Development Of Banana Hypoallergenic Sweat Pads

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***Abstract*—Banana hypoallergenic sweat pads are designed to manage sweat, decreasing the risk of allergic reactions, skin -friendly exposure pads. Made from natural banana fibre or bananas-rich materials, these pads offer a permanent and biodegradable option for traditional sweat pads. Banana hypoallergenic sweat pad properties make them ideal for individuals with sensitive skin, reduce irritation and discomfort. The moisture and antibacterial nature of banana fibre enhances comfort and hygiene, making them a suitable option for daily use. Ideal for biodegradable, antibacterial, and sensitive skin, offering a natural, environmentally friendly option for traditional sweat pads. These hypoallergenic sweat pads are innovative, environmentally friendly solutions designed to manage sweat while becoming soft on sensitive skin. Made from natural banana fibre, these pads offer excellent exploitative, moisture-diking and antibacterial properties, which reduces irritation and discomfort. Unlike traditional sweat pads, which may have synthetic materials or allergies, bananas fibre pads are biodegradable, breath and durable. Banana hypoallergenic nature makes them ideal for individuals for skin reactions. Sweat pads help prevent sweat stains, ensuring freshness and confidence throughout the day, promoting environmental stability. Sweating is a natural physical function, but excessive moisture can cause discomfort, skin irritation and allergic reactions, especially for individuals with sensitive skin. Banana hypoallergenic sweat pad is an innovative solution designed to provide better sweating absorption, ensuring skin-friendship and stability. Banana fibre, a naturally moisture and biodegradable material, banana hypoallergenic nature makes them ideal for individuals prone to skin reactions. This sustainable material not only enhances comfort but also supports ethical manufacturing practices. As more consumers seek eco-friendly alternatives, products like these are set to revolutionize the textile industry. This research highlights the benefits of banana fibber in individual hygiene products, emphasizing its efficiency, comfort, and ecological benefits over synthetic options. Banana hypoallergenic sweat pad represents a step towards durable and skin-friendly hygiene solutions, catering to increasing demand for biodegradable and allergen-free individual care products.**

***IndexTerms*—Moisture-wicking, Breathable, Antibacterial, Eco-friendly, Skin-friendly, Sustainable.**

I. INTRODUCTION

Sweat management is an essential aspect of personal hygiene, particularly for individuals with sensitive skin who are prone to irritation from conventional sweat-absorbing products. Traditional sweat pads often contain synthetic materials, chemicals, or adhesives that may cause allergic reactions, discomfort, or environmental concerns. To address these issues, banana hypoallergenic sweat pads have emerged as a natural, skin-friendly, and eco-conscious alternative.

Derived from banana fibers, these pads offer superior absorbency, breathability, and antibacterial properties while remaining gentle on the skin. Their hypoallergenic nature makes them particularly beneficial for individuals with allergies or sensitivities, providing effective sweat absorption without irritation. The Hypoallergenic Sweat Pad is an innovative solution designed for individuals with sensitive skin, offering superior sweat absorption without irritation. Utilizing banana fiber technology, it provides a natural, breathable, and moisture-wicking alternative to traditional synthetic materials. Its hypoallergenic composition ensures a skin-friendly experience, free from harsh chemicals, while its biodegradable nature makes it an eco-conscious choice. With a soft, flexible design that conforms to body movements, this sweat pad delivers both comfort and effectiveness, making it an ideal option for those seeking a sustainable and irritation-free solution to excessive sweating. Excessive sweating can be

uncomfortable and may cause skin irritation, especially for individuals with sensitive skin. Traditional sweat pads often contain synthetic materials that may lead to allergic reactions. The Banana Hypoallergenic Sweat Pad offers an innovative solution, utilizing banana fiber technology for enhanced sweat absorption and skin friendliness.

II. OBJECTIVES

- To develop a sweat pad using Aparajita, banana fiber, cotton fiber, bamboo fabric.
- To collect the raw material for the development of banana hypoallergenic sweat pad.
- To arrange all the materials in order for finishing.
- To Protect clothing from visible sweat marks.

