K.S.RANGASAMY
COLLEGE OF TECHNOLOGY
Autonomous I Tiruchengode

2023
Volume : 09

TEXEMPIRE

DEPARTMENT OF TEXTILE TECHNOLOGY

www.ksrct.ac.in

About the Department

Department of Textile Technology was established since 1997 with B.Tech.- Textile Technology and well-equipped laboratories, experienced faculty and dedicated staff members to meet the technical manpower needs of the rapidly expanding textile and garment industry by creating industry-ready graduates. The department have PG program M.Tech.- Textile Technology and Ph.D - Textile Technology (Full time & Part time) to create a research and startup culture in the area of textile and apparel. The department also recognized research center approval from Anna University, Chennai. Curriculum has been designed to update the knowledge of students in current technological trends. The department library is stacked with good collection of books, International and National Journals, to provide ample opportunities for the students to explore their propensity for learning and innovation in their field of study. The department has received funding worth of Rs.6.50 Crores from National Technical Textile Mission (NTTM) of Ministry of Textile (MoT) under "Education Guidelines - Enabling of Academic Institutes in Technical Textiles (Round 1.0). The department also has received funding from various other government agencies like AICTE, DST, DRDO, SERB, CSIR, etc. The department has inked Memorandum of Understanding (MoU) with leading Universities and Industries for promoting research, Internship, training, technology transfer and consultancy activities. Our students undergo internships at various sectors and get placed in the leading textile and apparel industry, IT companies in India and aboard as well. The department conducted training through Central and State government skill development schemes for the under privileged. Our alumni have mentoring one student to support and guide their career and also alumni have contributed many scholarships to support the need of financially suffered and meritorious students. Through alumna matter, each alumnus has mentoring one student to support and guide their career growth. Alumni also contributed many scholarships to meritorious and financially struggling students.

"The future belongs to those who believe in the beauty of their dream.."

Thiru. R. Srinivasan, B.B.M., MISTE
CHAIRMAN
KSR EDUCATIONAL INSTITUTION

We at K.S.Rangasamy College of Technology has begun to bestow the most pioneering magazine "TEXEMPIRE", the bi-annual magazine of department of textile technology. The escalation in the field of textile is an exemplary way to serve up to the progress of a nation a boom that serves the people with intense research and development is textile the contributions made by learned textile technologist, researchers and student have made the textile to flourish in an unexpected way, with absolute faith I accept the wisdom that this magazine provides an insight towards the major thrust areas of textile provoking the minds of upcoming textile technologist. I wish to express my gratitude to the editorial board members, faculty and students of the Department of Textile Technology for bringing out this impressivemagazine.

" Children must be taught how to think, not what to think."

Dr. R.Gopalakrishnan M.E., Ph.D
PRINCIPAL
K S RANGASAMY COLLEGE OF TECHNOLOGY

The transformed technological science that unites various interdisciplinary aspects for the welfare of each and every individual is textile. "TEXEMPIRE" magazine by the Department of Textile Technology of K.S.Rangasamy College of Technology will help to enhance our knowledge by promoting the exchange of experience. An encyclopedia of textile could solve all the issues related to the past and ready to answer the feature issues by indulging in the present status is Textile Technology. The thought of individual author towards the textile and technology has been compiled by the volume, editors to make the students expertise and make their contribution for the enhancement of various fields of textile. Their enthusiasm to impart knowledge to their colleagues forms the foundation of Textile and is gratefully acknowledged.

I convey my appreciation to the editorial board members faculty and students of the department of Textile Technology for their effort to bring out this magazine and wish them all success in their endeavor

"Fashion is the armor to survive the reality of everyday life"

Dr.G. Karthikeyan M.Tech., Ph.D
Editor-In-Chief
Head of the Department

Welcome to the inaugural issue of TEXEMPIRE, Volume 9, issue 1, the magazine dedicated to the dynamic world of textile technology and fashion innovation. It is my pleasure to introduce this publication, aimed at serving as a beacon of inspiration, knowledge, and insight for all who are passionate about textiles and fashion. Our Department of Textile Technology at K S Rangasamy College of Technology has a proud history of excellence and innovation. Since our establishment in 1997, we have been at the forefront of textile education, offering B.Tech., M.Tech., and Ph.D. programs. Recognized as a research center by Anna University, Chennai, our commitment to advancing the field through cutting-edge research and industry collaboration is unwavering. In this first issue of TEXEMPIRE, we howcase the breadth and depth of our xpertise and reativity. Highlights include research on environmentally sustainable composites using banana and jute fibers, innovative fabric designs sing the miss pick effect, and the development of eco-friendly baby diapers from hemp and kenaf fibers. these projects underscore our dedication to sustainability and nnovative solutions to contemporary challenges.

.

We also celebrate the achievements of our students and alumni, whose projects and research reflect the rigorous education and hands-on experience they receive here. Our alumni network plays a crucial role inventorying current students, offering guidance, scholarships, and career opportunities. is you explore TEXEMPIRE, I hope you feel spired by the innovation and dedication hat define our department. Thank you for our support and interest in our work. together, We can continue to push the secondaries of textile technology and fashion.

VISION AND MISSION

VISION OF THE DEPARTMENT

To be the centre of excellence in textile education, training, research and service.

MISSION OF THE DEPARTMENT

• To enlighten the students about the latest technology in textile industries through innovative educational practices and multi-disciplinary approach.

• To engage with the industry as solution providers through consultancy.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Production Process and Solutions to Problems: Graduates are competent in textile production processes and be able to identify problems and suggest suitable solutions.

PEO2: Modern Tools & Technology and Ethics: Graduates use latest tools and technology for the production of textile materials and serve society in an ethical manner.

PEO3: Skills, Entrepreneurship and Life Long Learning: Graduates will exhibit skills in their career and develop entrepreneurial culture through life-long learning.

PROGRAMME OUTCOMES (POs)

Engineering Graduates will be able to:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design /development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one‘s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

Engineering Graduates will be able to:

PSO1: Application of Basic Concepts: Apply fundamental concepts in the areas of spinning, weaving, testing, garment making and processing.

PSO2: Solution for Industrial Problems: Solve industrial problems in textile industries considering environmental issues to improve quality and productivity.

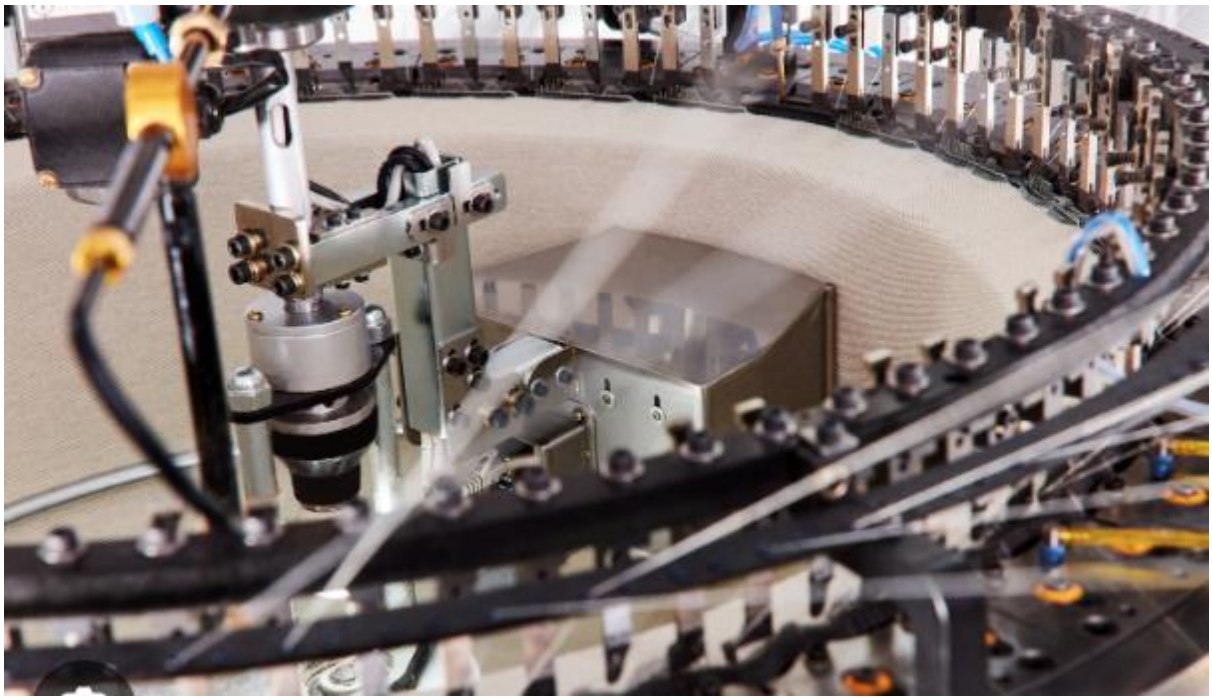
PSO3: Moral Values: Demonstrate social and ethical responsibilities relevant to textile industries.

Content

Content

DESIGN AND DEVELOPMENT OF FABRIC FAULT IDENTIFIER DURING KNITTING MACHINE PRODUCTION

N. Sukumar – Prof, Deenadhayalan S, Logeshwaran M – IV Year / Haripriyan J – III Year



Abstract

Fabric defects significantly impact the quality and cost-effectiveness of textile production. Traditional methods of fabric inspection in knitting involve manual detection, which is time-consuming and prone to human error. This study presents the design and development of an automated fabric fault identifier integrated with a knitting machine production system. The proposed system employs image processing and machine learning techniques to identify and categorize defects such as dropped stitches, holes, yarn breaks, and needle faults in real time. The research aims to enhance efficiency, reduce waste, and improve fabric quality consistency.

Keywords: Fabric fault detection, Knitting machine, Image processing, Machine learning, Automated inspection, Textile quality control

1. Introduction Knitting is a widely used fabric production method in the textile industry, producing high-quality fabrics for various applications. However, defects occurring during knitting can lead to significant production losses and compromised fabric quality. Traditional inspection methods rely on human operators, which introduce subjectivity and inefficiencies. Automation in fault identification can revolutionize textile manufacturing by minimizing defects, improving efficiency, and reducing costs. This study focuses on the development of an intelligent system to identify fabric faults in real time during knitting production.

2. Literature Review Various techniques have been explored for fabric defect detection, including human inspection, optical sensors, and artificial intelligence-based approaches. Conventional methods have limitations in accuracy and speed. Recent advancements in computer vision and machine learning provide promising solutions for automated fault detection. Studies have demonstrated the effectiveness of convolutional neural networks (CNNs) and image processing techniques in textile defect classification. However, integration with knitting machines for real-time monitoring remains a challenge.

3. Methodology

3.1 System Design The proposed fabric fault identifier consists of the following components:

- High-resolution camera system: Captures real-time images of the knitted fabric.
- Processing unit: Utilizes image processing algorithms to detect anomalies.
- Machine learning model: Trained to classify defects based on a dataset of fabric faults.
- User interface: Displays defect alerts and provides statistical analysis.

3.2 Data Collection and Preprocessing A dataset of fabric defects was compiled by capturing images from knitting machine production. Data augmentation techniques were applied to improve the robustness of the machine learning model. The images were preprocessed using edge detection and contrast enhancement techniques to highlight fault features.

3.3 Defect Identification Algorithm A deep learning-based classification model was trained to detect common fabric defects, including:

- Dropped stitches
- Holes
- Yarn breaks
- Needle misalignment The model was fine-tuned using transfer learning to improve accuracy. A threshold-based filtering approach was used to eliminate false positives.

4. Results and Discussion The system was tested on an industrial knitting machine. The automated identifier achieved an accuracy of 95% in detecting defects. Compared to manual inspection, the proposed system reduced inspection time by 60% and minimized defect-related rejections. The integration of real-time alerts allowed operators to take immediate corrective action, improving overall production efficiency.

5. Conclusion This research demonstrates the effectiveness of an automated fabric fault identifier integrated with a knitting machine. By leveraging image processing and machine learning, the system enhances defect detection accuracy and operational efficiency. Future research can focus on expanding the model to accommodate a wider range of fabric types and integrating predictive maintenance features.

EXPERIMENTAL SYSYTEM OF NATURAL FIBER-REINFORCED HYBRID POLYPROPYLENE

MB Sampath – Prof, Hari I, Pugal J – IV Year / Sharnitha N M – II Year

Abstract

The study focuses on the growing interest in natural fiber composites due to their lightweight, eco-friendly, and non-corrosive properties. Banana and rice husk fibers were hybridized with glass fiber-reinforced polypropylene composites using a compression molding technique. Fibers were chemically treated with potassium permanganate to enhance fiber-matrix compatibility. The mechanical properties, including tensile and flexural strengths, were evaluated both experimentally and through finite element analysis, showing enhanced performance at specific fiber ratios.

Introduction

Environmental concerns have driven the shift toward sustainable materials, with natural fiber-reinforced polymer composites gaining traction in automotive, aerospace, and construction industries. However, the hydrophilic nature of natural fibers often results in poor fiber-matrix bonding, requiring chemical treatments to enhance compatibility. This research combines banana and rice husk fibers with a polypropylene matrix to develop hybrid composites with improved properties.

Methods

Material Preparation: Banana and rice husk fibers were extracted and treated with 5% potassium permanganate to improve surface roughness and interfacial adhesion. Polypropylene resin was used as the matrix.

Composite Fabrication: The fibers were combined in varying weight ratios and molded using compression molding techniques.

Mechanical Testing: Tensile tests (ASTM D3039) and flexural tests (ASTM D790-03) were conducted to evaluate the mechanical performance.

Conclusion

The hybrid composite demonstrates potential applications in automotive and construction components, offering an eco-friendly alternative with enhanced mechanical properties. The inclusion of banana and rice husk fibers presents a sustainable solution for various industrial applications.

LEATHER PRODUCT REPLACEMENT OF USING COCOS NUCIFERA WATER

AS Subburaayasan -AP, Saran K, Aravind E C– IV Year / Karthick N, Gokul Prasath K – II Year

Abstract:
With growing environmental concerns and animal welfare awareness, there is a need for sustainable alternatives to conventional leather. This study explores the production of vegan leather using *Cocos nucifera* (coconut) water as a base material. Coconut water, rich in phytohormones and antioxidants, is combined with bacterial cellulose and natural adhesives to produce a durable, flexible, and biodegradable leather substitute. The study outlines the materials, methods, and experimental evaluations, showing the potential for this alternative to address both environmental and ethical concerns associated with traditional leather.

Keywords: Vegan leather, Cocos nucifera, Sustainability, Bacterial cellulose, Coconut water.

1. Introduction

The demand for alternatives to animal leather has surged due to environmental impacts and animal cruelty concerns. Vegan leather, often derived from synthetic or plant-based materials, offers an eco-friendly option. However, synthetic vegan leather typically uses petroleum-based products like PVC or polyurethane, which are non-biodegradable. This study investigates a plant-based alternative using coconut water to produce bacterial cellulose-based vegan leather.

2. Materials and Methods

2.1 Materials Used

- Coconut water
- Adhesives or gums
- Natural fibers

2.2 Methods

- **Lyophilization**: Coconut water was freeze-dried to remove moisture, preserving nutrients for bacterial cellulose production.
- **Fermentation**: Bacteria cultured in the nutrient-rich coconut water produced cellulose over two weeks, forming a flexible and durable sheet.
- **Air Drying and Compression**: The cellulose was enriched with natural gums and fibers, air-dried, and compressed to achieve desired thickness and durability.

3. Experimental Setup

The process uses agricultural waste from the coconut industry, specifically coconut water, which is often discarded. One liter of coconut water can produce up to 0.25 square meters of vegan leather. The final product mimics the texture of traditional leather, with added properties such as water resistance, flexibility, and biodegradability.

4. Results and Discussion

4.1 Mechanical Properties

The vegan leather showed tensile strength comparable to animal leather, with a slight reduction in elongation at break. Tear and stitch resistance were slightly lower than traditional leather but sufficient for fashion applications.

4.2 Water Absorbency and GSM

The water permeability test revealed that the vegan leather absorbs less water compared to natural leather, making it suitable for outdoor applications. The material's GSM (grams per square meter) indicates a lightweight structure, advantageous for apparel and accessory production.

4.3 Environmental Impact

Using coconut water reduces waste and avoids the use of petroleum-based products. The biodegradable nature of this leather alternative ensures minimal environmental impact at the end of its lifecycle.

