DEVELOPMENT OF ENVIRONMENTAL FRIENDLY MENSTRUAL ABSORBENTS

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ABSTRACT

Girls' bodies undergo considerable physiological changes during menstruation, a natural biological occurrence. Various menstrual hygiene products are utilized during these times to maintain good cleanliness. Recently, many awareness campaigns have been launched to improve women's menstrual hygiene. Additionally, these items' contains absorbents that lead to improper disposal and lack of degradability result in some harm to the environment. In order to make hygiene products more affordable and environmentally beneficial, emphasis is placed on using naturally occurring absorbent fibres, such as organic cotton, banana fibre, jute, bamboo, and others that are readily available, biodegradable, and have low carbon footprints. The invention of menstruation absorbents using pure bamboo and banana fibres, two different fibrous compositions, is the subject of this work. The absorbing, swelling, absorbency of the materials' physical attributes and performances are to be tested to prove this invention.

Keyword: *Hygiene , Bamboo, banana, natural fibers , absorbency and biodegradable.*

1. INTRODUCTION

Healthcare & hygiene, which encompasses both disposable and non-disposable items, is a significant field of textile. The topic of personal hygiene product non-biodegradability and how it has evolved into a significant environmental concern globally. Sanitary pads are the most popular period product among women. Up to 90% of disposable sanitary pads are made of bleached wood pulp and non-biodegradable polymers. There is a possibility of being exposed to hazardous emissions that are bad for people and ecosystems throughout the sanitary pad's life cycle.

The cultural shame attached to menstruation and the lack of knowledge regarding the chemical ingredients used in sanitary pads, on the other hand, have prevented people from paying much attention to the health and environmental effects of disposable sanitary pads. A further improvement would be to employ natural fibres rather than synthetic super absorbent polymer. By substituting an eco-friendly raw material for petroleum-based ones, hygiene products can become more sustainable.

To make these absorbents more user- and environmentally-friendly, they can be made from low-cost, highly absorbent natural materials like bamboo and bananas. Bamboo fibre wicks away moisture quickly and naturally absorbs it up to four times faster than cotton. Banana fibre has a moisture absorption capacity of 10% to 11.5%. Due

to its quick absorption and release of moisture, this fibre has a strong moisture absorption quality. Bamboo fibre that has been treated and coarser banana fibre can be combined to create a non-woven web to act as an absorbent.

2. MATERIALS AND METHODS:

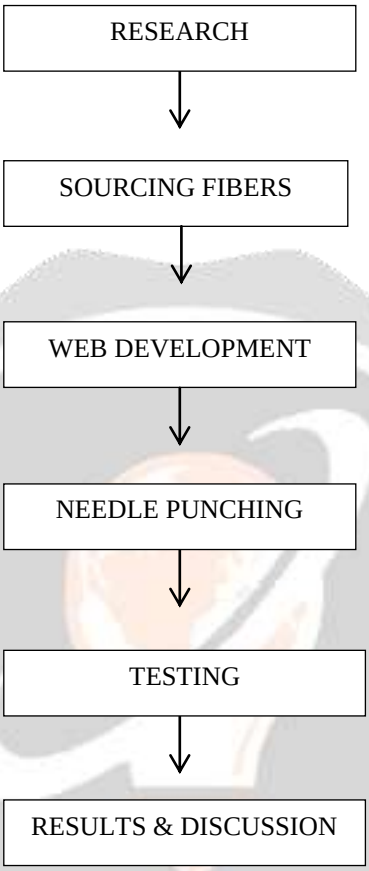

Fig -1: Methodology

First, processed bamboo fibre and raw banana fibre are obtained. Bamboo fibre was left in its processed state, whilst the raw banana fibre was manually chopped into coarser granules. Banana fibre and bamboo fibre are blended after being ground into a more coarse powder to make non-woven webs with a 70:30 ratio using a carding machine. Then it is needle punched to have the perfect core layer.

