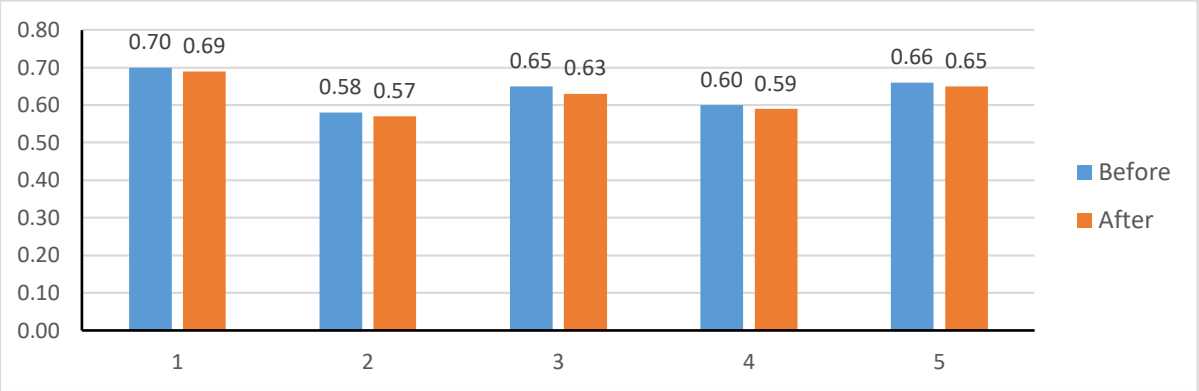
In this table, it can be examined the difference between before values and after values of the abrasion tester.

ABRASION TESTER – VARIATION BETWEEN BEFORE AND AFTER

No.	Before	After	Difference
1	0.70	0.69	0.01
2	0.58	0.57	0.01
3	0.65	0.63	0.02
4	0.60	0.59	0.01
5	0.66	0.65	0.01

From the above table, it is cleared that the difference between before and after abrasion of represented sheet. Before abrasion the highest value of the sheet is 0.70 and lowest value of the sheet is 0.58. After abrasion the highest value is 0.69 and lowest value is 0.57. Mostly difference is same for five samples.

BAR CHART



TEARING STRENGTH

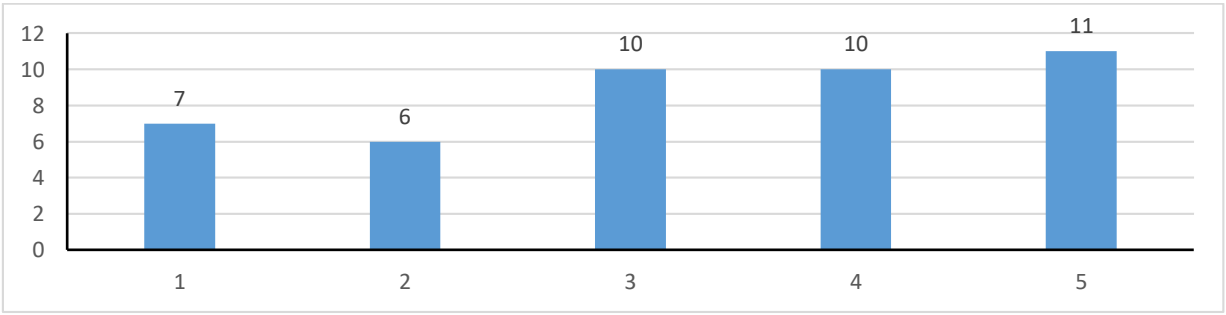
Tearing strength means as the force required to start or to continue to tear a fabric, in either weft or warp direction, under specified conditions. A tear in a fabric or garment generally occurs progressively along a line, and can be initiated by a moving fabric being caught on a sharp object. The following table shows the tearing strength of the given fabric.

TEARING STRENGTH

No.	Tearing Strength (kn/m)
1	7
2	6
3	10
4	10
5	11

From the above table, the highest value of tearing strength is 11 and lowest value of tearing strength is 6. We can find the durability of the paper using the tearing strength. The average value of tearing strength is 8.8Kn/m.