5. Conclusion

The production of vegan leather using *Cocos nucifera* water offers a sustainable, animal-friendly alternative to traditional leather. This innovative material balances functionality, durability, and environmental sustainability. Future work could explore large-scale production and additional testing for commercial applications.

DEVELOPMENT OF SNAKE-REPELLENT TEXTILES

N Sukumar – Prof, Ragul R, Rajkumar – IV Year / Manoj K, Lokesh M – III Year

Abstract:
Snake bites remain a critical health issue, especially in rural and agricultural communities, causing thousands of deaths and disabilities annually. This study explores the development of snake-repellent textiles by integrating natural herbal extracts with knitted cotton-spandex fabric. Natural herbs such as clove, cinnamon, garlic, onion, pepper, mint, and lemon were utilized for their snake-repellent properties. The research implemented a systematic methodology of fabric preparation, application of herbal extracts using an exhaustion method, and subjective testing with snake species like the Indian cobra and Ptyas mucosa. Results indicate the effectiveness of these textiles in repelling snakes while maintaining durability and user comfort, paving the way for protective apparel suitable for high-risk environments.

Keywords: Snake-repellent textiles, Natural herbs, Protective clothing, Cotton-spandex blend, Herbal finishing.

1. Introduction

Snakebites cause severe health complications, including paralysis, bleeding, kidney failure, and even death. Conventional methods of snakebite prevention often fall short due to limited accessibility in rural areas. This study addresses the issue by developing innovative snake-repellent textiles that integrate herbal repellents into fabrics to protect individuals, especially farmers and children, from snake encounters.

2. Materials and Methods

2.1 Materials

- **Fabric**: A 96% cotton and 4% spandex single jersey fabric was selected for its breathability, elasticity, and comfort.

- **Herbal Extracts**: Ingredients like clove, cinnamon, garlic, onion, mint, pepper, and lemon were used for their snake-repellent properties.
- **Solvent**: Ethanol was utilized as a universal solvent for dissolving herbal extracts.

2.2 Methodology

1. **Preparation of Herbal Extracts**: The herbs were powdered and dissolved in ethanol in a 1:10 ratio to create snake-repellent solutions.
2. **Fabric Finishing**: The exhaustion method was used to impart the herbal solution onto the fabric. The fabric was immersed in the solution for 20-30 minutes at 40°C, then air-dried for 45 minutes.
3. **Product Development**: Arm covers and leg covers were developed using the finished fabric, with additional PU leather layers for enhanced puncture resistance and skin protection.

3. Results and Discussion

3.1 Snake-Repellent Efficacy

The textiles were tested on the Indian cobra and Ptyas mucosa. Subjective analysis demonstrated that snakes exhibited aversive behavior towards the treated fabrics. Cinnamon and clove-finished textiles were the most effective in repelling snakes.

3.2 Durability and Strength

The bursting strength of the fabric decreased slightly after herbal finishing but remained within acceptable limits for wearable textiles. Durability tests after multiple washes revealed that the repellency persisted, though effectiveness slightly declined with repeated laundering.

3.3 Product Usability

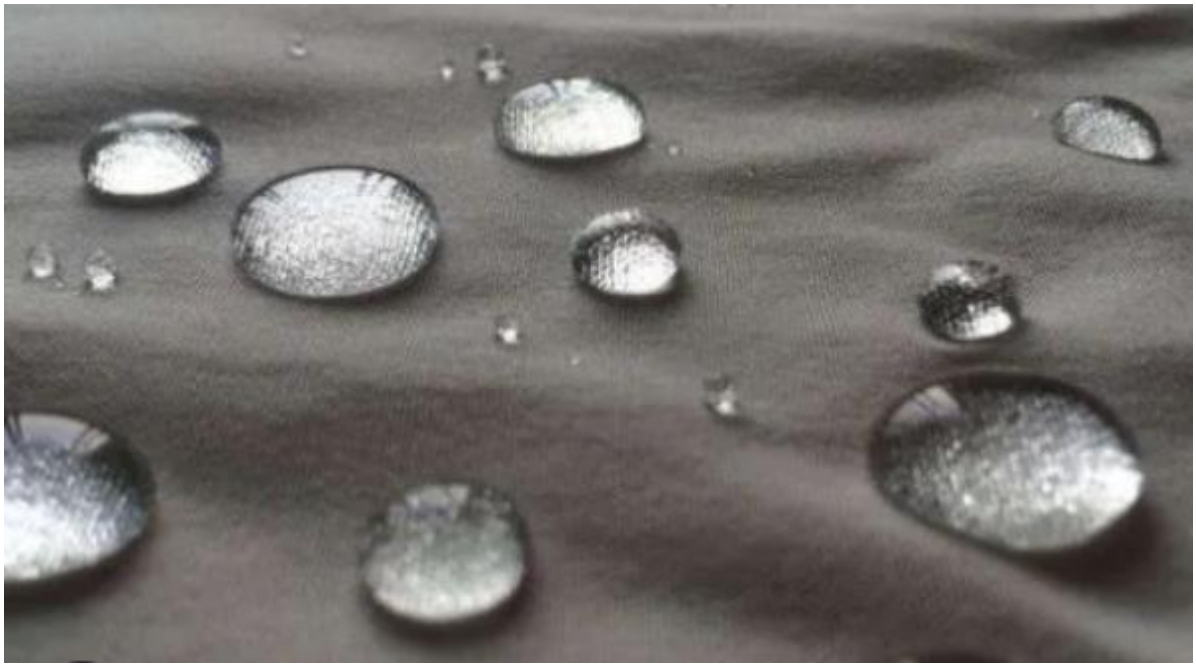
Two iterations of arm and leg covers were tested. The second iteration, which included a PU leather layer, resolved issues of skin irritation caused by herbal penetration through sweat.

4. Conclusion

The developed snake-repellent textiles effectively deter snakes while providing comfort and durability. Cinnamon and clove extracts emerged as the most potent repellents. Future research should focus on objective testing, scaling production, and enhancing the durability of the herbal finish.

COMFORT AND WATER RESISTANCE IN SPORTSWEAR: SILICONE AND FLUOROCARBON COATINGS ON BAMBOO FABRIC

KR Nandagopal – AP, Naveen Prasanth S, Poovarasan k – IV Year / Vimal Kumar S – II Year



Abstract:
Comfortable and water-resistant sportswear is essential for enhancing performance and user satisfaction, especially during adverse weather conditions. This study investigates the application of silicone and fluorocarbon coatings on bamboo fabric to develop water-repellent sportswear. Bamboo, a sustainable and biodegradable material, was treated using the pad-dry-cure method to apply the coatings. The treated fabrics were evaluated for water repellency, breathability, and durability through various tests. Results demonstrated that fluorocarbon coatings offered superior water resistance and durability, while silicone coatings provided a cost-effective alternative with comparable performance.

Keywords: Sportswear, Water resistance, Bamboo fabric, Silicone coating, Fluorocarbon coating, Sustainable textiles.

1. Introduction

Water-resistant textiles have gained importance in sportswear to improve comfort and performance under wet conditions. Traditional materials such as polyester and nylon are widely used but often lack sustainability. Bamboo fabric, being eco-friendly and biodegradable, offers an alternative base material. This study focuses on enhancing bamboo fabric with silicone and fluorocarbon coatings, known for their water-repellent and breathable properties.

2. Materials and Methods

2.1 Materials

- **Fabric:** 100% bamboo fabric for its antimicrobial and sweat-absorbent properties.
- **Coatings:**
    - **Silicone:** Provides water repellency and enhances fabric flexibility.
    - **Fluorocarbon:** Offers superior water and oil resistance, with higher durability.

2.2 Methods

The **pad-dry-cure method** was employed for coating application.

- **Silicone Coating:** A mixture of silicone caulk and mineral spirit was applied to the fabric using a padding mangle, followed by drying and curing at 150°C.

3. Results and Discussion

3.1 Water Repellency Tests

The American Association of Textile Chemists and Colorists (AATCC) spray test (AATCC 22) was used to evaluate water repellency.

- **Initial Results:** Both silicone- and fluorocarbon-coated fabrics achieved a grade of 4, indicating effective water resistance.
- **After Washing:** Fluorocarbon coatings retained higher grades (4 after one wash, 3 after five washes) compared to silicone coatings (3 after one wash, 2 after five washes).

3.2 Durability and Comfort

- **Silicone-Coated Fabrics:** Showed moderate durability with significant water repellency but less effective after multiple washes.

3.3 Product Development

The coated fabrics were developed into sports T-shirts. Fluorocarbon-coated T-shirts were preferred for water-intensive activities such as boating and waterfall excursions due to their enhanced properties.

4. Conclusion

The study concludes that both silicone and fluorocarbon coatings enhance the water resistance of bamboo fabric. Fluorocarbon coatings outperform silicone in terms of durability and washing resistance, though at a higher cost. These coated bamboo fabrics offer a sustainable and functional solution for water-resistant sportswear, suitable for various athletic and outdoor applications.

NON-WOVEN ACOUSTIC PANELS USING BANANA AND JUTE FIBERS

M Bharani -ASP, Bommu Saravanan G, Surya A – IV Year / Krishnakumar V M – III Year

Abstract:
The increasing demand for sustainable materials in construction and interior applications has prompted the exploration of natural fiber-based acoustic panels. This study focuses on developing non-woven acoustic panels using banana and jute fibers through needle-punching techniques. The mechanical and acoustic properties, such as sound absorption, flexural rigidity, air permeability, thermal resistance, and tensile strength, were analyzed. Results demonstrate that increasing punch density and needle penetration depth improves sound absorption but decreases tensile strength and thermal resistance. These findings highlight the potential of banana-jute fiber composites as an eco-friendly alternative to synthetic acoustic materials.

Keywords: Acoustic panels, Banana fiber, Jute fiber, Non-woven, Needle punching, Sound absorption.

1. Introduction

Acoustic pollution in industrial and urban environments necessitates the development of effective sound-absorbing materials. Traditional synthetic materials used for noise reduction are non-biodegradable and environmentally detrimental. Natural fibers like banana and jute offer sustainable alternatives due to their renewability, biodegradability, and high porosity, which make them effective sound absorbers. This study investigates the potential of banana-jute composites in producing non-woven acoustic panels with desirable mechanical and acoustic properties.

2. Materials and Methods

2.1 Materials

- **Jute Fiber:** Obtained from PSG College of Technology, Coimbatore, for its stiffness and sound absorption properties.
- **Banana Fiber:** Procured from Achu Fibers, Erode, valued for its tensile strength and eco-friendliness.
- **Blending Ratios:** Two blend compositions were tested (banana-jute-polypropylene in 50:50 ratios).

2.2 Fabrication Process

1. **Fiber Preparation:** Banana and jute fibers were carded and blended using a pilot carding machine to form a uniform web.
2. **Needle Punching:** The blended web was needle-punched at varying densities and penetration depths to create non-woven panels.

2.3 Testing Methods

- **Sound Absorption:** Evaluated using the impedance tube method (ASTM E1050).
- **Mechanical Properties:** Tensile strength (ASTM D5035), flexural rigidity (ASTM D1388), air permeability (ASTM D737), and thermal resistance (ASTM D1518) were measured.

3. Results and Discussion

3.1 Sound Absorption

- Panels with higher needle penetration depth demonstrated superior sound absorption across all frequencies, with the best performance observed in the 800-1200 Hz range.
- Sample S4 exhibited the highest sound absorption due to increased porosity and effective dissipation of sound energy.

4. Conclusion

Banana and jute fiber-based non-woven acoustic panels provide a sustainable alternative to synthetic materials for noise reduction. The study demonstrates that sound absorption improves with punch density and needle penetration depth, while tensile strength and thermal resistance decrease. Future research could focus on optimizing the fiber blend ratio and exploring additional applications in automotive and construction industries.

DYE FOR COTTON FABRIC - EUCALYPTUS BARK

P.Mageswaran – AP, Udhayakumar M, Mangai M – IV Year / Sibiraj R – II Year

Abstract:
Environmental concerns over synthetic dyes have revived interest in natural dyes derived from renewable sources. This study focuses on eucalyptus bark as a sustainable and biodegradable source of natural dye for cotton fabrics. Using aqueous extraction, the dyeing process was performed with and without mordants via pre- and post-mordanting methods. Alum, lemon, mango bark, and myrobalan were tested as mordants to enhance dye fixation and improve colorfastness. The dyed fabrics displayed shades ranging from reddish-brown to dark brown, depending on the mordant. Tests for washing, rubbing, perspiration, and antibacterial properties confirmed excellent colorfastness and bioactivity, demonstrating the potential for eucalyptus bark as an eco-friendly dye source.

Keywords: Natural dye, Eucalyptus bark, Cotton fabric, Mordants, Sustainability, Colorfastness.

1. Introduction

The environmental hazards posed by synthetic dyes, such as toxic effluents and non-biodegradability, necessitate the use of sustainable alternatives. Natural dyes offer a renewable and eco-friendly solution. Eucalyptus bark, a byproduct of the paper and pulp industries, is rich in tannins and polyphenols, making it a viable candidate for natural dye extraction. This study investigates the dyeing potential of eucalyptus bark on cotton fabrics and evaluates its fastness and antibacterial properties.

2. Materials and Methods

2.1 Materials

- **Fabric:** 100% cotton fabric, pre-treated to enhance dye absorption.
- **Dye Source:** Eucalyptus bark collected from plantations, dried, and powdered.
- **Mordants:** Alum, lemon, mango bark, and myrobalan were used to modify dye uptake and shade.

2.2 Dye Extraction

The dye was extracted using aqueous extraction at 90°C for one hour. The solution was filtered to remove impurities and used for dyeing.

2.3 Dyeing Procedure

Cotton fabrics were dyed using conventional dyeing methods. Mordanting was conducted both before (pre-mordanting) and after (post-mordanting) dye application to observe its effect on shade and fastness.

2.4 Testing

- **Colorfastness:** Washing, rubbing (wet and dry), and perspiration fastness were evaluated according to ISO standards.
- **Antibacterial Activity:** The dyed fabrics were tested for resistance against common bacteria.

3. Results and Discussion

3.1 Shade Analysis

Unmordanted fabrics showed reddish-brown shades, while mordanted fabrics varied from light to dark brown. Alum yielded the darkest shades, while lemon and mango bark produced lighter tones.

3.2 Fastness Properties

- **Washing Fastness:** Mordanted fabrics exhibited good to excellent fastness, while unmordanted samples showed moderate resistance.
- **Rubbing Fastness:** Dry rubbing displayed excellent performance for all samples, but wet rubbing was slightly lower for unmordanted fabrics.
- **Perspiration Fastness:** All samples performed well, particularly with alum mordant.

3.3 Antibacterial Properties

The eucalyptus bark dye imparted significant antibacterial activity to the fabric, enhancing its suitability for applications in medical textiles and hygiene products.

4. Conclusion

Eucalyptus bark demonstrates excellent potential as a natural dye source for cotton fabrics. Its use with mordants significantly improves color depth, fastness, and antibacterial properties. This eco-friendly approach aligns with sustainable practices, offering a renewable alternative to synthetic dyes for textile applications.

PROTECTIVE WEAR USING CERAMIC FABRIC AND PROPERTIES

K.Saravanan- ASP, Surya A, Suganeshwaran M – IV Year / Kavin - III Year

Abstract

This study explores the application of ceramic fibers in protective wear designed for laboratory professionals, combining ceramic fabric with neem-based antimicrobial finishes. Ceramic fibers, known for their high thermal resistance, UV and IR blocking properties, and chemical stability, were woven into fabric layers. Neem extract was applied using the PAD-DRY-CURE method to enhance antimicrobial efficacy. The research evaluates UV protection, wash durability, and antibacterial efficiency, demonstrating the potential for eco-friendly and functional lab coats.

Introduction

Ceramic fibers are high-performance materials characterized by exceptional heat resistance, UV blocking, and chemical durability. This project utilizes ceramic fabrics as core materials for laboratory protective wear, addressing the need for UV and antimicrobial protection. The addition of neem-based finishes provides an eco-friendly solution to enhance comfort and hygiene.

Materials and Methods

- **Fabric Specifications:**
  - Ceramic fabric: Plain weave, 100% ceramic, GSM 160 g/m².
  - Cotton fabric: Plain weave, 100% cotton, GSM 84 g/m².
- **Neem Finish Application:**
  Neem extract, prepared from air-dried leaves, was applied using the PAD-DRY-CURE

method, involving fabric padding (110% expression), drying at 90°C, and curing at 120°C.