2.1 Bamboo fiber:

Bamboo is a naturally occurring cellulose regenerative, biodegradable, and environmentally beneficial textile fibre. In addition to being a green fibre, it also naturally includes antibacterial and UV protection properties, making it a special eco-friendly textile material. Bamboo fibres offer better drapery, great moisture permeability, and moisture vapour transport properties. The bamboo fibre is incredibly smooth, light, silky, and has many micro-gaps and micro-holes throughout its cross-section, which makes it breathable and comfortable to wear.

Fig -2: Bamboo fiber

2.2 Banana fiber

The natural fibre, which is made from the stem of the banana tree and is extremely durable, is biodegradable. All the synthetic and natural fibres can be replaced with banana fibre. Banana fibre is non-toxic, chemical-free, odourless, and eco-friendly. Since no toxic chemicals or colours are utilised, banana fibres' inherent cooling and therapeutic properties improve the health of their user.

Fig -3: Banana fiber

2.3 Web development

To make a single non-woven web, a mini carding machine is used to combine a web of fibers (bamboo and banana in the ratio of 70:30).

Fig -4:Web developed bamboo and Banana fiber

2.4 Needle punching

A needle loom packed of barbed needles is used in the needle punching technique to compel the free strands to push through and entangle themselves. A nonwoven fabric called needled felt or needle punched felt is produced using a newer, more sophisticated felting process as opposed to weaving. Barbed needles are used to generate industrial or craft felt during the needle felting process.

Fig -5:Needle punched bamboo and Banana fiber

3. RESULTS & DISCUSSION

3.1 Air permeability

The amount of air that may move through a specific region of a fabric is known as its air permeability.

S.No	70:30
Trial 1	22.1
Trial 2	27.1
Trial 3	28.3
Trial 4	25.4
Trail 5	26.6
Avg	**25.9**

Table-1: Air permeability of bamboo and banana nonwoven web samples

3.2 Water absorbency test

The length of time needed for a non-woven web sample to become completely wet is measured when the sample is laid out as flatly as possible on the water's surface under predetermined circumstances. A weighed cloth sample is submerged in water to determine its ability to absorb water. After a predetermined amount of time to make the sample saturated, the sample is taken out, drained, and reweighed.

Absorption (%) = (Absorbed weight- Dry weight) X 100 / Absorbed weight

S.No	Test Parameters	Specified/customer value	70:30
1	(A) Absorption %	50%	89.73
	(B) umber of times (Initial weight 13 grams)	2 times by its own weight	9 time by its own weight

Table-2: Water absorbency capacity of bamboo and banana non-woven sample

3.3 Anit-microbial test

The word "antimicrobial activity" refers to all active principles (agents) that can stop the growth of microorganisms, prevent the formation of microbial colonies, and possibly even destroy them.

S.No	Test Parameters	Specified/customer value	70:30

1	Anti-microbial activities (Bacteria: E. coli)	AATCC100/ AATCC147	No microbial activities found

Table-3: Anti-microbial test of bamboo and banana non-woven sample

3.4 Hold on capacity test

The capacity of a fabric to absorb liquids and hold them within its framework has an impact on a variety of qualities, including the comfort of the skin, static build-up, shrinkage, water repellence, and wrinkle healing.

S.No	**Test Parameters**	**Specified/customer value**	**70:30**
1	Water holding capacity (ml) / (10X10 cm^2)	30 ml min	140 ml min

Table-4: Water holding capacity of bamboo and banana non-woven sample

4. CONCLUSIONS

Bamboo and banana fibres were used to create needle-punched non-woven fabrics with ratio 70:30. A few experiments were conducted to verify the functionality, traits, and qualities of the non-woven web, and the findings were reported. A non-woven web made of 70% bamboo, 30% banana, and 10 grammes of tulsi powder is demonstrated to meet all the requirements and pass the test to replace other absorbent layers based on all the tests conducted and the results displayed. As these fibers are readily available and affordable, they can be used to replace SAPs. This absorbent layer can also be utilised in other menstrual hygiene items.

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