DEVELOPMENT OF BIODEGRADABLE, ECO-FRIENDLY & COST EFFECTIVE SANITARY NAPKINS

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Introduction:
Today in the era of eco-friendly environment, it has become very important for human beings to live in the world of hygiene and freshness. The awareness of health and hygiene of consumers has increased the demand for antimicrobial properties and as two functions—one protecting the wearer and the second ensuring biodegradation of the material. An important area of the materials is the health care and hygiene sector.

About half of the people in the world deal with menstrual hygiene for as long as 30 years of their lives. The use of disposable feminine sanitary napkins has been key to managing menstrual health for decades; an estimated some million sanitary napkins, tampons and applicators are sent to landfill every year and it takes centuries for the biodegrade inside plastic bags. Additionally, it requires high amounts of fossil fuel energy to produce the plastic for these products, resulting in a large carbon footprint.

Objectives:
- Treatment of Areca nut fibers to enhance the absorption properties.
- Designing of Bio-degradable & Ecofriendly sanitary napkin with super absorbent areca fibers.
- Treatment of developed sanitary napkins with naturally available antimicrobial & de-odorizing agents.
- Market assessment and comparison with the commercially available napkins.

Methodology:
1. Bio softening of Areca fibers:
   - To soften the areca fibers we have carried out biological method.
   - The fungi used is Phenerochaete chrysosporium which has been procured by MTCC (MTCC no: 787).
   - Vogel's mineral media is used for the fungal growth, later the species was sub cultured(for activation of lyophilized culture).
   - It was incubated for about 7 days at 25°C.
   - Areca fibers were segregated manually.
   - Areca fibers were sterilized at 121°C (autoclaved).
   - Kept for soaking in distilled water for 1 week.

2. Natural deodorizing agents:
   - Rosemary oil is used here, Rosmarinus officinalis, commonly known as rosemary, is a woody, perennial herb with fragrant, evergreen, needle-like
leaves and white, pink, purple, or blue flowers, native to the Mediterranean region.

Properties of Rosemary oil:
- Improves brain function
- Boosts immune system
- Has anti-microbial property.

3. **Natural adhesives**: commercially available biodegradable adhesive tapes have been used

**Conclusion:**
The sanitary napkins was designed and developed consisting of two parts, the outer-shell and the disposable insert. The insert was made using natural locally available raw materials - Areca husk and cotton fibres. The fibres constituting the insert were made absorbent, and their performance determined using appropriate technologies. The ease of availability of the natural fibres in the local areas makes the process of using these fibres sustainable and affordable. At these prices, majority of women would be in a position to afford the Napkins.

**Result: 1. FTIR test results**

![Graph no.1: FT-IR result of raw areca husk fibre](image1)

![Graph no.2: FT-IR graph of treated areca husk fibre](image2)

2. **Absorbency test result**: We have chosen standard Stayfree regular commercial napkin which has absorbency of 30 ml, and our napkin resulted in 60ml of absorbing capacity.
Future work:
1. Rosemary oil can be emulsified to convert it into powder form to prevent the oil from evaporation and losing its characteristic odour.
2. Varied proportions of Areca husk can be used to increase the absorbency.