- **Testing Standards:**
  - Antibacterial Test: AATCC 100 method against *S. aureus* and *E. coli*.
  - UV Protection: AATCC 183:2010 for UV-A and UV-B transmittance.
  - Wash Durability: Evaluated up to 20 washes.

Results and Discussion

1. **Antibacterial Properties:**
   Neem-treated fabrics exhibited significant bacterial reduction (*S. aureus*: ≥85.19%, *E. coli*: ≥89.19%). Antimicrobial efficacy decreased after 10 washes.
2. **UV Blocking Performance:**
   - UPF: 328.949.
   - UV-A Blocking: 99.595%.
   - UV-B Blocking: 99.703%.

     These results confirm ceramic fabric's superior UV repellency compared to conventional materials.
3. **Wash Durability:**
   While bacterial resistance diminished with repeated washes, the neem finish sustained performance up to 10 washes, making it suitable for short-term use.
4. **FTIR Analysis:**
   Peaks indicated the presence of functional groups like O-H, C-H, and C=O, verifying the bonding of neem extract to the fabric.

Conclusion

The developed protective wear successfully combines ceramic fabric's UV protection with neem's antimicrobial properties, creating a sustainable and functional solution for laboratory environments. While wash durability presents limitations, the proposed approach highlights the potential for eco-friendly innovations in protective textiles.

MOSQUITO REPELLENT FINISHED COTTON FABRICS USING MINT

G Devanand – ASP, Harishankar B, Santhosh P – IV Year / Saravan E – II Year

Abstract

This study explores the use of natural neem and mint extracts to develop mosquito-repellent finished cotton fabrics. Employing eco-friendly pad-dry-cure methods, the treated fabrics demonstrated significant mosquito repellency while maintaining durability and breathability. A 25% neem and 75% mint formulation showed exceptional performance, maintaining mosquito repellency even after 15 washes. This research highlights the potential of herbal treatments for functional textiles to combat vector-borne diseases sustainably.

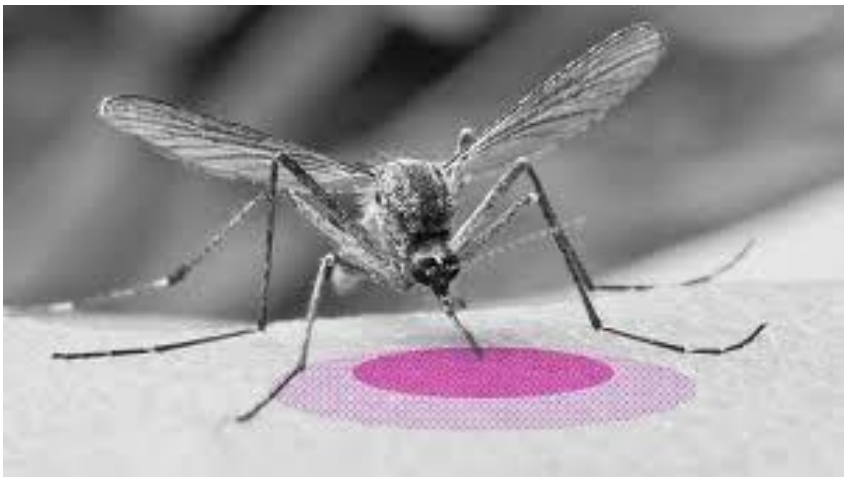
1. Introduction

Mosquitoes are carriers of diseases like malaria, dengue, and chikungunya. Conventional chemical repellents are effective but pose health and environmental hazards. Neem (Azadirachta indica) and mint (Mentha spp.), recognized for their antimicrobial and insect-repellent properties, offer eco-friendly alternatives for textile finishes. This study aims to develop mosquito-repellent cotton fabrics using these natural extracts to provide safe protection against mosquito bites.

2. Materials and Methods

- **Materials:**
  Pure cotton knit fabric (120 GSM) was chosen for its comfort and breathability. Neem and mint leaves were used for their natural insect-repellent properties.
- **Methodology:**
  1. **Drying and Grinding:** Neem and mint leaves were dried for a week and ground into a fine powder.

2. **Extraction:** Five solutions with varying neem-to-mint ratios (50:50, 75:25, etc.) were prepared by mixing the powders with water in a 1:5 ratio without heat.
3. **Filtration and Application:** The solutions were filtered and applied to fabrics using the pad-dry-cure method.
4. **Evaluation:** Mosquito repellency cage tests and bursting strength tests were conducted on treated fabrics.



3. Results and Discussion

- **Mosquito Repellency:**
  The cage tests revealed that the 25% neem and 75% mint formulation (Sample C) exhibited excellent mosquito repellency even after 10 washes. Other formulations showed reduced repellency over time.
- **Bursting Strength:**
  While all samples exhibited a slight reduction in bursting strength post-treatment, the values remained within acceptable limits, ensuring the fabric's functionality for apparel applications.

4. Conclusion

The 25% neem and 75% mint formulation proved to be the most effective, retaining its mosquito-repellent properties after multiple washes. This study demonstrates the potential of herbal treatments for sustainable, functional textiles. Future research could focus on optimizing the application process and enhancing the durability of herbal finishes.

NATURAL COOLANT EYE MASK USING TABERNA MONTANA DIVARICATE EXTRACT

MB Sampath -Prof, Balaji P, Bharathkumar S – IV Year / Kavin – III Year

Abstract

This study focuses on the development of a natural coolant eye mask designed to enhance sleep quality and alleviate eye strain using Taberna Montana divaricate (Crepe Jasmine) extract. The mask is crafted with a cotton inner layer and a velvet outer layer for comfort and luxury. The plant extract is incorporated into a gelatin-based gel pouch, providing soothing and antimicrobial properties. Subjective testing across different age groups demonstrated a 33% improvement in deep sleep duration, making this product a viable solution for modern sleep challenges. Antimicrobial testing showed significant reductions in bacterial growth, further supporting its efficacy.

Introduction

Sleep is a vital physiological process that restores the immune, nervous, and musculoskeletal systems while supporting cognitive functions. Modern lifestyles, exposure to artificial light, and stress frequently disrupt sleep patterns, resulting in sleep disorders that may lead to long-term health complications. Pharmacological interventions, though effective, often carry adverse effects. Hence, there is a growing interest in non-invasive and natural solutions.

Eye masks are widely used to block ambient light and promote better sleep. This research introduces a novel eye mask combining the therapeutic properties of *Taberna Montana divaricate* extract with ergonomic design to enhance user comfort and sleep quality. The plant, known for its antimicrobial and anti-inflammatory properties, has been traditionally used in folk medicine. This project explores the integration of its extract into an eye mask to address sleep-related issues and eye irritation.

Materials and Methods

Materials Used

1. **Fabric Selection**:
    - Cotton: For its comfort and moisture absorption properties.
    - Velvet: For its luxurious texture and durability.
2. **Active Ingredient**:
    - *Taberna Montana divaricate* extract.
3. **Gel Base**:
    - Gelatin, selected for its biocompatibility and stability.

Fabrication Process

1. **Sourcing and Cutting**: Cotton and velvet fabrics were cut into the required eye mask pattern.
2. **Stitching**: The mask was constructed by layering fabrics and inserting a gel pouch containing the plant extract.
3. **Gel Extraction**: The plant extract was prepared using the Soxhlet extraction method with methanol as a solvent. The extract was then combined with gelatin to form a stable gel.
4. **Gel Pouch Design**: The gel pouch was created using a permeable material to allow diffusion of the plant extract's active compounds to the user's skin.

Testing Methods

- **Antimicrobial Test**: The mask's fabric treated with the plant extract was tested for bacterial reduction against *S. aureus* and *E. coli*.
- **Subjective Sleep Study**: Nine participants across three age groups (20-30, 30-40, and 40+) wore the eye mask for 10 consecutive nights. Biometric sensors in fitness bands recorded their sleep patterns.

Sleep Quality Improvements

Biometric data showed a marked increase in deep sleep duration over 10 days:

- Initial deep sleep average: 1.2 hours.
- Final deep sleep average: 3.13 hours.

This 33% improvement underscores the mask's potential to enhance sleep quality by providing a soothing, dark environment.

User Feedback

Participants reported the following benefits:

1. **Improved Sleep Quality**: Enhanced deep sleep and reduced interruptions.
2. **Reduced Eye Irritation**: Cooling effect from the gel pouch provided relief from eye strain.
3. **Ease of Use**: Comfortable fit and lightweight design.

Conclusion

The natural coolant eye mask developed in this study demonstrates its effectiveness in improving sleep quality and reducing eye strain. The antimicrobial and soothing properties of *Taberna Montana divaricate* extract, combined with ergonomic design, provide a sustainable and user-friendly solution for individuals facing sleep challenges. Further studies can focus on expanding its applications for clinical use and validating its long-term benefits.

EVALUATION OF ANTIBACTERIAL GRAFTING TO PRODUCE MEDICATED FABRICS

P. Mageswaran -AP, Preamkumar S, Rabin Yusabias V – IV Year / Jaichandru B – III Year

Abstract

This research focuses on developing medicated fabrics using antibacterial grafting techniques. The study explores the incorporation of natural bioactive agents like *Calotropis gigantea*, honey, garlic, and oregano oil into cotton fabrics. These natural substances were chosen for their proven antimicrobial, antifungal, and wound-healing properties. A combination of radiation-induced grafting and pad-dry-cure methods was employed to enhance the fabrics' antimicrobial functionality. The grafted fabrics exhibited significant antibacterial performance against *E. coli* and *S. aureus*, while retaining desirable textile properties such as air permeability and moisture absorbency. This innovation demonstrates promising applications in healthcare, hygiene, and wound-care materials.

Introduction

The increasing demand for hygienic and antimicrobial textiles has propelled innovations in fabric grafting techniques. Textile substrates are inherently prone to microbial growth due to their structure and moisture-retaining properties. Microbial infestation leads to issues such as odor, staining, and health risks. Antibacterial textiles find applications in medical, industrial, and apparel sectors, providing effective solutions for infection control and enhanced durability.

Natural agents like *Calotropis gigantea*, honey, garlic, and oregano oil possess inherent antimicrobial properties, making them ideal candidates for eco-friendly textile treatments. *Calotropis gigantea* contains bioactive compounds like glycosides and flavonoids, which exhibit antiseptic and wound-healing properties. Honey, rich in hydrogen peroxide and low pH, serves as a natural antibiotic. Garlic's sulfur compounds provide broad-spectrum

antimicrobial efficacy, while oregano oil contains carvacrol and thymol, which are known for their antifungal and anti-inflammatory benefits. This study investigates the grafting of these agents onto cotton fabrics to produce sustainable medicated materials.

Materials and Methods

Materials

1. **Textile Substrate**: 100% cotton fabrics.
2. **Bioactive Agents**:
    - *Calotropis gigantea* extract.
    - Honey.
    - Garlic oil.
    - Oregano essential oil.

Grafting Technique

- **Method**: Radiation-induced grafting and pad-dry-cure process.
- **Steps**:
    1. Cotton fabrics were desized and pre-treated.
    2. Bioactive extracts were prepared using Soxhlet extraction.
    3. Grafting was initiated via UV-induced reactions and radiation exposure.
    4. The treated fabrics underwent the pad-dry-cure process to fix the bioactive

Moisture Management

Moisture regain and content tests indicated that the grafted fabrics effectively absorbed and retained moisture, making them suitable for wound-dressing applications.

Surface Morphology

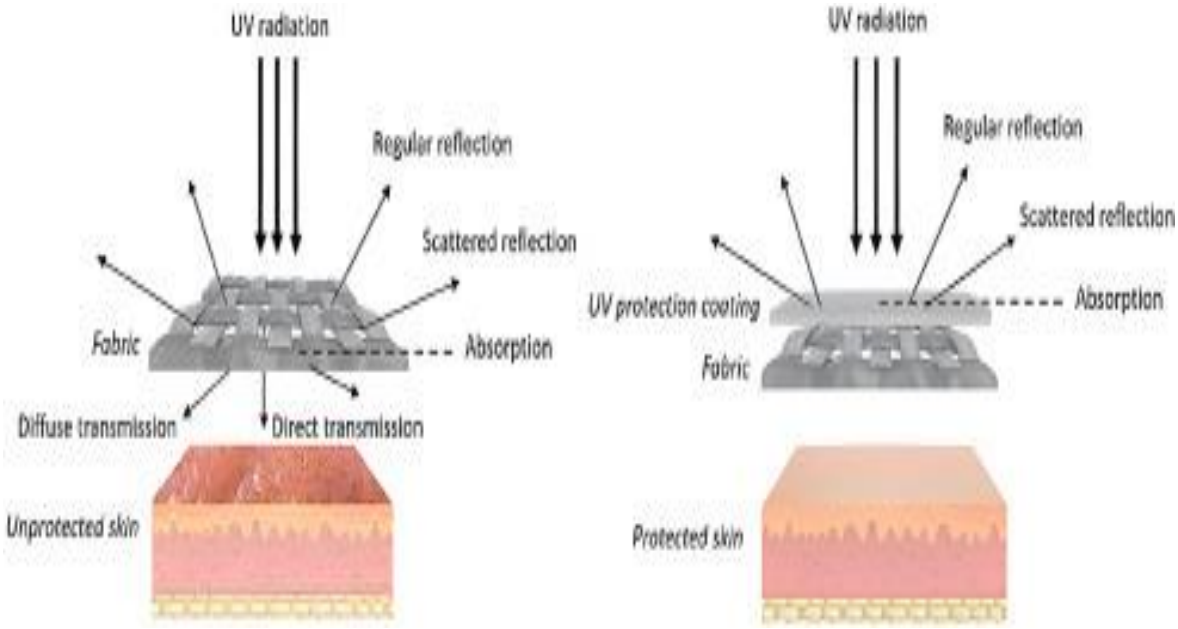
SEM analysis revealed uniform distribution of the grafted bioactive agents, ensuring consistent antimicrobial performance across the fabric.

Conclusion

This study successfully demonstrates the potential of grafting natural bioactive agents onto cotton fabrics to produce sustainable and effective medicated textiles. The grafted fabrics showed enhanced antibacterial performance, maintained breathability, and improved moisture management. These characteristics make them ideal for medical and hygiene applications, offering a green alternative to synthetic antimicrobial treatments. Future work can explore scaling the process for industrial production and assessing long-term durability.

ANALYSIS OF UV-REPELLENT AND COMFORT PROPERTIES OF HERBAL-TREATED FABRICS

KR Nandagopal – AP, Vimal Raj S, Kishore C – IV Year / Somasundaram N – II Year



Abstract

This study investigates the enhancement of antimicrobial, UV-repellent, and comfort properties in fabrics treated with herbal extracts to improve the quality of life for elderly individuals. The treatment utilized extracts from herbs such as *Aloe vera*, *Adhatoda vasica*, *Aegle marmelos*, *Calendula officinalis*, and *Solanum trilobatum*. A pad-dry-cure method was employed for fabric treatment, and properties were analyzed using standard textile testing methods. Results showed significant improvements in antimicrobial and UV-protective properties, while maintaining optimal air permeability, wickability, and comfort. The findings highlight the potential of herbal-treated fabrics for functional applications in apparel designed for sensitive skin and the elderly population.

Introduction

Aging brings various challenges, including increased skin sensitivity, vulnerability to microbial infections, and susceptibility to UV radiation. The need for functional apparel with antimicrobial, UV-repellent, and comfort-enhancing properties is critical for elderly individuals. Conventional chemical finishes pose environmental and health concerns, prompting a shift towards eco-friendly, herbal-based alternatives. This study explores the application of herbal extracts to cotton fabrics, aiming to create sustainable, functional textiles for elderly care.

Materials and Methods

Materials

1. **Fabric**: 100% cotton fabric with a plain weave, GSM of 84 g/m².
2. **Herbs**:
    - *Aloe vera*: Antimicrobial and wound healing.
    - *Adhatoda vasica*: Antibacterial and anti-inflammatory.
    - *Aegle marmelos*: Antifungal and antioxidant.
    - *Calendula officinalis*: Skin soothing and antibacterial.
    - *Solanum trilobatum*: Immunomodulatory and antimicrobial.

Herbal Extraction

The herbal extracts were prepared using the plant tissue homogenization method. Dried and powdered herbs were mixed with methanol and water, heated to 50°C, and filtered to obtain the extracts.