To test the developed sweat pad for absorbency, PH properties.

III. REVIEW OF LITERATURE

Selection of herbs and fiber:

HERBS USED

- Bamboo fabric
- Banana fiber
- Cotton fiber
- Aparajita essence

MANUFACTURING PROCESS:

SELECTION OF FABRIC:

BAMBOO FABRIC:

In the current landscape marked by increasing environmental awareness, bamboo has emerged as a pivotal player in the fashion sector, providing a sustainable option for consumers. This rapidly renewable resource is primarily cultivated in regions such as China, India, Indonesia, and Vietnam, which together account for a significant portion of the world's bamboo production. India, with its rich bamboo resources and favorable climate, is well-positioned to make considerable strides in both bamboo cultivation and processing. Beyond fashion, bamboo is making waves in the medical textiles arena, where it offers exceptional comfort and effective infection control. Its soft texture and hypoallergenic nature make it suitable for individuals with sensitive skin, while its natural antimicrobial properties help prevent bacterial growth. The breathability and moisture-wicking characteristics of bamboo fabric enhance patient comfort and minimize the likelihood of skin irritations

PHYSICAL PROPERTIES

1. Softness: Bamboo fabric is remarkably soft, breathable, and gentle against the skin
2. Lightweight: The lightweight nature of bamboo fabric makes it perfect for comfortable clothing that allows for easy movement.
3. Moisture-wicking: Bamboo fabric effectively wicks moisture away from the skin, facilitating
Quick evaporation of sweat.

CHEMICAL PROPERTIES

1. PH Balance: The natural pH balance of bamboo fabric makes it an excellent choice for
individuals with sensitive skin.
2. Antibacterial Properties: Bamboo fabric possesses inherent antibacterial qualities that inhibit
Bacterial growth and help prevent unpleasant Odors.
3. Allergy-Friendly: This fabric is designed to be allergy-friendly, lowering the risk of allergic
reactions and skin irritation.

MECHANICAL PROPERTIES:

1. Tensile Strength: Bamboo fabric demonstrates significant tensile strength, which enhances its resistance to stretching and tearing.
2. Elongation: It possesses moderate elongation characteristics, enabling it to stretch and revert to its original form without any distortion.
3. Abrasion Resistance: Renowned for its superior abrasion resistance, bamboo fabric plays a crucial role in ensuring durability and longevity.

SELECTION OF FIBER:

BANANA FIBER:

Banana fiber is one of the most versatile natural fibers extracted from the stem of the banana plant. This eco-friendly raw material has gained immense importance in the global market because of its inherent characteristics, especially the sustainable method by which it is produced and its varied applications. The present article deals with the attributes of banana fiber, its methods of production, and its wide applications for a better and greener future.

Banana fiber is a very versatile and sustainable material, and the stems of the banana plant portray unique properties that correspond with an eco-friendly process of production. Because it respects its rich history of conventional uses among diverse cultures, banana fiber can presently vie with the more

established textile and non-textile purposes of such fibers.

Banana fiber comes from the stem of the banana plant. This renewable and abundant resource does not require extra land or water; in fact, it even competes with the fruit for water while it is growing. The environmental impact of producing banana fiber is a lot less than a traditional fiber dress would be—cotton or polyester. So you can strut your stuff in that banana fiber dress knowing you're making a stylishly sustainable choice.

Advantages of Blended Raw Materials:

1) Durability & Strength: Banana fiber enhances fabric strength, making blends more long-lasting.
2) Eco-Friendly & Sustainable: Cotton and banana fibers are biodegradable, reducing environmental impact.
3) Comfort & Breathability: Cotton-banana blends provide moisture absorption and skin-friendly properties.
4) Antimicrobial Benefits: Aparajita-based dyes replace synthetic chemicals, while banana fiber prevents odor and infections.
5) Cost-Effective: Used in textiles, hygiene products, and eco-friendly packaging, reducing waste and production costs.