BAR CHART



BURSTING STRENGTH

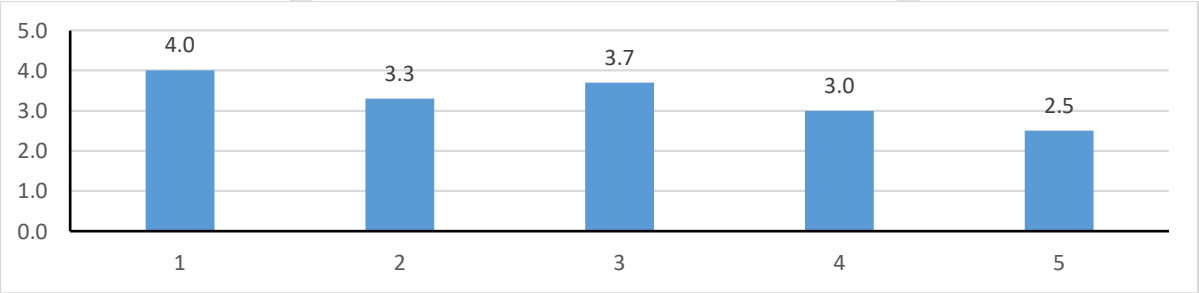
Bursting strength refers to the force required to break the fabric. When force or pressure is vertically applied on fabric it is called bursting. The force needed to rupture the fabric (when applied perpendicularly) is called bursting strength. The following table shows the bursting strength of the given fabric.

BURSTING STRENGTH

No.	Bursting Strength
1	4.0
2	3.3
3	3.7
4	3.0
5	2.5

From the above the table, the highest value of bursting strength is 4.0 and the lowest is 2.5. The average value of bursting strength is 3.3.

BAR CHART



GSM CUTTER

GSM Cutter-1.20g

Plate 9 gsm cutter

ANTI BACTERIAL PROPERTY

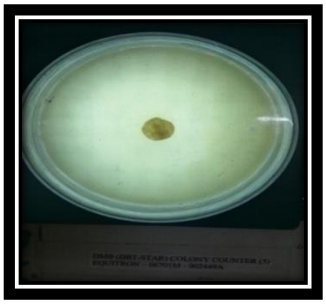


Plate 10 anti-bacterial test

This banana fiber sheet has anti – bacterial property.

CONCLUSION

This research has mainly focussed on to develop bio-degradable products using natural fiber with seeds infused. For this waste banana fibre (WBF) and extracted banana fibre (EBF) have been selected to develop a fabric. Various active alkali was used to pulp EBF and WBF, the abrasion tester, tearing strength and bursting strength have been found and discussed through statistical technique. Through the experimental survey, it is proved that banana fibre is a sustainable product that can be easily marketed among the consumers.

ANNEXURE

Plate 6 annexure of the product

BIBLOGRAPH

1)Madhukiran.J, Dr.S.SrinivasaRao, Madhusudan.S , Fabrication and Testing of Natural Fiber Reinforced Hybrid Composites Banana , International Journal of Modern Engineering Research (IJMER) (2013) .
2) M.A.Maleque , F.Y.Belal , Mechanical properties study of pseudo-stem banana fiber reinforced epoxy composite , The Arabian Journal for Science and Engineering(2006).
3) Idiris Mehamud, Jegan Raj, Cheru Zeleke and Thomas Gebre, Fabrication and Mechanical Property Evaluation of Ethiopia Banana Fiber Reinforced Polymer Composites, Advances in Research 7(5): 1-10, 2016, Article no.AIR.26991.
4) Japan Echo Inc. 2005. Banana Stem Become Denim-like Cloth. Domestic Japanese News Source. 1-6. DOI= http://web-japan.org/trends/science/sci040105.html
5) Johnston, T. 2003. Banana Paper. The Buzz. Transform Australia. 1-4.DOI=http://ingentaconnection.com/content/oup/exbotj/2002/00000053/00000375/art01771Banana Paper.

6) https://doi.org/10.1177/0731684412473005

7) https://doi.org/10.1016/j.compositesb.2019.03.071

8)https://doi.org/10.3390/agronomy11020242