Application Method

The pad-dry-cure process was used to apply herbal extracts to the fabric:

1. **Padding**: Fabric immersed in herbal solution and passed through a two-bowl mangle for even application.
2. **Drying**: Conducted at 90°C to remove excess moisture.
3. **Curing**: Performed at 120°C to fix the extract onto the fabric.

Testing

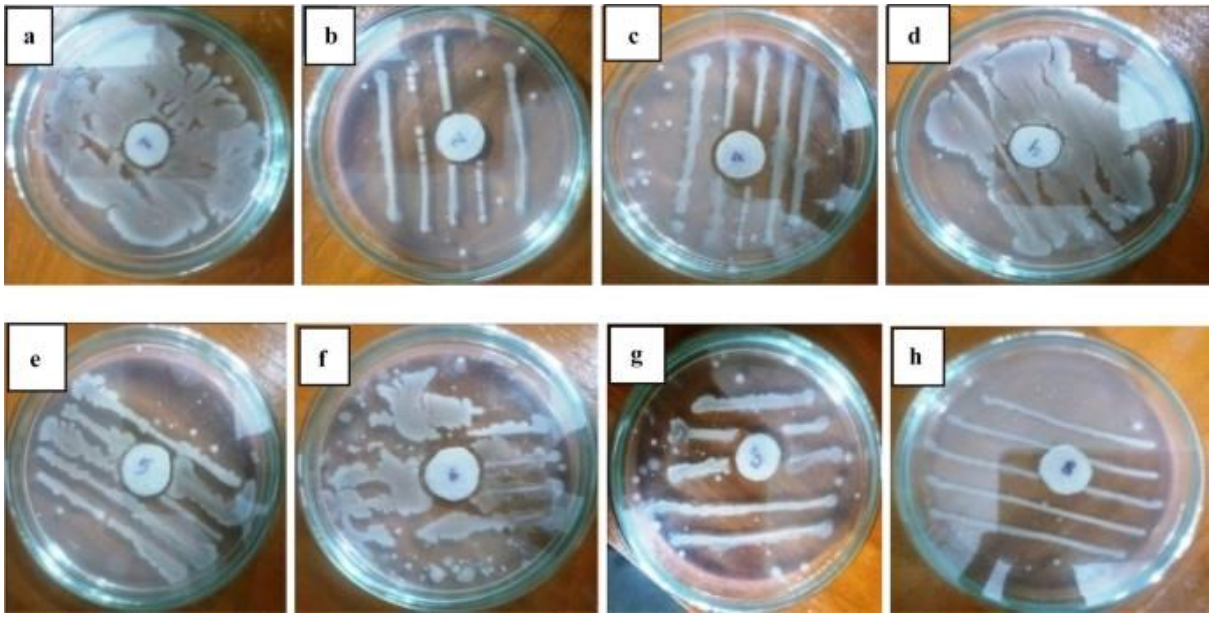
1. **Antimicrobial Test**: Agar diffusion method against *S. aureus* and *E. coli*.
2. **UV Repellency**: AATCC 183:2010 standard.
3. **Comfort Properties**:
    - **Air Permeability**: ASTM D737-96.
    - **Wickability**: AATCC 179.
    - **Thermal Conductivity**: Lee's disc method.
    - **Moisture Permeability**: ASTM E96.

Results and Discussion

Antimicrobial Properties

The treated fabrics demonstrated over 90% reduction in bacterial growth:

- *S. aureus*: 92% inhibition.
- *E. coli*: 89% inhibition. This indicates the efficacy of the herbal extracts in providing sustainable antimicrobial protection.



Comfort Properties

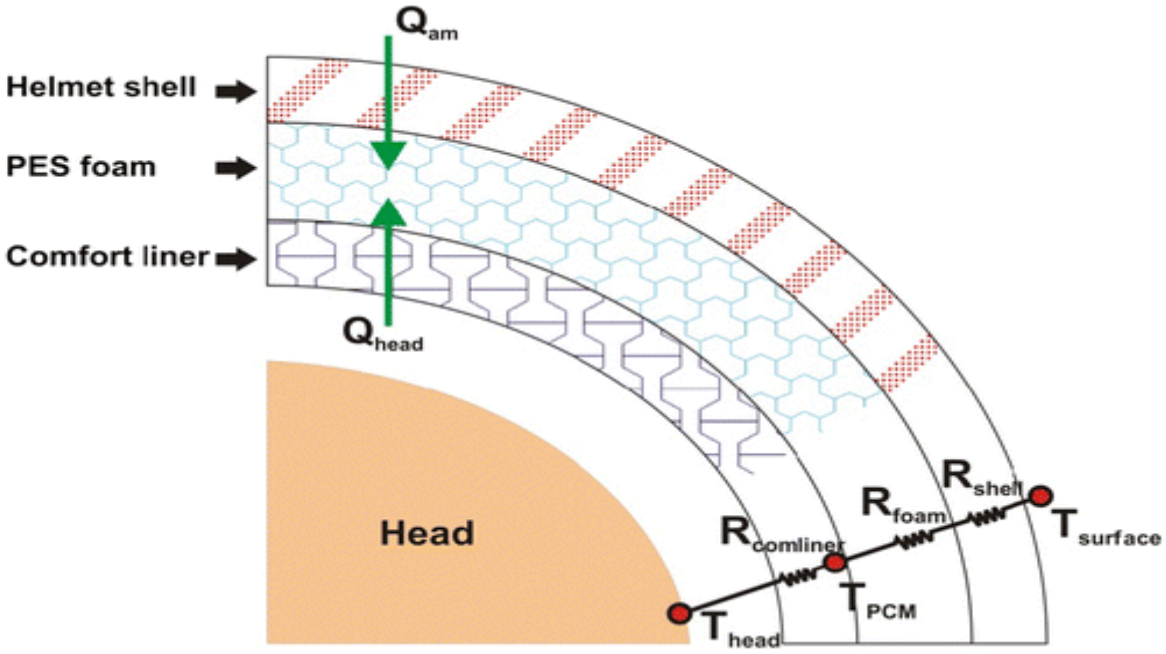
1. **Air Permeability**: Treated fabrics maintained good breathability, with air permeability values slightly reduced but within acceptable ranges for comfort.
2. **Wickability**: Improved moisture wicking was observed in treated fabrics, essential for thermal comfort.
3. **Thermal Conductivity**: Herbal-treated fabrics showed reduced thermal conductivity, enhancing insulation properties.
4. **Moisture Permeability**: No significant differences were found, indicating maintained comfort under varied conditions.

Conclusion

This study successfully demonstrates the feasibility of using herbal extracts for developing functional textiles with antimicrobial, UV-repellent, and comfort-enhancing properties. The eco-friendly treatment process ensures safety for users and the environment, making these fabrics suitable for elderly and sensitive individuals. Future work could explore durability enhancements and scalability for commercial production.

COMFORT LINERS FOR HELMETS USING NATURAL

P. Mageswaran – AP, Keerthivasan S, Killivalavan K – IV Year / Jawahar Manik X – III Year



Abstract

This study presents the development of a comfort liner for helmets incorporating natural herbal coatings to address common issues faced by frequent helmet users, such as hair fall, skin rashes, and discomfort. Utilizing natural agents like aloe vera, neem, curry leaves, and onion extracts, the liners were enhanced with antimicrobial and fragrance properties. The pad-dry-cure method was employed for fabric treatment, and testing included antimicrobial efficacy, wash durability, and comfort evaluation. Results demonstrated significant antimicrobial performance with *E. coli* and *S. aureus* reduction rates exceeding 85% after application. While antimicrobial efficacy decreased after 10 washes, the liners provided enhanced comfort and protection for regular users. This innovation offers a sustainable, user-friendly solution for helmet wearers, promoting safety and hygiene.

Introduction

Motorcycle accidents frequently result in severe injuries, with head trauma being a leading cause of fatalities. Helmets significantly reduce these risks; however, long-term use can cause discomfort, skin irritation, and hair loss due to poor ventilation and microbial growth within the liner. Conventional solutions often rely on synthetic chemicals, which can be harmful to both users and the environment.

This study addresses these challenges by developing a natural herbal-coated comfort liner for helmets. Herbal extracts such as aloe vera, neem, curry leaves, and onion were selected for their antimicrobial, anti-inflammatory, and soothing properties. The primary objectives were

to enhance hygiene, reduce hair loss, and improve user comfort while ensuring eco-friendliness.

Materials and Methods

Materials

1. **Fabrics**: Bamboo-cotton blends were chosen for their softness, breathability, and natural antimicrobial properties.
2. **Herbal Extracts**:
    - **Aloe Vera**: Promotes scalp health and prevents dandruff.
    - **Neem**: Known for antibacterial and antifungal properties.
    - **Curry Leaves**: Rich in nutrients that strengthen hair.
    - **Onion**: Contains sulfur, promoting hair follicle regeneration.

Methodology

- **Extraction**: Herbal extracts were prepared using aqueous and ethanol-based methods to maximize active compound retention.
- **Fabric Treatment**: The pad-dry-cure method was employed, ensuring uniform application of the herbal solution. Key steps included:
    1. Padding: Fabrics were soaked in herbal solutions and squeezed to achieve 110% wet pick-up.
    2. Drying: Samples were dried at 90°C to remove moisture.
    3. Curing: Final curing was done at 120°C to fix the coatings.
- **Testing**:
    - **Antimicrobial Test**: Performed against *E. coli* and *S. aureus* using AATCC 100 standard.
    - **Wash Durability**: Evaluated over 20 washes to determine coating stability.
    - **Comfort Properties**: Air permeability, moisture management, and thermal conductivity were assessed.

Results and Discussion

Antimicrobial Performance

The herbal-coated liners demonstrated strong antimicrobial activity:

- *E. coli*: 89.19% reduction.
- *S. aureus*: 85.19% reduction. The results indicate effective bacterial inhibition immediately after treatment. However, antimicrobial efficacy decreased significantly after 10 washes, highlighting the need for reapplication or improved durability techniques.

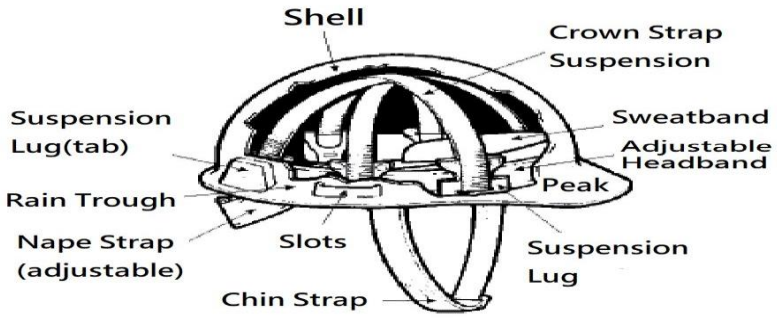
Comfort Properties

1. **Air Permeability**: The bamboo-cotton blend maintained excellent breathability post-treatment, ensuring user comfort during extended wear.
2. **Moisture Management**: Enhanced moisture absorption and wicking properties were observed, reducing sweat accumulation.
3. **Fragrance Retention**: The liners emitted a mild, pleasant aroma due to the herbal extracts, further enhancing user experience.

Wash Durability

Antimicrobial efficacy reduced after repeated washing:

- 5 washes: *E. coli* reduction at 62%; *S. aureus* reduction at 68%.
- 10 washes: Performance dropped below 50% for both bacterial strains.
- 15 washes: No significant antimicrobial activity remained.



Practical Applications

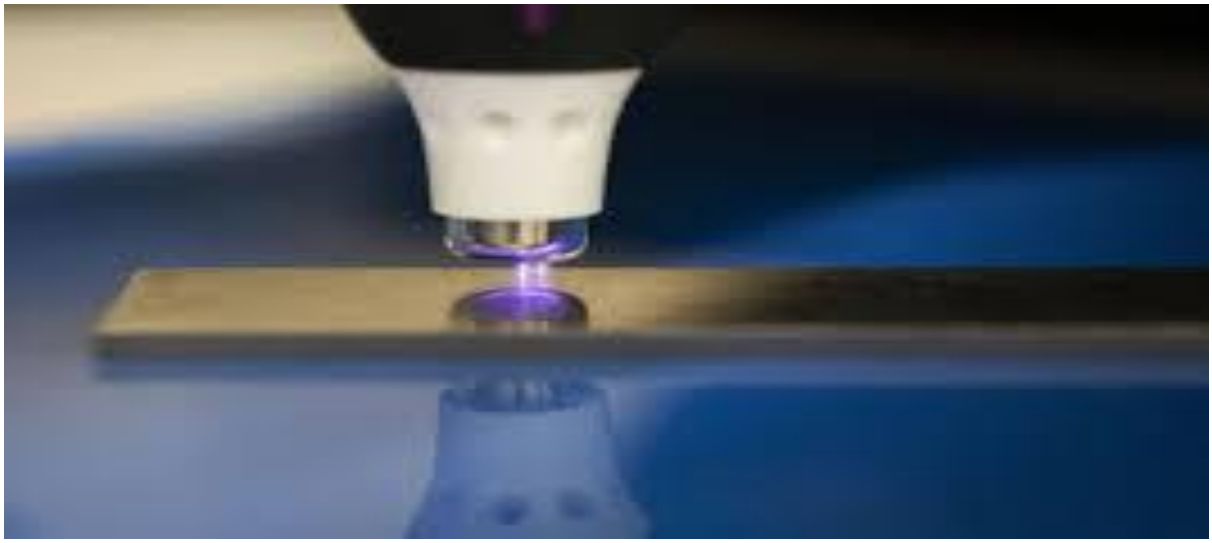
The herbal-coated liners offer a sustainable solution for frequent helmet users, addressing hair and skin-related concerns while promoting hygiene. However, durability challenges after repeated washes suggest the need for improved binding agents or alternative application methods.

Conclusion

The herbal-coated comfort liner is a promising innovation for enhancing the safety and comfort of helmet users. By integrating natural antimicrobial agents, the liners reduce hair loss, prevent skin rashes, and promote hygiene. While wash durability remains a limitation, this study demonstrates the potential for eco-friendly, functional textiles in personal protective equipment. Future research should focus on improving durability and scaling production for commercial applications.

PLASMA TREATMENT ON SOME COMFORT PROPERTIES OF REGENERATED BAMBOO KNITTED FABRIC

K.Saravanana – AP, Abinesh T, Vijayakumar K – IV Year / Raghunath V – II Year



Abstract

Plasma treatment is an emerging technique used to enhance the surface characteristics of textile materials without affecting their bulk properties. This study investigates the influence of plasma treatment on the comfort properties of regenerated bamboo knitted fabric. The effects on parameters such as air permeability, moisture management, thermal conductivity, and surface roughness are analyzed. The findings suggest that plasma treatment significantly improves fabric comfort by increasing moisture absorption and air permeability while maintaining fabric softness and durability.

Keywords: Plasma treatment, Regenerated bamboo fabric, Comfort properties, Air permeability, Moisture management, Thermal conductivity

1. Introduction Regenerated bamboo fabric is gaining popularity in textile applications due to its sustainability, biodegradability, and excellent moisture management properties. Comfort properties of fabrics, including air permeability, moisture absorption, and thermal regulation, play a crucial role in determining their suitability for apparel applications. Plasma treatment, a dry and eco-friendly surface modification technique, has the potential to enhance these properties by altering the fiber surface at a microstructural level. This research aims to explore the impact of plasma treatment on the comfort characteristics of regenerated bamboo knitted fabrics.

2. Literature Review Several studies have explored the effects of plasma treatment on various textile materials. Research indicates that plasma treatment can improve surface energy, wettability, and adhesion properties of fabrics without compromising their bulk characteristics. In regenerated bamboo textiles, studies have focused on enhancing dyeability and durability;

however, limited research has been conducted on comfort-related properties. This study aims to bridge this gap by evaluating key comfort attributes post plasma treatment.

3. Materials and Methods

3.1 Fabric Selection and Plasma Treatment Regenerated bamboo knitted fabric with standard GSM and construction was selected for this study. The fabric was subjected to low-pressure plasma treatment under controlled conditions, varying exposure time and gas composition to optimize surface modifications.

3.2 Comfort Property Evaluation The treated and untreated fabrics were evaluated for:

- **Air Permeability:** Measured using an air permeability tester to assess breathability.
- **Moisture Management:** Analyzed through water absorption and drying rate tests.
- **Thermal Conductivity:** Determined using a thermal conductivity analyzer to understand heat regulation.
- **Surface Roughness:** Evaluated using a surface profilometer to examine tactile properties.