COTTON FIBER:

Cotton is a fluffy fiber that grows in a protective case in cotton plants that are shrubs native to tropical and subtropical regions of the world, including the Americas, Africa, Egypt, and India. The fiber is almost pure cellulose. The main objective of the study was to develop functional products using herbal finished cotton fabric. The cotton fabric was finished with medicinal property containing plant source viz. name (Azadirachta indicia) leaves extract. The herbal extract was applied to cotton fabric through pad-dry-cure technique using citric acid as cross-linking agent. The cotton fabric finished with herbal name extract was assessed for antimicrobial efficacy and 7 percent name leaves extract showed 70.01 and 50.50 percent inhibition for S. aurous and Recoil, respectively. Nine products viz. diaper, baby night wear, bib, mittens, apron, mask, baby sheet, baby feeder cover and kitchen napkin were developed using the herbal finished cotton fabric. The developed products were found acceptable amongst the consumers indicated by the average weighted mean score of all the ranging. Cotton is a soft, fluffy staple fiber that grows around the seeds of cotton plants in the mallow family Malvaceae. It is almost pure cellulose and is known for being soft, breathable, and highly absorbent. Cotton is widely used in textiles and clothing due to its strength, durability, and relatively low cost. Cotton, seed-hair fiber of several species of plants of the genus Gossipiyum, belonging to the hibiscus, or mallow, family (Malvaceae).Cotton, one of the world's leading agricultural crops, is plentiful and economically produced, making cotton products relatively inexpensive. The fibers can be made into a wide variety of fabrics ranging from lightweight voiles and laces to heavy sailcloth's and thick-piled velveteen's, suitable for a great variety of wearing apparel, home furnishings, and industrial uses. Cotton fabrics can be extremely durable and resistant to abrasion.

PROPERTIES OF COTTON FIBER:

- Cotton is sustainable, renewable, and biodegradable.
- It is eco-friendly fiber.
- It Absorbs water and breathable material.

Plate.No.1 Blended Fibers

APARAJITA :(Clitoria ternatea)

Aparajita (Clitoria ternatea) is a highly valued plant in various countries for its medicinal, culinary, and agricultural benefits. It is widely used in India, Sri Lanka, and China for Ayurvedic and traditional medicine, helping with brain function, stress relief, and immunity. In Thailand, Indonesia, and Malaysia, it is popular for making Butterfly Pea Flower tea, which is rich in antioxidants and used as a natural food dye. Countries like the Philippines, Australia, and the

USA recognize its growing importance in herbal wellness, skincare, and organic health products. Due to its numerous health benefits, Aparajita is increasingly gaining global recognition in the holistic and natural health industries.

Aparajita, Native to Southeast Asia, including India and the Philippines, has a deep historical and botanical significance. Aparajita has been cherished in India for centuries, especially in Ayurveda and traditional medicine. The plant's blue flowers, which resemble the shape of female genitalia, are thought to symbolize female fertility and vitality.

Plate No.2 Aparajita

PREPARATION PROCESS:

PREPARATION OF OIL INFUSION:

Plate No.2 Aparajita Essence

1. To initiate the process, gather 50ml of aparajita essential oil, along with banana cotton blended fiber.

2 In a suitable vessel, combine the Aparajita essential oil with the bamboo fabric.

3. Heat this combination to a temperature of 60°C for two minutes to aid in the infusion into the oil.

4, Afterward, let the mixture sit for 8 to 9 hours. So, the oil will observer the properties of herbs by dissolving into the oil completely.

5. Finally, strain the oil through a whit

BAMBOO FABRIC

COTTON AND BANANA BLENDED FIBER

PREPARATION OF FIBRES AND FABRIC

1. After strain the oil soak the fabric into the fabric and allow the fabric to absorb the oil for
24-48 hours.

2. After the fabric absorb the oil, remove the fabric from the oil extraction vessel and remove
the excess oil from the fabric by drying the fabric at room temperature for 24-48 hours.

