International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 09 Issue: 02 | Feb 2022 www.irjet.net p-ISSN: 2395-0072

THE VARIOUS PROPERTIES AND USES OF BANANA FIBRE IN HOME TEXTILE

Pavithra Shen G T[1*], Bhaarathi Dhurai[2]

[1]M.Tech Scholar, Department of Fashion Technology, Coimbatore
[2]Professor, Department of Fashion Technology, Coimbatore

Abstract - *Clothing is the foremost essential to live in this world for human. But, the synthetic fibers which we are using for most of the apparels are polluting the environment in many ways by polluting the Air, Affecting the ecology etc. But at the same time we are in the situation to save our planet 'THE EARTH'. For this case, the whole world is running beyond sustainable and eco-friendly fashion.Even the customers are also more sustainable conscious now a day. Hence, sustainable product has a big demand in market. So, this paper discusses the various properties and uses of banana in home textile.*

***Key Words*: banana fibres, cellulosic, banana pseudo-stem, biodegradable, Agro-based fibers**

1. INTRODUCTION

Natural fibres are becoming more useful on a worldwide scale as people become more concerned about the environment. Synthetic fibres made from petroleum-based compounds have been shown to be toxic, non-biodegradable, and energy-intensive. Natural fibres are increasingly used in composites due to their inexpensive cost and outstanding mechanical qualities. These are promising prospects for the development of agro-based fibres. Banana fibres have a great potential as a natural fibre among the available agro-based, natural cellulosic fibres. Its long-term viability is clear, and it offers untapped potential in the textile industry. [2]There are numerous options in India for extracting fibres from banana stems.In south India, banana fibre is used in several cottage businesses to make handmade goods. Because it is a food fruit crop, the banana is aptly termed kalpatharu, and all plant components may be utilised for a variety of purposes. This ancient species is grown all over the world and is mostly used as a citrus fruit replacement. Around a fifth of the world's bananas are produced in India.[5] After harvesting the banana crop, the stem, which can contain fibres, is discarded as garbage. For farmers, disposing of banana pseudostem is a serious issue. The majority of them are squandered due to a lack of understanding of their applications. The application potential of banana pseudostem fibre has yet to be fully realised, despite the fact that it is abundant. [1]

2. PRODUCTION OF BANANA FIBER

The banana plant's pseudo-stem fibre is comparable to pineapple leaves, sisal, and other stiff fibres, although it is somewhat more elastic. Banana pseudo-stem fibre is mostly used to make specialised and high-quality sanitary items like as baby pampers, linens, and banknotes. Because the banana pseudo-stem fibre is resistant to seawater and possesses buoyant qualities, it may be used to make ropes like marine rope. Other uses for this fibre include coffee and tea bags, filter cloths, plaster reinforcing fibres, disposable textiles, and light-density woven fabrics. Global Abaca (Musa textiles) fibre output is estimated to be over 100,000 tonnes per year, according to the literature. The production in 1960 was likewise close to this number (i.e., 97,000 tonnes per year), whereas the production of Abaca in 2002 was around 99,320 tonnes per year. Figure 1 depicts the percentage of banana output worldwide in 2010.[5]

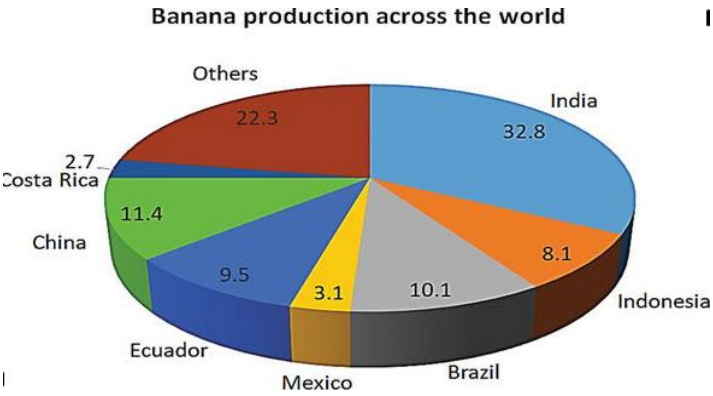

Fig -1: Percentage of banana production over world [6]

3. EXTRACTION OF BANANA FIBRE

A decorticator machine can remove fibres from banana pseudo-stem leaves. It's a machine that removes bark, skin, wood, stalks, and grain from trees. As soon as the pseudo-leaves stem's are cut, the extraction procedure begins. Water retting and scraping are the most typical methods used in practise. The first stage, known as tuxing, is to separate the fibre bundles from the rest of the material. Tuxing can be done manually or with the use of a machine.[7] The leaves of the chopped pseudo-stems are removed. The outer layer of the leaf shaft is then firmly grabbed and pushed out with a knife placed between the outer and middle layers of the leaf shaft at the butt end. The fibre bundles formed by this tuxing process are around 5–8 cm wide, which is the same as the length of the leaf. The gum or non-fibrous and any leftover components present in the fibres are removed in the second step after the tuxing process. [8] After that, the fibres are washed and dried thoroughly. These procedures necessitate a great deal of patience and skill. In the banana pseudo-stem,

there are only 11 external leaf sheaths that can be removed for fibres. Because of their brittleness and weak strength, the fibres inside the internal sheaths are difficult to peel.[9]

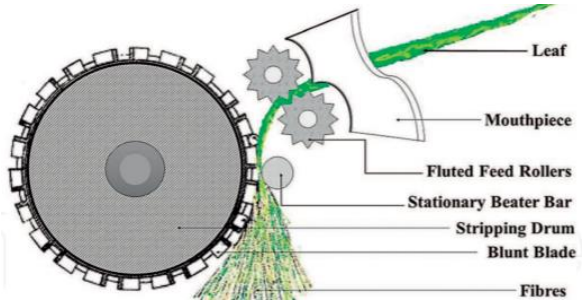

Fig -2: Machine for Pseudo stem extraction[5]