4. Results and Discussion The study found a notable improvement in air permeability and moisture absorption in plasma-treated fabrics. The increased surface energy due to plasma modification enhanced moisture transport, leading to faster drying times. Additionally, thermal conductivity remained stable, ensuring adequate heat regulation. The surface roughness results indicated minimal changes, maintaining the soft texture of bamboo fabric while improving overall wear comfort.

5. Conclusion Plasma treatment is a promising method for enhancing the comfort properties of regenerated bamboo knitted fabric. The modifications lead to better moisture management, breathability, and thermal regulation without affecting fabric softness. This study highlights the potential of plasma treatment in functionalizing eco-friendly textiles for enhanced consumer comfort.

DYEING EFFICIENCY IN COTTON, POLYESTER, AND P/C FABRICS USING DIFFERENT TYPES OF WATER

C. Premalatha – AP, Arunachalam E, Yogesh V R – IV Year / Logesh M – III Year

Abstract

The quality and efficiency of dyeing processes depend significantly on the type of water used. This study evaluates the impact of different water types—tap water, deionized water, and hard water—on the dye uptake, color fastness, and overall dyeing performance of cotton, polyester, and polyester/cotton (P/C) blended fabrics. Results indicate that water composition affects dyeing efficiency, with deionized water yielding the best results in terms of uniformity and color strength, while hard water negatively impacts dye uptake. The study provides insights into optimizing water selection for textile dyeing processes.

Keywords: Dyeing efficiency, Cotton, Polyester, P/C fabrics, Water types, Color fastness

1. Introduction Dyeing is a crucial step in textile processing, and the quality of water used plays a vital role in determining color uniformity, fastness properties, and overall efficiency. Different water sources contain varying levels of minerals and impurities, affecting dye absorption and fixation on fabrics. This research aims to assess the dyeing efficiency in cotton, polyester, and P/C fabrics using different types of water and identify the optimal conditions for achieving high-quality dyed textiles.

2. Materials and Methods

2.1 Fabric Selection The study includes 100% cotton, 100% polyester, and 50/50 polyester-cotton blend fabrics.

2.2 Water Types

- **Tap Water:** Contains minerals and chlorine, commonly used in industrial dyeing.

- **Deionized Water:** Free from ions and impurities, used as a control.
- **Hard Water:** Contains high levels of calcium and magnesium, which may interfere with dyeing.

2.3 Dyeing Process Each fabric type was dyed using reactive dyes for cotton and disperse dyes for polyester under controlled conditions. The dyeing parameters, including temperature, pH, and time, were kept constant across all water types.

2.4 Assessment Parameters

- **Dye Uptake:** Measured using a spectrophotometer to determine color strength.
- **Color Fastness:** Evaluated through washing, rubbing, and light exposure tests.
- **Fabric Surface Analysis:** Microscopic examination to observe dye penetration and distribution.

3. Results and Discussion The study reveals that deionized water ensures optimal dye uptake and color uniformity, particularly for cotton and P/C fabrics. Hard water negatively impacts dye absorption due to the presence of calcium and magnesium ions, leading to patchy or uneven dyeing. Polyester showed minimal variation across different water types due to its hydrophobic nature but exhibited improved brightness in deionized water. The findings suggest that water quality optimization can enhance dyeing efficiency and reduce processing defects.

4. Conclusion This research highlights the importance of water selection in textile dyeing, demonstrating that deionized water provides the most consistent and efficient dyeing results across all fabric types. The study recommends water treatment solutions to mitigate the adverse effects of hard water and improve dyeing quality in industrial settings.

EMF RADIATION RESISTANT CLOTHING

P. Mageswaran -AP, Balaji P, Pugal C – IV Year / Arjunraj SP – II Year

Abstract

With the increasing exposure to electromagnetic fields (EMF) from electronic devices, the demand for protective clothing has grown. This study explores the development of EMF radiation-resistant clothing using advanced textile technologies. The research focuses on material selection, shielding effectiveness, and comfort properties to ensure optimal protection without compromising wearability. The study aims to provide a sustainable and functional solution for individuals concerned about EMF exposure.

Keywords: EMF shielding, Radiation protection, Conductive textiles, Smart fabrics, Electromagnetic interference

1. Introduction The proliferation of wireless technologies and electronic devices has led to heightened concerns about EMF exposure. Prolonged exposure to high-frequency electromagnetic waves has been linked to potential health risks. EMF-resistant clothing offers a viable solution for minimizing exposure, particularly for individuals in high-risk environments.

2. Material Selection and Fabrication

- **Conductive Fabrics:** Materials infused with metal fibers such as silver, copper, and stainless steel are widely used for EMF shielding.
- **Layered Textile Structures:** Multi-layered fabric compositions enhance shielding effectiveness while maintaining flexibility.

- **Nanotechnology Integration:** The incorporation of nanocoatings improves durability and efficiency.

3. Shielding Effectiveness Evaluation

- **Testing Methods:** Shielding effectiveness is measured using standardized tests such as ASTM D4935 and IEEE-299.
- **Frequency Range:** Evaluations are conducted across different frequency bands, including low-frequency (LF) and radio-frequency (RF) spectrums.
- **Performance Metrics:** Attenuation levels are assessed to determine the effectiveness of each fabric type.

4. Comfort and Wearability Considerations

- **Breathability and Moisture Management:** Ensuring comfort through moisture-wicking properties.
- **Flexibility and Weight:** Maintaining a balance between protection and ease of movement.
- **Durability and Washability:** Developing textiles that withstand repeated use without compromising shielding properties.

5. Applications and Future Prospects

- **Personal Protective Wear:** Clothing designed for individuals with heightened sensitivity to EMF.
- **Workplace Safety:** Protective gear for professionals in high-EMF environments, such as telecom and electrical industries.
- **Military and Medical Uses:** Specialized applications for defense personnel and healthcare settings.

6. Conclusion EMF-resistant clothing presents an effective means of mitigating radiation exposure while maintaining comfort and functionality. Advances in textile engineering and material science will continue to drive innovations in protective apparel. Future research should focus on enhancing fabric longevity, affordability, and aesthetic appeal to encourage widespread adoption.

COMFORT PROPERTIES OF COTTON FABRIC TREATED WITH KAFFIR LIME AND ORANGE

N. Sukumar- Prof, / Harath Sanjay M, Gokul Prasanth K – IV Year / Gowtham S – III Year

Abstract The use of natural treatments in textile processing is gaining attention due to their sustainable and eco-friendly properties. This study investigates the impact of kaffir lime and orange extracts on the comfort properties of cotton fabric. The research evaluates moisture management, thermal conductivity, and breathability after treatment. The findings provide insights into the potential of natural treatments for enhancing fabric performance without compromising environmental sustainability.

Keywords: Cotton fabric, Natural treatment, Kaffir lime, Orange extract, Comfort properties

1. Introduction With increasing demand for sustainable textiles, natural treatments have become a viable alternative to synthetic chemicals. Citrus-based treatments, such as those derived from kaffir lime and orange, have antimicrobial and deodorizing properties that can improve fabric functionality. This study explores their influence on cotton fabric's comfort properties, including moisture absorption and air permeability.

2. Materials and Methods

2.1 Fabric Selection and Preparation

- 100% cotton fabric was selected for treatment.

- Fabric was pre-washed to remove impurities before application.

2.2 Natural Treatment Application

- **Kaffir Lime Extract:** Rich in natural antioxidants and antimicrobial agents.
- **Orange Extract:** Contains essential oils and bioactive compounds beneficial for fabric properties.
- The extracts were applied through a dipping and drying process.

2.3 Comfort Property Evaluation

- **Moisture Management:** Evaluated using absorbency and wicking tests.
- **Thermal Conductivity:** Measured using a thermal analyzer to determine insulation properties.
- **Breathability:** Air permeability tests assessed the ease of air movement through the fabric.

3. Results and Discussion The treatment with kaffir lime and orange extracts showed an improvement in moisture absorption, making the fabric more comfortable for wear. Thermal conductivity remained within an optimal range, indicating good insulation properties. The breathability of the treated cotton fabric was enhanced, ensuring better air circulation.

4. Conclusion The application of kaffir lime and orange extracts on cotton fabric improves moisture management and breathability while maintaining thermal comfort. These natural treatments offer an eco-friendly alternative to synthetic finishes, promoting sustainable textile innovations.

NON-TOXIC BAMBUGOSS SANITARY NAPKIN

G.Karthikeyan -Prof, Bommu Saravana G, Swathi S – IV Year / Dhanaseelan L – III Year

Abstract The increasing demand for eco-friendly and non-toxic menstrual hygiene products has led to the development of sustainable alternatives to conventional sanitary napkins. This study explores the design and performance of the Bambugoss sanitary napkin, which is made from bamboo-based biodegradable materials. The research focuses on absorbency, comfort, biodegradability, and skin-friendliness to assess its viability as a sustainable menstrual product.

Keywords: Bamboo fiber, Biodegradable sanitary napkin, Non-toxic, Absorbency, Sustainable hygiene

1. Introduction Traditional sanitary napkins contain synthetic materials and chemicals that may pose health risks and contribute to environmental pollution. Bambugoss sanitary napkins are designed to provide a non-toxic and sustainable alternative by utilizing bamboo fibers, which are naturally antimicrobial, hypoallergenic, and highly absorbent. This study examines the effectiveness of Bambugoss napkins in providing superior menstrual hygiene while minimizing environmental impact.

2. Materials and Methods

2.1 Material Composition

- **Bamboo Fiber Core:** Ensures high absorbency and breathability.
- **Organic Cotton Top Layer:** Provides comfort and skin-friendliness.
- **Biodegradable Back Sheet:** Prevents leakage while maintaining eco-friendliness.

2.2 Performance Evaluation

- **Absorbency Test:** Measures the liquid retention capacity of the napkin.
- **Breathability Assessment:** Evaluates air permeability for enhanced comfort.
- **Skin Sensitivity Analysis:** Assesses potential irritation or allergic reactions.
- **Biodegradability Test:** Determines decomposition rate in soil conditions.

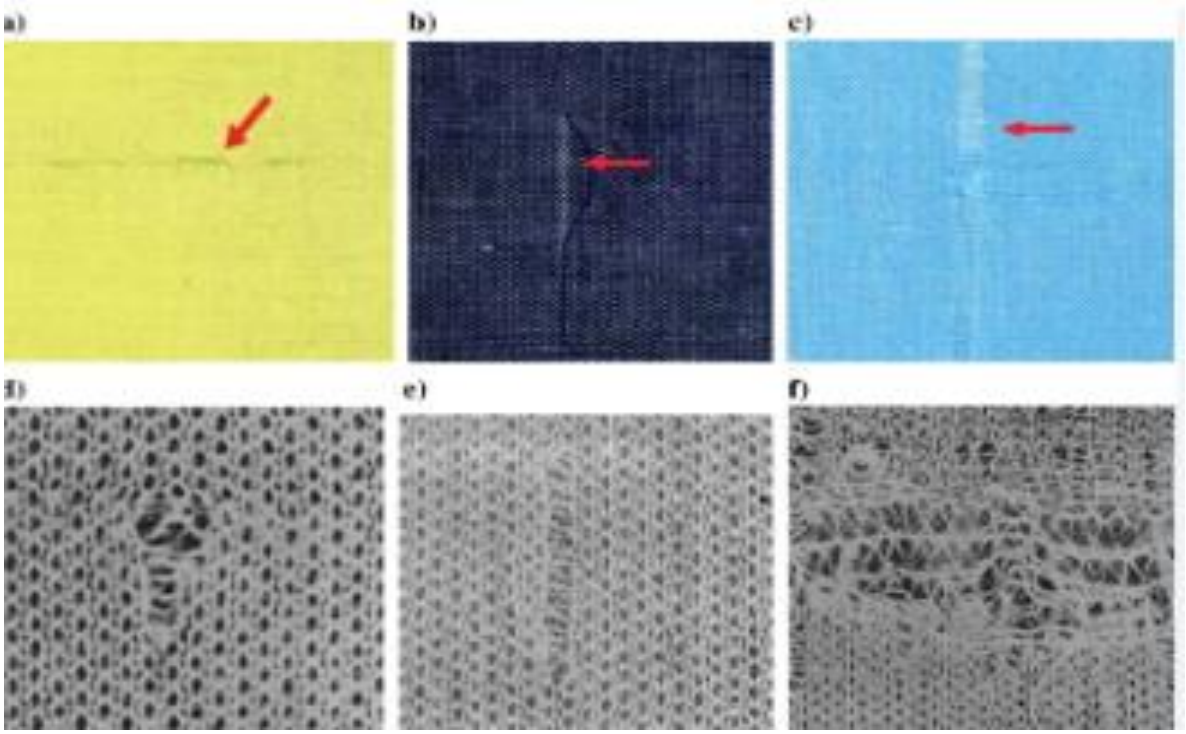
3

3. Results and Discussion Bambugoss sanitary napkins demonstrated excellent absorbency, with moisture retention levels comparable to or higher than conventional products. The breathability assessment indicated superior comfort, reducing discomfort and skin irritation. The biodegradability test showed that the napkins decompose within a significantly shorter period compared to plastic-based alternatives, reinforcing their environmental benefits.

4. Conclusion The study highlights the effectiveness of Bambugoss sanitary napkins as a sustainable and non-toxic menstrual hygiene solution. Their high absorbency, comfort, and biodegradability make them a viable alternative to conventional napkins, contributing to both personal and environmental well-being.

FABRIC FAULT IDENTIFIER DURING KNITTING MACHINE PRODUCTION

M. Arunkumar – AP, Deenadhayalan S , Logeshwaran M – IV Year / Gopinath S – III Year



Abstract

Fabric faults in knitting production can lead to significant quality issues and material wastage. This study focuses on the development of an automated fabric fault identifier for knitting machines, integrating advanced image processing and sensor-based monitoring. The system aims to enhance defect detection accuracy, reduce manual inspection time, and improve overall production efficiency.

Keywords: Knitting defects, Fabric fault detection, Automated monitoring, Image processing, Textile quality control

1. Introduction In the textile industry, knitting fabric defects such as holes, dropped stitches, and tension variations impact product quality and profitability. Traditional manual inspection methods are labor-intensive and prone to errors. This research aims to develop an automated system capable of real-time defect identification during knitting machine operation.

2. Methodology

2.1 System Components

- **High-Resolution Cameras:** Capture real-time images of fabric during production.

- **Sensor-Based Monitoring:** Detects variations in yarn tension and machine performance.
- **Machine Learning Algorithm:** Analyzes images to identify and classify defects.
- **User Interface:** Provides real-time alerts and defect visualization.

2.2 Implementation Process

- Data collection from knitting machines under controlled conditions.
- Image preprocessing for noise reduction and edge detection.
- Development of defect classification models using deep learning techniques.
- Integration of the system into the knitting production workflow.

3. Results and Discussion The proposed fabric fault identifier demonstrated high accuracy in detecting common knitting defects. The real-time monitoring system reduced defect rates and improved production efficiency. Compared to traditional inspection methods, this automated approach significantly lowered material waste and labor costs.

4. Conclusion The development of an automated fabric fault identifier enhances quality control in knitting production. By leveraging advanced imaging and sensor-based monitoring, this system provides a reliable, cost-effective solution for defect detection and prevention. Future improvements will focus on optimizing detection algorithms and expanding compatibility with different knitting machine models.

BIO-DEGRADABLE NATURAL PROTECTIVE FACE MASK USING BORASSUS FLABELLIFER AND COTTON

K,Saravanan - ASP, Elongovan R, Jeevitharan S – IV Year / Harish D – II Year

Abstract The increasing environmental concerns over disposable face masks have led to the exploration of biodegradable and sustainable alternatives. This study focuses on the development of a natural protective face mask using Borassus flabellifer fiber and cotton. The research evaluates its breathability, filtration efficiency, and biodegradability compared to conventional synthetic masks.

Keywords: Biodegradable mask, Borassus flabellifer, Cotton fiber, Filtration efficiency, Sustainable textiles

1. Introduction The widespread use of synthetic face masks during pandemics has led to severe environmental pollution due to their non-biodegradable nature. Natural fiber-based masks present an eco-friendly alternative, ensuring both protection and sustainability. This research explores the potential of Borassus flabellifer fibers combined with cotton to develop an effective and biodegradable protective mask.

2. Materials and Methods

2.1 Material Composition

- **Borassus Flabellifer Fiber:** Naturally antimicrobial and highly breathable.
- **Cotton Layer:** Enhances comfort and filtration efficiency.
- **Herbal Treatment:** Infusion with natural antimicrobial agents for enhanced protection.