3. Spray the oil solution into the banana cotton blended fibers and dry the fibers at room temperature for 24-48 hours.

IV. MANUFACTURING PROCESS

PATTERN MAKING AND CUTTING

Plate.No.03 bamboo sweat pad cutting

1. To create a pattern for a sweat pad, begin by deciding on the desired dimensions. A typical sweat pad measures approximately 6 to 8 inches in width and 5 to 6 inches in height.

2. Next, sketch a rectangle on paper or cardboard that reflects these width and height measurements, ensuring to include a 1/4-inch seam allowance around the perimeter. This piece will be designated as the "Under Arm" of the sweat pad.

3. For the blend needle punching component, draw a long, narrow rectangle measuring 1 to 2 inches in width and 13 to 16 inches in length, again incorporating a 1/4-inch seam Allowance.

4. Additionally, mark notches on the pattern pieces to indicate where the needle punched will be placed, and include markings for the center front and center back of the Sweat pad

5. After finalizing the pattern pieces, carefully cut them out using scissors. Position the pattern pieces on your chosen fabric and cut the fabric accordingly, ensuring to maintain the seam allowance.

6. Utilize these fabric pieces to assemble the sweat pad, adhering to the pattern and markings for guidance.

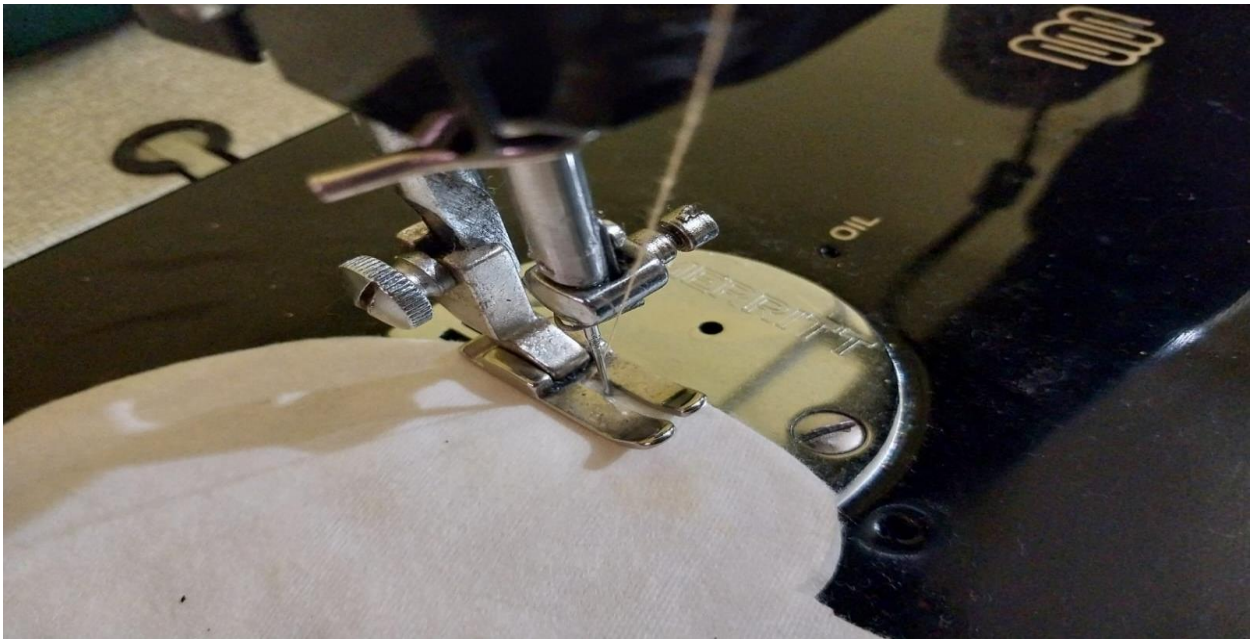

Plate.No.04 sweat pad sewing

SEWING THE SWEAT PAD

1. Begin by placing the two fabric pieces together with the right sides facing inward, securing them with pins along the edges while leaving a small opening for turning the sweat pad right side out. Sew along the edges using a 1/4-inch seam allowance, making sure to backstitch