4. CHARACTERISTICS OF BANANA FIBER

- Banana fibre has a similar appearance to bamboo and ramie fibre, but its fineness and spinnability are superior to the two.
- cellulose, hemicellulose, and lignin are the chemical components of banana fibre.
- It's a really tough fibre.
- Its elongation is shorter.
- It has a relatively lustrous appearance due to the extraction and spinning processes.
- It's not too heavy.
- It has a high capacity for absorbing moisture.
- It quickly absorbs and releases moisture.
- It degrades naturally.
- It has no harmful effects on the environment and is thus classified as an environmentally friendly fibre.
- It has a fineness of 2400Nm on average.
- It can be spun in a circle using practically any method, including ring spinning, open-end spinning, bast fibre spinning, and semi-worsted spinning, among others.[3]

5. APPPLICATION OF BANANA FIBRE

As previously stated, once the banana fruit harvesting season is through, banana pseudo-stems typically become biomass trash. Due to the volume of waste, disposal has become a big issue. As a result, researchers have begun to separate the stem's fibres and other components and use them to create a variety of value-added goods. Rope and cordage are two of the most frequent banana pseudo stem fibre products made today. [7] The saltwater resistance and natural buoyancy of the pseudo-stem fibre have generated a market for it in the shipping cable business. This fibre is used to make fishing nets, different forms of cordage, mats, packaging, sheets, and other goods. Figure 3 depicts some banana pseudo-stem fiber-based value-added products. Banana pseudo-stem fibre was also used to manufacture traditional Japanese clothes such as kimono and kamishimo during the Edo era (1600–1868). Because of its light weight and comfort, this fibre is commonly used. In addition, banana pseudo-stem fibre is used to make pillow covers, bags, tablecloths, and curtains, among other things.[2]

Banana fibres may also be used as a natural absorbent, in mushroom production, arts and crafts, string thread, paper cardboard, tea bag and high-quality textiles/fabric materials, currency note paper, and a number of other things. Banana fibre has the ability to absorb oil spills when used as a natural absorbent in oil refineries. It may also be used to absorb coloured effluent from dyeing processes in the textile sector. Proteins involved in pathogenesis have been discovered in bananas and banana pseudo-stems. It also has a high level of cellulose and starch, making it appropriate for use as cow feed. In addition, banana pseudo-stem fibre has been employed in the creation of polymer/fiber composites in a number of research projects. [10]

6. CONCLUSION

Banana plants are frequently recognised as one of the world's most valuable plants. The fruit, peel, leaf, pseudo-stem, stalk, and inflorescence are just a few of the plant's parts that may be used. The banana fruit is a valued commodity and one of the most widely consumed fruits on the planet. However, once the banana fruit harvesting season is over, banana pseudo-stems are normally discarded as biomass waste. As a result, researchers have begun to separate the stem's fibres and other components and use them to create a variety of value-added goods. A decorticator machine can separate the fibres from the banana pseudo-stem. The fibres will be retted and degummed in the following phases. Banana pseudo-stem fibres can be used to make rope, cordage, fishing nets, mats, packaging material, paper sheets, textile fabrics, bags, tablecloths, handicrafts, absorbent, polymer/fiber composites, and other value-added commodities. Other components produced by the banana pseudo-stem can also be used. Pickles, sweets, and soft drinks may be made from the centre core, while the BPS (banana pseudo-stem sap) can be used as a mordant and organic liquid fertiliser, and the scutcher can be used to generate compost and vermi-compost.

REFERENCES

[1] K. Sangamithirai* and N. Vasugi Banana fibre – A potential source of sustainable textiles 22(2): 133-136, 2020

[2] Mohapatra D, Mishra S, Sutar N. Banana and its by-product utilisation: An overview. Journal of Scientific & Industrial Research. 2010;69:323-329

[3] N.Tondonsana Singh,Satwika Das Fabrication of blanket using eco-friendly banana fiber 2018 JETIR December 2018, Volume 5, Issue 12

[4] Bello K, Sarojini BK, Narayana B, Rao A. A study on adsorption behavior of newly synthesized banana

pseudostem derived superabsorbent hydrogels for cationic and anionic dye removal from effluents. Carbohydrate Polymers. 2018;181:605-615

[5] Banana Pseudo-Stem Fiber: Preparation, Characteristics, and Applications AsmantoSubagyo and AchmadChafidz November 28th 2018

[6] Ray D, Nayak L, Ammayappan L, Shambhu V, Nag D. Energy conservation drives for efficient extraction and utilization of banana fibre. International Journal of Emerging Technology and Advanced Engineering. 2013;3:296-310

[7] Pappu A, Patil V, Jain S, Mahindrakar A, Haque R, Thakur VK. Advances in industrial prospective of cellulosic macromolecules enriched banana biofibre resources: A review.International Journal of Biological Macromolecules. 2015;79:449-458

[8] Franck RR. 8—Abaca. In: Franck RE, editor. Bast and Other Plant Fibres. United Kingdom: Woodhead Publishing; 2005. pp. 315-321

[9] Jayaprabha JS, Brahmakumar M, Manilal VB. Banana pseudostem characterization and its fiber property evaluation on physical and bioextraction. Journal of Natural Fibers. 2011;8:149-160

[10] Basak S, Saxena S, Chattopadhyay S, Narkar R, Mahangade R. Banana pseudostem sap: A waste plant resource for making thermally stable cellulosic substrate. Journal of Industrial Textiles. 2016;46:1003-1023