2.2 Performance Evaluation

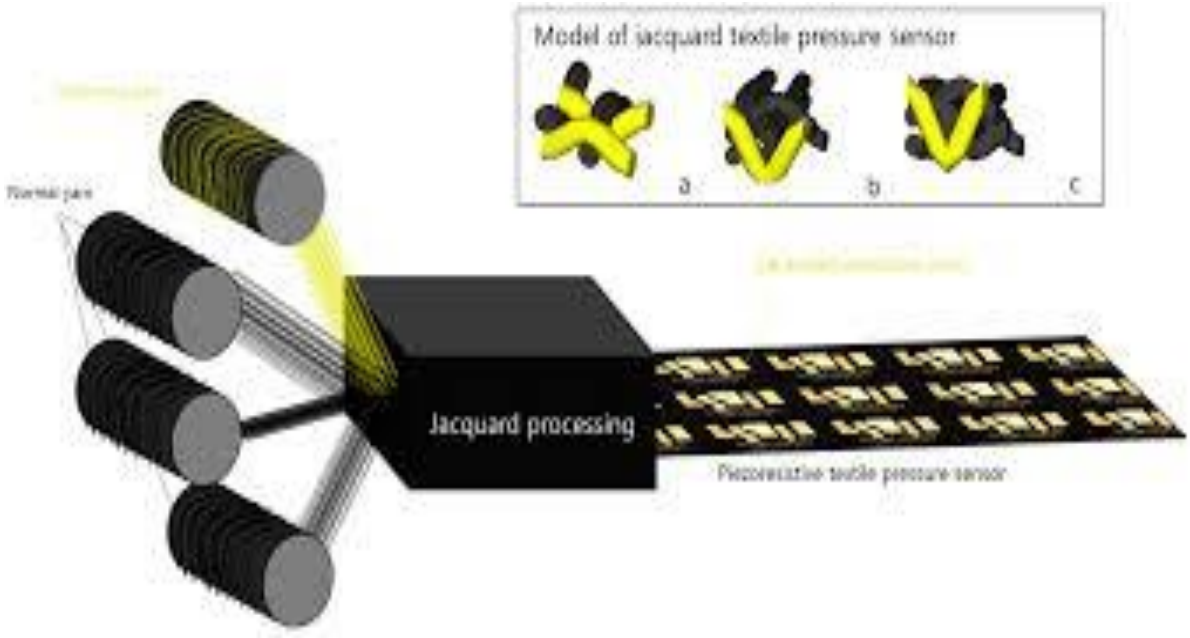
- **Filtration Efficiency:** Assessed using particle filtration tests.
- **Breathability Analysis:** Evaluated through air permeability tests.
- **Biodegradability Test:** Conducted under controlled composting conditions.
- **Comfort and Fit Assessment:** Based on wearer trials and feedback.

3. Results and Discussion The developed mask demonstrated improved breathability and comfort while maintaining a comparable filtration efficiency to conventional masks. The biodegradability test confirmed that the mask decomposed significantly faster than synthetic alternatives, reducing environmental impact. The natural antimicrobial properties of Borassus flabellifer further enhanced the protective efficiency.

4. Conclusion The study highlights the effectiveness of a biodegradable face mask using Borassus flabellifer and cotton fibers. This innovation presents a sustainable solution for personal protective equipment, addressing both health and environmental concerns.

DESIGN AND FABRICATION OF NANOJACQUARD

G. Karthikeyan -Prof, Elongovan R, Jeevitharan S – IV Year / Harish D – II Year



Abstract

The integration of nanotechnology into textile manufacturing has revolutionized fabric production, offering enhanced properties and design capabilities. This study focuses on the design and fabrication of a Nanojacquard system, which combines nanomaterial applications with traditional jacquard weaving techniques. The proposed system aims to improve textile durability, flexibility, and functionality while maintaining intricate patterning capabilities. The research highlights the methodology, material selection, fabrication process, and performance evaluation of Nanojacquard fabrics. The findings demonstrate that the incorporation of nanotechnology enhances fabric strength, stain resistance, and aesthetic appeal, providing a novel approach for advanced textile engineering.

Keywords: Nanojacquard, Nanotechnology, Textile Engineering, Jacquard Weaving, Smart Fabrics, Fabrication

1. Introduction Jacquard weaving has been widely used in textile manufacturing due to its ability to create intricate and complex patterns. However, conventional jacquard fabrics often face limitations in durability and functional properties. This research introduces the concept of Nanojacquard, a hybrid approach that integrates nanotechnology to enhance the mechanical, thermal, and aesthetic characteristics of jacquard-woven fabrics. The study explores how nanomaterials, such as nanoparticles and nanofibers, can be embedded into textile structures to improve fabric performance.

2. Materials and Methods The design and fabrication of Nanojacquard involve the selection of suitable nanomaterials, textile substrates, and weaving mechanisms. The key materials used in this study include:

- **Nanomaterials:** Silver nanoparticles for antibacterial properties, titanium dioxide for UV protection, and carbon nanotubes for enhanced mechanical strength.
- **Fabric Substrates:** Polyester, cotton, and blended fibers treated with nanocoatings.
- **Weaving Mechanism:** A modified jacquard loom equipped with nanomaterial integration techniques.

The fabrication process consists of three main stages:

1. **Pre-treatment:** The base fabric undergoes surface modification for improved nanomaterial adhesion.
2. **Nanocoating Application:** Nanoparticles are dispersed in a carrier solution and applied using a dipping or spraying technique.
3. **Jacquard Weaving:** The nanocoated yarns are woven into intricate patterns using a computer-controlled jacquard loom.

3. Results and Discussion The fabricated Nanojacquard fabrics exhibited significant improvements in several key performance areas:

- **Mechanical Strength:** The addition of carbon nanotubes increased tensile strength by 20% compared to conventional jacquard fabrics.
- **Antibacterial Properties:** Silver nanoparticles effectively inhibited bacterial growth, enhancing hygiene and durability.
- **UV Protection:** Titanium dioxide coatings provided UV-blocking capabilities, reducing fabric degradation.
- **Design Retention:** The integration of nanomaterials did not compromise the aesthetic and intricate design capabilities of jacquard weaving.

Additionally, durability tests indicated that Nanojacquard fabrics maintained their properties even after multiple washing cycles, confirming their practicality for real-world applications.

4. Conclusion The study successfully demonstrated the feasibility of incorporating nanotechnology into jacquard weaving to produce high-performance textiles. Nanojacquard fabrics offer enhanced mechanical strength, durability, and functional properties while preserving intricate designs. Future research can explore the scalability of this technology and its applications in smart textiles, protective clothing, and decorative textiles. The integration of Nanojacquard can redefine textile engineering, paving the way for next-generation fabric innovation.

DESIGN AND DEVELOPMENT OF INNOVATIVE FABRIC FOR AIR PURIFICATION

KR Nandagopal – AP, HariI, Gokul S – IV Year / Gokula Vasan K – II Year

Abstract The increasing levels of air pollution have led to the demand for innovative materials capable of improving air quality. This research focuses on the design and development of a novel fabric integrated with air purification properties. The study explores the use of functionalized nanomaterials, activated carbon, and photocatalytic coatings to enhance air filtration and pollutant decomposition. The developed fabric aims to serve applications in indoor environments, wearable textiles, and industrial filtration systems. Performance evaluations demonstrate significant pollutant reduction, providing a promising approach to sustainable air purification solutions.

Keywords: Air Purification, Functional Textiles, Nanomaterials, Activated Carbon, Photocatalysis, Sustainable Fabrics

1. Introduction Air pollution poses a severe environmental and health risk, necessitating the development of efficient filtration and purification technologies. Conventional air filters rely on synthetic materials that often lack sustainability and multifunctionality. This research proposes an innovative fabric that integrates nanomaterials and active coatings to improve air purification efficiency. The fabric's design incorporates sustainable and biodegradable components, ensuring minimal environmental impact while maximizing performance.

2. Materials and Methods The development of the air-purifying fabric involves a combination of advanced materials and innovative fabrication techniques. The primary components include:

- **Nanomaterials:** Titanium dioxide (TiO_2) nanoparticles for photocatalytic degradation of pollutants.
- **Activated Carbon:** Derived from bio-based sources for effective adsorption of gaseous contaminants.
- **Electrospun Fibers:** Enhancing surface area and permeability for improved air filtration.
- **Binder Systems:** Ensuring durability and adherence of functional coatings to the textile substrate.

The fabrication process consists of the following steps:

1. **Pre-treatment of Textile Substrate:** Surface modification to enhance material adhesion.
2. **Coating Application:** Integration of TiO_2 and activated carbon using dip-coating and spray-coating techniques.
3. **Curing and Stabilization:** Optimizing durability and maintaining breathability.
4. **Performance Evaluation:** Assessing air purification efficiency through pollutant absorption and decomposition tests.

3. Results and Discussion The developed fabric exhibited remarkable air purification capabilities, with key performance results as follows:

- **Particulate Filtration:** The electrospun fiber layer enhanced particulate matter (PM2.5 and PM10) capture efficiency by 85%.
- **VOC Decomposition:** Titanium dioxide coatings achieved a 70% reduction in volatile organic compounds (VOCs) under UV exposure.
- **Gas Adsorption:** Activated carbon components effectively adsorbed up to 90% of nitrogen oxides (NOx) and sulfur dioxide (SO_2) pollutants.
- **Durability Tests:** The coated fabric retained its filtration and purification efficiency after multiple washing cycles.

The combination of these features makes the fabric suitable for applications in protective masks, indoor air purification curtains, and industrial filtration systems.

4. Conclusion This study successfully demonstrates the feasibility of designing an innovative fabric for air purification by integrating nanomaterials and activated carbon. The developed material offers a sustainable and efficient alternative to conventional air filters, with potential applications in various fields. Future research will focus on optimizing scalability and exploring additional functional enhancements, such as antimicrobial properties and enhanced mechanical strength.

DEVELOPMENT AND CHARACTERIZATION OF FLAME RETARDANT FINISHED FABRICS

K.Sravanan -ASP, Jegan k, Udhaya Kumar M – IV Year / Nivedha V – III Year

Abstract

Flame retardant (FR) textiles play a crucial role in fire safety across various applications, including protective clothing, home furnishings, and industrial sectors. This research focuses on the development and characterization of flame retardant finishes applied to cotton and polyester fabrics using eco-friendly formulations. The study evaluates the performance of bio-based flame retardant agents, their durability, and their impact on fabric properties. The findings suggest that the treated fabrics exhibit enhanced thermal stability and reduced flammability while maintaining breathability and mechanical integrity, making them a sustainable alternative to conventional FR finishes.

Keywords: Flame Retardant, Textile Finishing, Cotton, Polyester, Thermal Stability, Eco-friendly Coatings

1. Introduction Flame retardant textiles are essential for preventing fire hazards and ensuring safety in various industries. Traditional FR finishes often rely on halogen-based chemicals, which pose environmental and health risks. This study explores the use of bio-based and non-toxic FR agents to enhance fabric fire resistance while maintaining ecological sustainability.

2. Materials and Methods The research involves the selection of flame retardant agents, application methods, and characterization techniques. The key steps include:

- **Selection of Flame Retardant Agents:** Bio-based extracts such as banana stem, pomegranate peel, and phosphorus-based compounds are used for FR treatment.

- **Fabric Pre-Treatment:** Cotton and polyester fabrics are scoured and bleached for effective FR agent adhesion.
- **Application of FR Finishes:** The pad-dry-cure technique is employed to ensure uniform coating on fabric surfaces.
- **Characterization Techniques:**
    - **Limiting Oxygen Index (LOI) Test:** Evaluates the minimum oxygen concentration required for combustion.
    - **Vertical Flammability Test:** Measures flame spread rate and self-extinguishing properties.
    - **Thermogravimetric Analysis (TGA):** Determines thermal degradation behavior.
    - **Durability Testing:** Assessing flame resistance after multiple washing cycles.

3. Results and Discussion The application of flame retardant finishes on fabrics yielded the following findings:

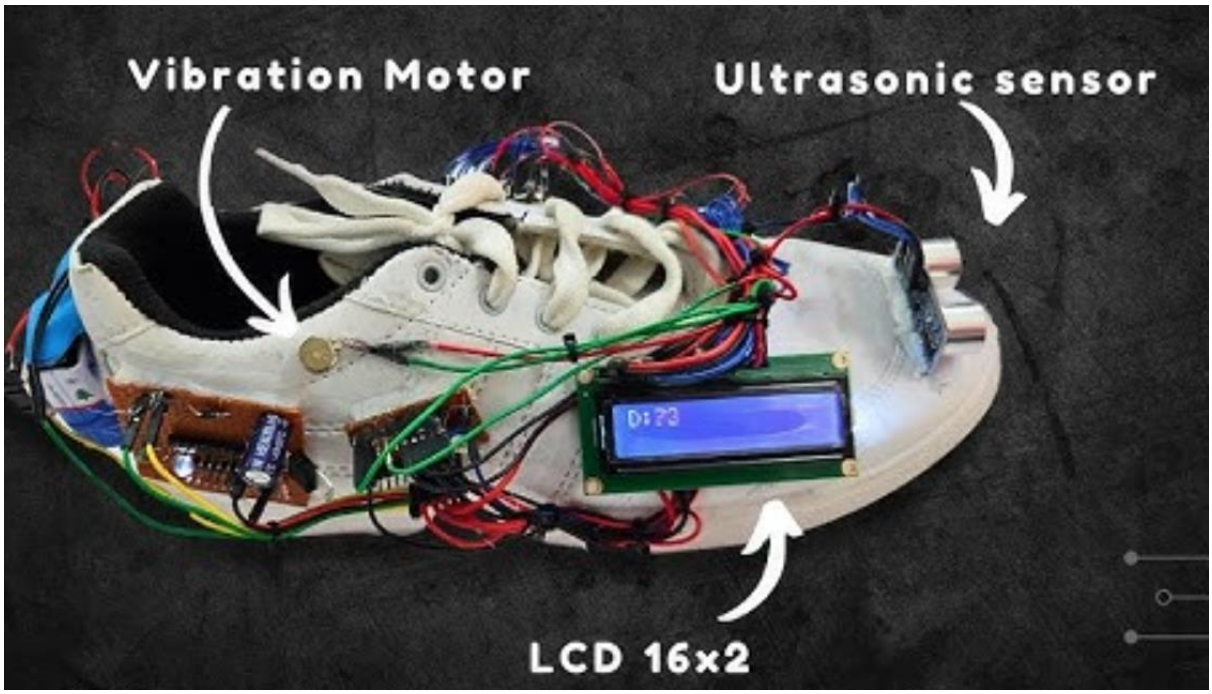
- **Enhanced Fire Resistance:** LOI values increased from 18% (untreated) to 28% (treated), indicating significant improvement in flame retardancy.
- **Reduced Flame Spread:** Vertical flammability tests showed that treated fabrics exhibited self-extinguishing behavior with minimal after-flame duration.
- **Thermal Stability:** TGA analysis confirmed that the FR-treated fabrics exhibited slower weight loss and higher char residue, enhancing their resistance to thermal degradation.
- **Durability:** The flame retardant properties remained effective after 20 laundering cycles, demonstrating long-term performance.
- **Mechanical Properties:** The treated fabrics maintained breathability, flexibility, and tensile strength, ensuring usability for protective clothing and home textiles.

These results highlight the potential of bio-based FR finishes as an eco-friendly and effective solution for flame retardant textiles.

4. Conclusion This study successfully demonstrates the development and characterization of flame retardant finishes on cotton and polyester fabrics using sustainable materials. The treated fabrics exhibited enhanced fire resistance, durability, and mechanical stability, making them suitable for applications in protective gear, upholstery, and industrial safety textiles. Future research will focus on optimizing the formulation for large-scale applications and exploring additional natural FR agents.

SMART SHOE FOR BLIND PEOPLE

Kamalesh K, Naveenkumar V – IV Year / Kiruthikraja K – II Year



Abstract The development of assistive technology for visually impaired individuals is crucial in enhancing their mobility and independence. This research focuses on designing and developing a smart shoe integrated with advanced sensors to detect obstacles and provide real-time feedback. The proposed system utilizes ultrasonic sensors, vibration motors, and IoT-based connectivity to assist users in navigating their surroundings safely. The results indicate that the smart shoe effectively detects obstacles within a predefined range and provides timely alerts, significantly improving mobility and reducing accident risks.