at both the beginning and end of your stitching.
2. Once you have sewn the main body, carefully turn it right side out through the opening and
press the edges with an iron for a polished look. For the blended fibers, fold the fabric in
half lengthwise with the right sides together and sew along the edge with a 1/4-inch seam
allowance. After sewing, turn the right side out and press it flat.
3. To attach the strap to the sweat pad, fold the raw edges of the inward by about 1/4 inch,
then fold it again by the same amount. Pin the sweat pad, positioning it
approximately 1 inch from the top edge, and secure it with either a whipstitch or a straight
Stitch, ensuring that you sew through both the sweat pad and the strap. Finally, close the
small opening with a whipstitch or a blind stitch to complete your sweat pad.

TESTING AND RESULT

SKIN IRRITATION TEST

ISO 10993-10 is an internationally acknowledged standard that assesses the potential of medical devices to cause skin irritation and sensitization. This standard includes both in vitro and in vivo testing approaches.
In vitro testing focuses on detecting chemical interactions or cellular reactions to different substances, acting as initial screening methods before animal testing is performed. Conversely, in vivo testing entails the direct application of the test sample or its extract on animals, with traditional methods frequently employing small animals like rabbits. Recently, there has been a regulatory shift favoring the use of reconstructed human epidermis (RhE) testing methods as the preferred strategy. The materials evaluated in these tests encompass textiles or plastic components of the medical device, the device itself, and extracts obtained from the device.
RESULT: While testing the sample according to this standard procedure, there is no itching and irritation found in the sample.

PATCH TEST

The sweat pad patch test is conducted in accordance with IS 4011, aimed at assessing the risk of skin irritation and sensitivity linked to the materials utilized in sweat pads. This procedure entails applying a small sample of the sweat pad material onto the skin of human subjects, usually on the forearm or back, and securing it with hypoallergenic tape. The patch is kept in place for a specified period, typically ranging from 48 to 72 hours, after which it is removed. Upon removal, the skin is inspected for any indications of irritation, such as redness, itching, and inflammation, at intervals of 24, 48, and 72 hours. The results are then evaluated against established criteria to confirm the safety and non-irritating properties of the sweat pad materials.
RESULT: While testing the sample according to this standard procedure, there is no skin
inflammation can cause by the sample.

GSM-WEIGHT (G/SQMT) TEST

The testing procedure outlined in IS 1964:2001 for evaluating the Gramm age (gsm) of fabric involves the preparation of a representative sample from which 5 to 10 circular test specimens, each measuring 100 mm in diameter, are extracted using a cutting die. These specimens must
undergo conditioning in a controlled environment, specifically maintained at a temperature of
23°C ± 2°C and a relative humidity of 50% ± 5%, for at least 24 hours. After this conditioning
phase, each specimen is weighed on a balance with an accuracy of 0.01 g. The grammage for each specimen is calculated using the formula: gsm = (Weight of test specimen in grams) x (10000 / Area of test specimen in square centimeters). Ultimately, the average gsm of the 5 to 10 specimens is calculated and rounded to the nearest whole number, with the final measurement expressed in grams per square meter (g/m^2).

RESULT: While testing the sample according to this standard procedure, there is 194.98 g/sqmt in the sample.

