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Banana Fiber - A Boon to Indian Textile

Tanvi Kumari[1], Prof. Divya Rani Singh[2], Prof. Sangita Deodiya[3]

1. Research Scholar, Department of Home Science, DDU Gorakhpur University, Gorakhpur UP
2. **Corresponding Author**- Professor & Head, Department of Home Science, DDU Gorakhpur University, Gorakhpur, UP
3. Professor & Head, Department of Home Science, Vasant Kanya Mahavidyalaya, Kamachha Varanasi UP.

Abstract:

The present paper is aimed to design and explain the qualities and fabrication of banana fiber. Banana fiber is extracted from banana pseudo stem. It has good mechanical properties, So best quality fabric is produced with this fiber. This paper is discussed about the processing and preparation of banana fiber.

Introduction:

Now a days demand of sustainable, biodegradable alternatives is rising. People are more aware and conscious about their purchasing and consuming and its impact on nature. The Indian textile industries too are adopting these changes and also looking for alternatives to waste -producing , nonrenewable materials. So the banana fiber is the sustainable alternatives in Indian textile industry (press reader 2018).

Banana fiber, ligno cellulosic fiber is obtained from pseudo stem. Banana plant (Musa sapient) is a bast fiber with relatively good mechanical properties. The properties of banana fiber are good absorbent, highly breathable, quickly dry with high tensile strength (Pitimaneeyakul 2010). So it will be very advantageous to investigate the potential of this grown up plant as the fiber source. Textile production has been developing to increase efficiency to serve consumer's need. Utilizing banana fiber will promote sustainable development in the community (Hossain et. al. 2017).

Banana fiber is not limited to textiles only, it also have great potential for paper making and special demand of handmade papers (Bhatnagar 2015). Banana fiber is also useful to make grease proof paper when blended with 20% bamboo pulp due to its good physical strength, higher pentosan gums and mucilage content (Goswami et. al. 2008)

Information about banana fiber:

Banana fiber is biodegradable and there is no negative effect to the environment. Banana fiber is eco-friendly, chemical free, non-toxic and odor free and is a good alternative to all the synthetic and natural fiber. The natural coolent and medicinal property of banana fibers helps in the health of their user and is 100% safe as no harmful chemicals and colours are used (Avneet 2015). Banana fiber is a waste product of banana cultivation and either not properly utilized or partially done so (Bhatnagar 2015). Banana fiber is a long perennial herb with leaf sheath that form pseudo stem about 10 -40 feet surrounding with 8 to 12 large

leaves (PTRI 2005). Banana fiber is biodegradable and there is no negative effect to the environment. So it is important to extract these impurities for making yarn.

Retting of the Banana Fiber:

Retting process is done for separating fiber from stem. Stem sheaths dimensions of approximately 30.5 cm length, 8 cm width and 1 cm thickness were used. About 3 kg of sheaths were soaked in 20 lt. distilled water whilst ensuring their complete immersion (Brindha 2017). The number of days required for retting depends on water temperature, locality, time of year, whether condition, depth and source of water, thickness of stalks and quantity of straw in relation to volume of water. During retting, the stems are monitoring to avoid excessive degradation of the fiber material (Ebisiki et.al 2013).

Since retting process is basically a microorganism process, several factors such as : microbiological agents (bacteria or fungi), nature of retting water, aeration and macro nutrients. the factor like temperature, length of retting time type of chemical additives (eg. Magnesium oxide) and pure culture of microorganism such pactin – decomposing bacteria in the retting liquor can reduce the retting time approximately 78% (Subagyo 2018).

Extraction of Banana fiber:

Banana fiber is a psuedostem fiber, so it is important to remove fiber from the stem (subagyo 2018). Banana fiber extractor machine can be procured extraction of banana fiber which can be easily operated by an any labour and gives maximum output. The fiber form psuedostem of various variety were extracted using the decorticating machine (Brindha et. al. 2012). Psuedostem has to be cut into 4- 5 inches breadth having length of 7 – 8 feet. The cut pseudo stems should be used within 48 hours after cutting and the cut open sheath have to be processed on the same day. The cut psuedostem are divided into the pieces and inserted into the machine for fiber extraction. Once the fiber is extracted it need to be washed thoroughly with clean water to remove the dirt and piece of psuedostem (Rhesto et. al. 2016).

Properties of Banana Fiber:

The properties of banana fibers are good absorbent, highly breathable, quickly dry with high tensile strength (Hossain et. al. 2017). The physical properties of banana fiber are dia is 80 – 250 μm, length 1000 – 5000 mm., 60% moisture content available in this fiber. Tensile strength of the fiber is 392 – 677 MPa., 60 – 65% cellulose, 6 – 19% hemicelluloses, 5 – 10% lignin, 3 – 5% pectin is also available in this fiber and the machenical properties of banana fiber are tensile strength 529 – 914 Mpa, young's modulus 27 – 32 Gpa, failure strain 1 – 3%, density 950 – 750 kg/m3(Bhatnagar 2015).

Formation of yarn (Spinning):

The term 'spinning' can be referred to the whole activity or just to the final process of making the yarn from fibers. This involves stretching the yarn to the required tex giving the thread strength by adding a twist and winding to on a bobbin (textile school 2018). Raw banana fiber was cleaned. The lint fiber was blend with cotton in the carding process followed by producing sliver by using miniature carding machine (Hussain 2017) the process step of fiber blending, lap production, carding, drawing, rove – preparation and spinning were controlled to result in blending yarn (prakash et. al.2011).

Banana fiber is spinnable and yarn can be produced with it. It also can be blend with other fiber like cotton, silk, wool or polyester. In all blends, banana and wool fiber blend is the most suitable blend for industrial scale (Ortega 2016)

Formation of fabric (weaving):

The inner layer of banana fiber is as soft as silk and the weaved fabric is highly temperamental and delicate. It can be used as the best alternative for any fabric or garment prepared by silk (sewport 2021). Basically good quality banana blended fabric can be woven. The fabric shows good strength values and also property wise these fabrics can be used as garments and upholstery (vandana 2010). Blending of banana fiber and viscose is excellent to prepared yarns and weaved fabric. The quality was enhanced like improved in moisture regain, air permeability quality (Liangping 2011). So the enhanced quality fabric is made with banana fiber and its blends. These fabrics are eco-friendly and biodegradable. Many fashion designers and clothing lines are making use of banana fabric in their upcoming projects (article textile value chain 2021).

Conclusion:

Now a days, banana fiber is being used in making clothes accessories furnishing etc. people are being aware about natural things and also aware about properties of banana fiber and fabric. Many researches have been done on banana fiber and many are under process. So we can say that banana fiber is the growing demand of todays.

Earlier banana was used only as a fruit and rest of the plant was waste but now banana fiber is extracted from its stem and it is used in paper making fabric making and accessories making (bag, footwear etc.). These products are soft, breathable and natural sorbent. They have their natural shine often compare to silk. Blending of this fiber is shown a boon textile. Banana fiber have potential to make a resurgence within fashion industries because banana fiber is sustainable alternative for these who is searching or eco-friendly and unique material.

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