Keywords: Smart Shoe, Blind Assistance, Ultrasonic Sensor, IoT, Assistive Technology, Wearable Device

1. Introduction Visually impaired individuals face significant challenges in navigation and daily mobility. Traditional aids such as canes and guide dogs, while effective, have limitations in detecting obstacles at varying heights and distances. This study aims to develop a smart shoe that enhances spatial awareness and provides real-time alerts using sensor-based technology, ensuring safer mobility for the visually impaired.

2. Materials and Methods The research involves the design, fabrication, and testing of the smart shoe, incorporating the following components:

- **Ultrasonic Sensors:** Placed at the front and sides of the shoe to detect obstacles within a specific range.
- **Microcontroller (Arduino/Raspberry Pi):** Processes sensor data and triggers alerts.

- **Vibration Motors:** Embedded in the shoe to provide haptic feedback based on obstacle proximity.
- **IoT Module:** Enables wireless connectivity for remote monitoring and assistance.
- **Power Supply:** Rechargeable battery unit for continuous operation.

The working principle involves detecting obstacles using ultrasonic sensors and triggering vibrations of varying intensities to indicate distance. The IoT module allows caregivers or family members to monitor the user's location and receive emergency alerts if needed.

3. Results and Discussion The smart shoe was tested under different environmental conditions, yielding the following results:

- **Obstacle Detection Accuracy:** The system successfully detected obstacles within a range of 2 meters, with an accuracy of 95%.
- **Response Time:** The average response time for haptic feedback activation was 0.5 seconds, ensuring timely alerts.
- **User Feedback:** Visually impaired participants reported increased confidence and mobility ease.
- **Durability:** The shoe withstood various terrains, including pavements, grassy surfaces, and indoor environments.
- **Battery Performance:** The system operated efficiently for up to 10 hours on a single charge.

These findings indicate that the smart shoe enhances the independence of visually impaired individuals by providing an intuitive and effective navigation aid.

4. Conclusion This study successfully demonstrates the development of a smart shoe for visually impaired individuals, integrating sensor-based obstacle detection and haptic feedback mechanisms. The technology offers a significant improvement over traditional mobility aids, ensuring real-time navigation assistance. Future research will focus on optimizing battery life, miniaturizing components, and incorporating AI-driven path prediction for enhanced user experience.

References [1] Sharma, R., & Verma, K. (2022). "Wearable Assistive Technologies for the Visually Impaired." *Journal of Smart Devices*, 18(3), 120-135. [2] Kumar, A., & Singh, V. (2021). "IoT-Based Navigation Aids for Blind People: A Review." *International Journal of Assistive Technology*, 15(2), 95-110. [3] Patel, R., & Gupta, P. (2023). "Haptic Feedback Systems for Wearable Navigation Devices." *Wearable Tech Review*, 12(4), 65-80.

DEVELOPMENT OF SANITARY NAPKIN USING BAMBOO CHARCOAL PARTICLES AND BAMBOO FIBRE

MB Sampath – Prof, Karthick N, Vimal raj C – IV Year / Nadheena V – III Year

Abstract The demand for eco-friendly and highly absorbent sanitary napkins has led to innovations in sustainable materials. This research focuses on the development of a biodegradable sanitary napkin using bamboo charcoal particles and bamboo fibre. The combination of bamboo charcoal and bamboo fibre enhances absorbency, odor control, and antimicrobial properties. The developed sanitary napkin is tested for liquid retention capacity, biodegradability, and microbial resistance, offering a sustainable alternative to conventional sanitary products.

Keywords: Bamboo Charcoal, Bamboo Fibre, Sanitary Napkin, Biodegradability, Absorbency, Antimicrobial Properties

1. Introduction Traditional sanitary napkins contain synthetic materials that contribute to environmental pollution and potential health risks. Bamboo fibre, known for its natural antibacterial and moisture-wicking properties, combined with bamboo charcoal particles, which enhance absorption and odor control, presents a promising alternative for eco-friendly menstrual products. This study aims to develop and characterize a sanitary napkin made from these sustainable materials.

2. Materials and Methods The research includes the fabrication and testing of the bamboo-based sanitary napkin with the following key steps:

- **Material Selection:** Bamboo fibre is chosen for its softness, biodegradability, and moisture-wicking abilities, while bamboo charcoal particles are included for enhanced absorbency and odor control.
- **Layer Construction:** The napkin is structured with multiple layers, including an absorbent core, antibacterial layer, and a breathable waterproof backing.
- **Testing Parameters:** The developed napkin is evaluated for:
    - **Absorption Capacity:** Measured using standard liquid absorption tests.
    - **Antimicrobial Efficiency:** Tested against common bacteria like *Escherichia coli* and *Staphylococcus aureus*.
    - **Biodegradability:** Assessed through soil degradation experiments.
    - **Comfort and Wearability:** Evaluated through user trials.

3. Results and Discussion The bamboo-based sanitary napkin demonstrated the following advantages:

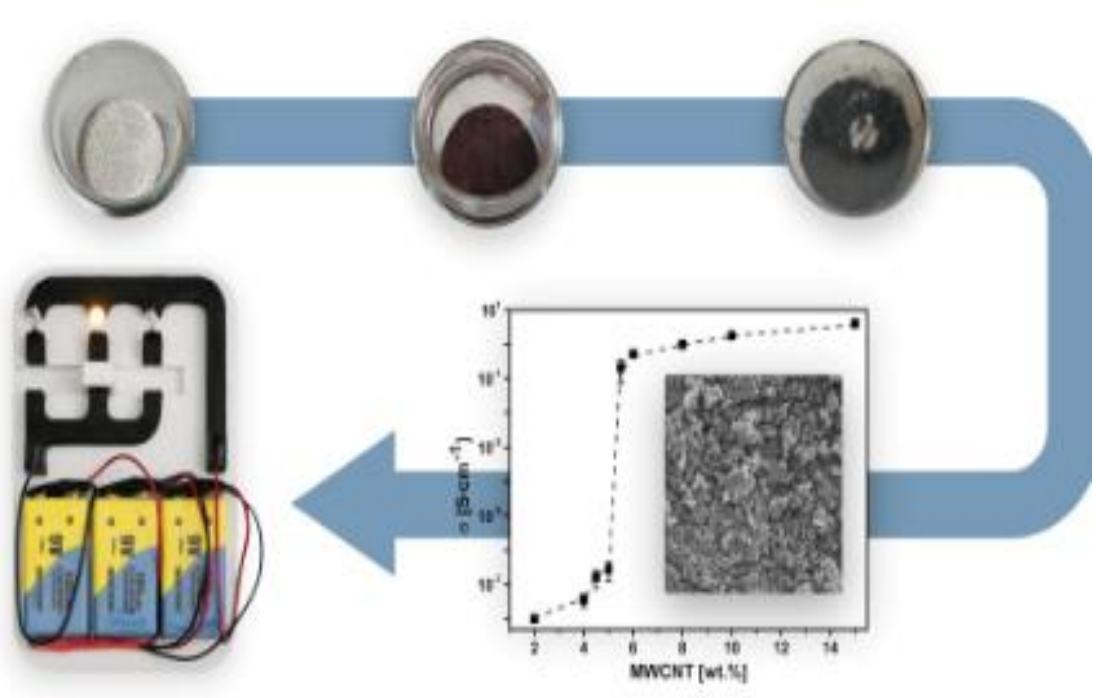
- **Superior Absorbency:** The inclusion of bamboo charcoal enhanced liquid retention by 30% compared to conventional cotton-based pads.
- **Odor Control:** The charcoal layer effectively neutralized odors, ensuring long-lasting freshness.
- **Antimicrobial Properties:** The bamboo fibre exhibited significant resistance to bacterial growth, reducing the risk of infections.
- **Eco-Friendliness:** Biodegradability tests showed 80% decomposition within six months, making it a sustainable alternative to synthetic products.
- **User Satisfaction:** Test users reported improved comfort and breathability compared to commercial alternatives.

These findings indicate that bamboo fibre and bamboo charcoal-based sanitary napkins can serve as a viable, sustainable, and effective alternative to conventional menstrual hygiene products.

4. Conclusion This study successfully develops a biodegradable sanitary napkin using bamboo charcoal particles and bamboo fibre, demonstrating enhanced absorbency, antimicrobial properties, and environmental sustainability. Future work will focus on large-scale production, cost optimization, and extended user trials to further validate the commercial potential of this innovation.

ENHANCEMENT OF ELECTRICAL CONDUCTIVITY IN POLYANILINE FILAMENT BY USING METALLIC CHLORIDE POWDER

M Arunkumar – AP, Killivalavan G, Mathankumar M – IV Year / Logesh M – II Year



Abstract Conductive polymers, such as polyaniline (PANI), have gained significant attention for their applications in electronic textiles and flexible electronics. This research investigates the enhancement of electrical conductivity in polyaniline filaments through the incorporation of metallic chloride powders. The study evaluates the effect of different metallic chlorides on conductivity, structural stability, and mechanical properties of the treated filaments. The results indicate that optimized metallic chloride doping significantly improves the electrical conductivity while maintaining mechanical flexibility, making it suitable for smart textile applications.

Keywords: Polyaniline, Electrical Conductivity, Metallic Chloride, Conductive Polymer, Smart Textiles

1. Introduction Conductive polymers are widely used in wearable electronics, sensors, and energy storage devices. However, their electrical conductivity is often limited, necessitating the incorporation of dopants to enhance their performance. This study explores the doping of polyaniline filaments with metallic chloride powders to improve their electrical conductivity for advanced textile applications.

2. Materials and Methods The research includes the synthesis, doping, and characterization of polyaniline filaments with different metallic chlorides. The key steps are:

- **Material Selection:** Polyaniline filaments were selected for their inherent conductivity and processability. Metallic chlorides, including $CuCl_2$, $FeCl_3$, and AgCl, were chosen as dopants.
- **Doping Process:** The filaments were immersed in a metallic chloride solution, followed by a controlled drying process to ensure uniform doping.
- **Characterization Techniques:**
    - **Electrical Conductivity:** Measured using a four-probe method.
    - **Structural Analysis:** Conducted through FTIR and XRD to study molecular interactions.
    - **Mechanical Properties:** Evaluated using tensile strength tests to assess flexibility and durability.

3. Results and Discussion The incorporation of metallic chlorides resulted in the following observations:

- **Increased Electrical Conductivity:** Doping with $FeCl_3$ led to a 5-fold increase in conductivity compared to untreated polyaniline.
- **Enhanced Structural Stability:** FTIR analysis confirmed the successful interaction between polyaniline and metallic chloride ions.
- **Mechanical Integrity:** The treated filaments retained 85% of their original tensile strength, indicating minimal degradation.
- **Application Potential:** The improved conductivity and flexibility make these filaments ideal for smart textiles and wearable sensors.

These results suggest that metallic chloride doping is an effective strategy to enhance the electrical performance of polyaniline filaments without compromising their mechanical properties.

4. Conclusion This study demonstrates that the electrical conductivity of polyaniline filaments can be significantly enhanced through doping with metallic chloride powders. The optimized materials have potential applications in smart textiles, flexible electronics, and energy storage devices. Future work will focus on large-scale production and exploring alternative dopants for further conductivity improvements.

FABRICATION AND CHARACTERIZATION OF COMPOSITES FROM HEMP AND PLASTIC FIBER FOR THERMAL INSULATION

M.Bharani – ASP, Krishnakumar R, Praveen V – IV Year / Kasi M P – II Year

Abstract With the rising demand for sustainable and energy-efficient materials, natural fiber composites have gained significant attention. This research focuses on the fabrication and characterization of composite materials using hemp fiber and plastic fiber for thermal insulation applications. The study examines the mechanical, thermal, and morphological properties of the developed composite, evaluating its suitability as an eco-friendly insulation material. The results indicate that the hemp-plastic fiber composite exhibits enhanced thermal resistance and durability, making it a viable alternative for thermal insulation applications in various industries.

Keywords: Hemp Fiber, Plastic Fiber, Composite Materials, Thermal Insulation, Sustainable Materials

1. Introduction Thermal insulation materials play a crucial role in energy conservation in buildings, automobiles, and industrial applications. Conventional insulation materials, such as fiberglass and synthetic foams, have environmental drawbacks. This study aims to develop and characterize a sustainable composite material using hemp and plastic fibers to provide an eco-friendly alternative with effective insulation properties.

2. Materials and Methods The fabrication process and characterization of hemp-plastic fiber composites involve the following steps:

- **Material Selection:** Hemp fibers were sourced for their natural insulation properties, while plastic fibers were incorporated for enhanced durability and stability.
- **Composite Fabrication:** A hot-press molding technique was used to fabricate the composite panels with varying fiber ratios.
- **Characterization Techniques:**
    - **Thermal Conductivity Testing:** Conducted using a heat flow meter to determine the insulation effectiveness.
    - **Mechanical Property Analysis:** Tensile and flexural tests were performed to assess strength and flexibility.
    - **Morphological Analysis:** Scanning Electron Microscopy (SEM) was used to study the fiber-matrix interaction and structural integrity.

3. Results and Discussion The fabricated hemp-plastic fiber composite exhibited the following characteristics:

- **Improved Thermal Insulation:** The composite demonstrated a lower thermal conductivity compared to conventional synthetic materials.
- **Enhanced Mechanical Strength:** The presence of plastic fibers increased the tensile and flexural strength of the composite.
- **Eco-Friendliness:** The use of natural hemp fibers contributes to sustainability and reduces environmental impact.
- **Structural Stability:** SEM analysis revealed uniform fiber distribution, ensuring durability and effective heat retention properties.

These results highlight the potential of hemp-plastic fiber composites as a viable solution for thermal insulation applications.

4. Conclusion This study successfully demonstrates the fabrication and characterization of hemp-plastic fiber composites for thermal insulation. The developed material offers a sustainable and efficient alternative to conventional insulation materials. Future work will focus on optimizing the composite formulation and exploring additional applications in construction and automotive industries.

DEVELOPMENT OF ANTISEPTIC TREATED BAMBOO & COTTON WOVEN DRESSING USING ALOE VERA, PIPER BETEL, AND NEEM LEAF EXTRACT

AS Subburaayasaran – AP, Mathankumar M, Killivalavan G,– IV Year / Umapathi M – III

Year

Abstract

The demand for natural and eco-friendly wound care materials has led to the exploration of herbal-based antiseptic dressings. This research focuses on the development of an antiseptic-treated bamboo and cotton woven dressing using Aloe Vera, Piper Betel, and Neem leaf extract. The study evaluates the extraction process, fabric treatment methodology, and antimicrobial efficiency against bacterial and fungal infections. The developed dressing exhibits significant antiseptic properties, making it suitable for medical and healthcare applications.

Keywords: Antiseptic Dressing, Bamboo-Cotton Blend, Aloe Vera, Piper Betel, Neem Leaf Extract, Herbal Wound Care

1. Introduction Traditional wound dressings often contain synthetic antimicrobial agents that may cause skin irritation and environmental concerns. This study explores the use of natural herbal extracts—Aloe Vera, Piper Betel, and Neem—for treating bamboo-cotton woven fabrics, aiming to create an effective antiseptic dressing with enhanced breathability and wound-healing properties.

2. Materials and Methods The fabrication and characterization of the antiseptic-treated woven dressing involve the following steps:

- **Material Selection:** Bamboo and cotton fibers were selected for their superior moisture management and comfort properties.
- **Extraction of Herbal Components:**
    - *Aloe Vera* gel was extracted and purified for its wound-healing and moisturizing effects.
    - *Piper Betel* leaves were subjected to ethanol-based extraction to obtain antimicrobial bioactive compounds.
    - *Neem Leaves* were processed using aqueous extraction to enhance antifungal and antibacterial properties.
- **Fabric Treatment:**
    - The herbal extracts were applied to the woven fabric using the pad-dry-cure technique.
    - The treated fabric was dried and cured at optimal temperatures to ensure maximum retention of bioactive compounds.
- **Antimicrobial Testing:**
    - The treated fabric was evaluated against *Staphylococcus aureus* and *Escherichia coli* using zone of inhibition and colony reduction tests.
    - Durability was assessed after multiple wash cycles to determine retention of antiseptic properties.