SOFTNESS TEST

The In-House Method 012 for evaluating fabric softness involves preparing a representative
Sample of the fabric, which is then cut to a specified size and conditioned in a controlled environment for at least 24 hours. After this conditioning period, the sample is placed on a softness testing device, such as the Kawabata Evaluation System (KES) or a Softness Tester (ST), with testing performed according to the manufacturer's specifications. Softness is measured in specific units, and an average value is calculated. This average softness is then classified using a

predetermined scale that may include categories such as soft (0-50 KES units), medium (51-100 KES units), and hard (101-150 KES units). The final report provides the average softness, its classification, and the standard deviation of the measured softness values

RESULT: While testing the sample according to this standard procedure, there is Very softness
feel cellulosic found in the sample

ABSORBENCY TEST
The IS 2369 standard outlines a method for evaluating the absorbency of textile materials. This
assessment measures the time it takes for a fabric to absorb a specified volume of water. During the test, a fabric sample is placed under a defined pressure, and a controlled amount of water is released onto it. The time taken for the fabric to completely absorb the water is recorded, and this measurement is used to determine its absorbency. To ensure precision, the procedure is repeated multiple times, and the average absorbency is calculated. The results are presented as absorbency time, indicating the average duration required for the fabric to absorb the water. Additionally, the standard provides comprehensive guidelines for sample preparation, the use of testing equipment, and the calculation of absorbency values.

RESULT: While testing the sample according to this standard procedure, there is 100% of
absorbency found in the sample.

V. TESTING AND RESULT

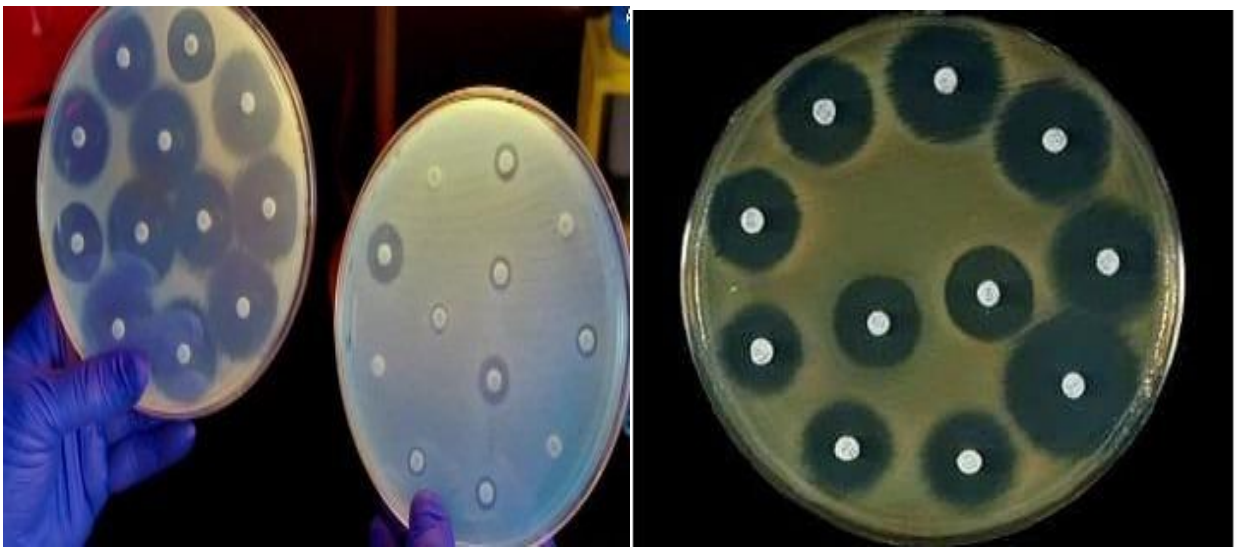

Plate NO.05 TESTING AND RESULT

VI. SUMMARY AND CONCLUSION

In contemporary society, numerous individuals find their daily routines disrupted due to underarm sweats. The primary objective of this herbal sweat pad is to enhance dryness quality and overall well-being by incorporating natural ingredients such as bamboo fabric (Phyllostachys edulis), cotton fiber (Gossypium), banana fiber (Musa fiber) and aparajita (Clitoria teratea linn). These components improve high absorbency control pigmentation and keep dry.

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