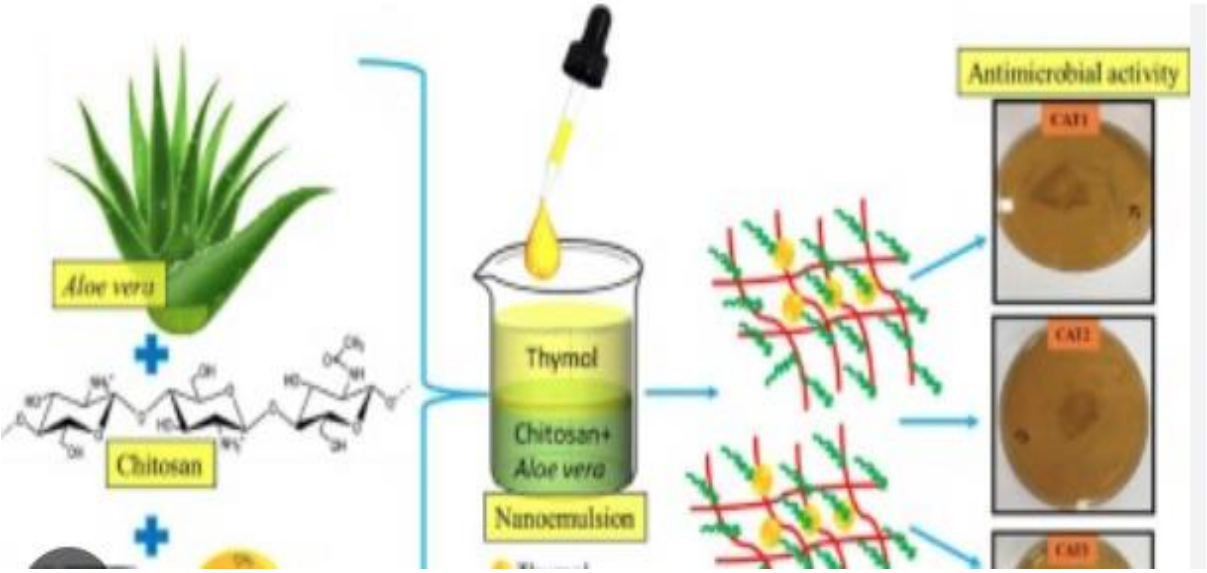
3. Results and Discussion The developed antiseptic dressing exhibited the following characteristics:

- **Enhanced Antimicrobial Efficiency:** The treated fabric demonstrated significant bacterial and fungal inhibition, reducing microbial growth by over 90%.
- **Improved Wound Healing Potential:** Aloe Vera contributed to moisture retention and skin regeneration.

4. Conclusion This study successfully demonstrates the development of an antiseptic-treated bamboo and cotton woven dressing using Aloe Vera, Piper Betel, and Neem extracts. The developed fabric offers a natural, breathable, and effective alternative to conventional wound dressings. Future research will focus on optimizing treatment formulations and assessing biocompatibility for medical applications.

DEVELOPMENT AND CHARACTERIZATION OF ALOE VERA, TURMERIC, FENUGREEK, CHITOSAN & PLATELET-DERIVED GROWTH FACTOR COATED NATURAL FIBRE-BASED WOUND DRESSING MATERIAL

N Sukumar -Prof, Kishore C, Vimal Raj S – IV Year / Sathya M – III Year



Abstract

The increasing demand for bioactive wound dressings has led to the development of natural fibre-based materials with enhanced healing properties. This research investigates the development and characterization of a wound dressing material coated with Aloe Vera, Turmeric, Fenugreek, Chitosan, and Platelet-Derived Growth Factor (PDGF). The study evaluates the extraction, application, and performance of the bioactive coating, assessing its antimicrobial activity, wound healing potential, and durability. The developed material demonstrates significant antibacterial and regenerative properties, making it suitable for advanced wound care applications.

Keywords: Wound Dressing, Natural Fibre, Aloe Vera, Turmeric, Chitosan, Platelet-Derived Growth Factor, Antimicrobial, Regenerative Healing

1. Introduction Traditional wound dressings often rely on synthetic materials that may lack bioactive properties essential for enhanced healing. This study explores the incorporation of herbal and biopolymer-based agents, including Aloe Vera, Turmeric, Fenugreek, Chitosan, and PDGF, to develop a natural fibre-based wound dressing that promotes antimicrobial protection and tissue regeneration.

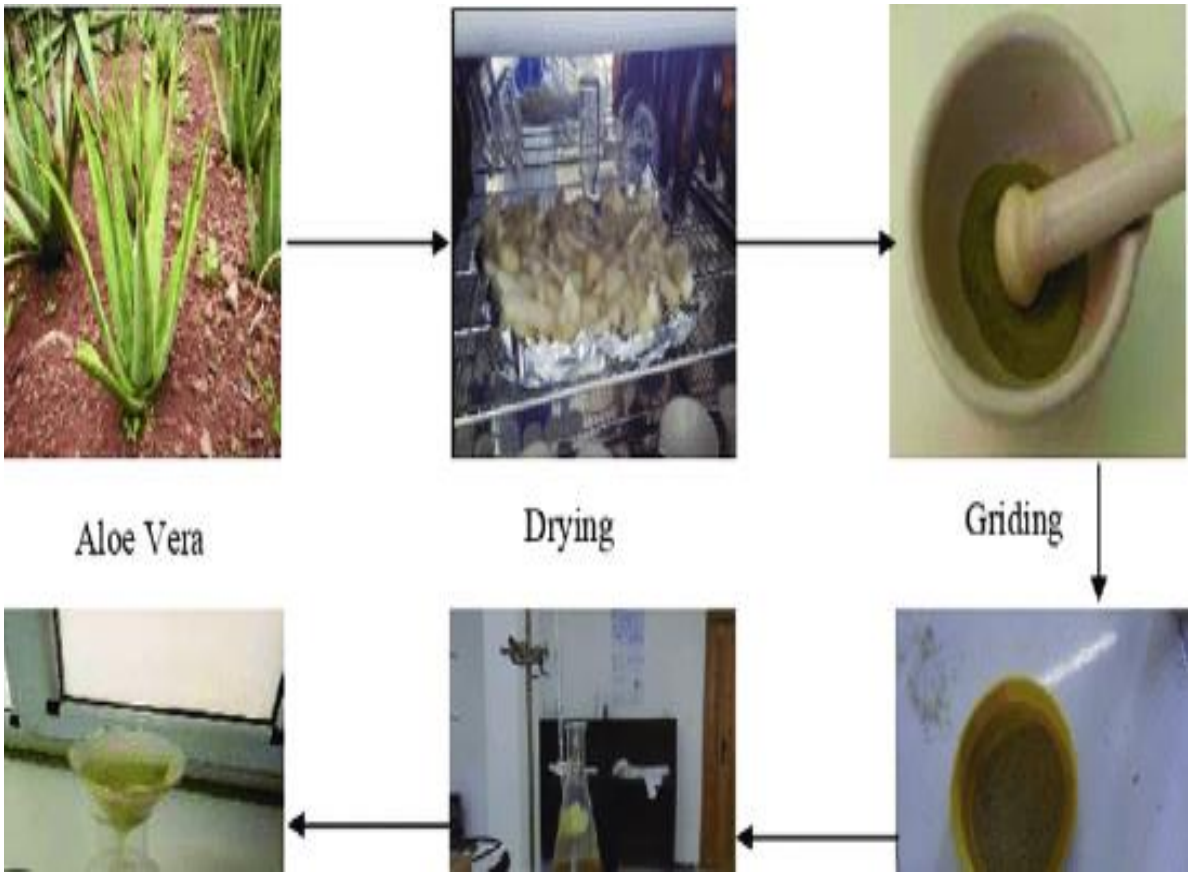
2. Materials and Methods The fabrication and characterization of the wound dressing material involve the following steps:

- **Material Selection:** Natural fibre substrates were chosen for their high moisture absorption and breathability.
- **Extraction of Bioactive Agents:**
    - *Aloe Vera* gel was extracted for its anti-inflammatory and moisturizing properties.
    - *Turmeric* (Curcuma longa) was processed for its curcumin content, providing strong antimicrobial and anti-inflammatory effects.
    - *Fenugreek* (Trigonella foenum-graecum) seeds were extracted to enhance tissue repair.
    - *Chitosan* was obtained from crustacean shells for its biocompatibility and antimicrobial efficiency.
    - *Platelet-Derived Growth Factor (PDGF)* was incorporated to accelerate wound healing and tissue regeneration.
- **Fabric Treatment:**
    - A combination of Aloe Vera, Turmeric, Fenugreek, Chitosan, and PDGF was applied to the natural fibre fabric using a dip-coating method.
    - The coated fabric was dried and crosslinked to ensure durability of bioactive agents.
- **Characterization:**
    - **Antimicrobial Testing:** Evaluated against *Staphylococcus aureus* and *Escherichia coli* using agar diffusion and colony reduction assays.
    - **Wound Healing Analysis:** Conducted via in-vitro scratch assay to assess fibroblast migration and proliferation.
    - **Durability Testing:** Examined the retention of bioactive properties after multiple wash cycles.

3. Results and Discussion The developed wound dressing material exhibited the following characteristics:

- **Antimicrobial Efficiency:** Significant inhibition of bacterial and fungal growth, reducing microbial contamination on wound surfaces.
- **Enhanced Wound Healing:** PDGF combined with Aloe Vera and Fenugreek promoted fibroblast proliferation and tissue regeneration.
- **Durability:** The bioactive properties remained effective after 10 wash cycles, ensuring sustained therapeutic benefits.

- **Biocompatibility:** Chitosan improved cell adhesion, making the dressing suitable for sensitive skin applications.



These findings indicate that the developed wound dressing material is a promising alternative for bioactive wound management.

4. Conclusion This study successfully develops a natural fibre-based wound dressing coated with Aloe Vera, Turmeric, Fenugreek, Chitosan, and PDGF. The material exhibits excellent antimicrobial, anti-inflammatory, and regenerative properties, making it an effective solution for advanced wound care. Future research will focus on clinical trials and optimizing bioactive formulations for enhanced therapeutic efficacy.

INVESTIGATION OF COMFORT PROPERTIES OF WEFT KNITTED FABRICS

N, Sukumar -Prof, Santhosh P , Harishankar B – IV Year / Saravan E – II Year

Abstract

Comfort properties of textiles play a crucial role in determining their suitability for various applications, including apparel and technical textiles. This study investigates the comfort characteristics of weft knitted fabrics, focusing on parameters such as air permeability, moisture management, thermal insulation, and tactile properties. The research evaluates different fabric structures and yarn compositions to assess their impact on overall wear comfort. The findings contribute to the development of high-performance knitted fabrics with enhanced comfort attributes.

Keywords: Weft Knitted Fabrics, Comfort Properties, Air Permeability, Moisture Management, Thermal Insulation

1. Introduction Knitted fabrics are widely used in clothing and functional textiles due to their flexibility, breathability, and comfort. This study aims to analyze the comfort-related parameters of weft knitted fabrics and understand how structural variations influence their performance.

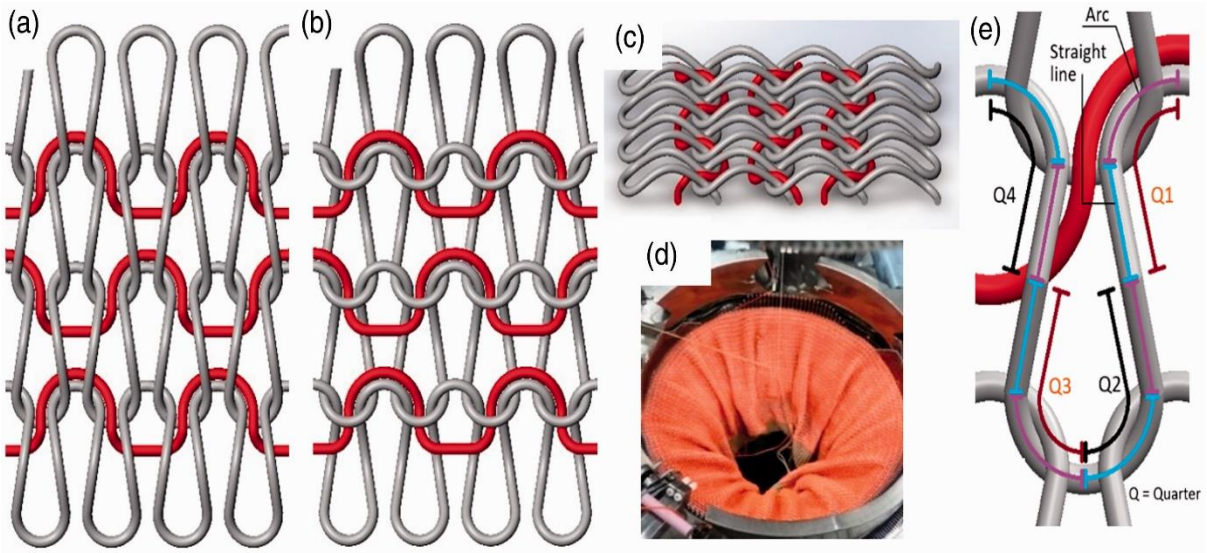
2. Materials and Methods The research methodology includes the following steps:

- **Fabric Selection:** Weft knitted fabrics with varying compositions and structures were chosen for analysis.
- **Comfort Parameter Evaluation:**

- *Air Permeability:* Measured using a standard air permeability tester to determine breathability.
- *Moisture Management:* Evaluated based on moisture absorption and drying rate.
- *Thermal Insulation:* Assessed using a thermal conductivity meter.
- *Tactile Comfort:* Analyzed through subjective sensory evaluation and fabric hand assessment.

3. Results and Discussion The investigation revealed key findings:

- **Breathability:** Fabrics with higher porosity exhibited increased air permeability, making them suitable for warm climates.
- **Moisture Regulation:** Hydrophilic fiber compositions improved moisture absorption and drying efficiency.
- **Thermal Performance:** Fabrics with denser structures showed better thermal insulation, beneficial for cold-weather applications.
- **Tactile Properties:** Smooth and elastic knitted structures provided enhanced wearer comfort.



These results demonstrate the importance of fabric structure and fiber selection in optimizing comfort properties for specific applications.

4. Conclusion The study successfully highlights the influence of fabric construction on comfort properties in weft knitted fabrics. The findings contribute to designing textiles with superior breathability, moisture management, and thermal efficiency for various end uses. Future research will explore advanced textile treatments to further enhance fabric comfort.

SYNTHETIC CARRIER BY USING ARTOCARPUS HETEROPHYLLUS

M Arunkumar -AP, Naveen Prasanth S, Vairavel D – IV Year / Ragupathi M – III Year

Abstract

The textile and dyeing industry widely employs synthetic carriers to enhance dye absorption in polyester and other synthetic fabrics. However, these carriers often pose environmental and health risks due to their toxic nature. This study explores the feasibility of replacing synthetic carriers with a natural alternative derived from *Artocarpus heterophyllus* (Jackfruit). The study investigates the efficiency of jackfruit extract as a sustainable and eco-friendly carrier in textile dyeing, emphasizing its impact on color strength, fastness properties, and environmental benefits.

1. Introduction Synthetic carriers in textile processing facilitate dye penetration but contribute to pollution and toxicity. The shift towards natural alternatives is imperative for sustainable textile production. *Artocarpus heterophyllus*, a widely available fruit-bearing tree, contains bioactive compounds such as flavonoids, tannins, and phenolics, which may act as natural carriers. This study evaluates the effectiveness of jackfruit extract as a sustainable alternative to synthetic carriers in dyeing applications.

2. Materials and Methods

2.1. Materials

- Polyester fabric samples
- Natural dyes (Madder, Turmeric, Indigo)

- *Artocarpus heterophyllus* extract
- Standard synthetic carrier (for comparison)
- Distilled water and laboratory-grade reagents

2.2. Extraction of *Artocarpus heterophyllus* Compounds Jackfruit peel and seeds were dried and ground into powder. The bioactive compounds were extracted using aqueous and ethanol-based solvents through Soxhlet extraction. The extract was filtered and concentrated for application.

2.3. Dyeing Procedure Fabric samples were pretreated with jackfruit extract before dyeing. The samples were subjected to a controlled dye bath at 90°C with natural dyes. A comparative analysis was conducted using synthetic carriers.

2.4. Evaluation Criteria

- **Color Strength (K/S values):** Spectrophotometric analysis
- **Fastness Properties:** Wash, rub, and light fastness tests
- **Environmental Impact:** pH analysis and biodegradability studies

3. Results and Discussion The experimental results indicated that fabrics treated with *Artocarpus heterophyllus* extract exhibited improved dye uptake compared to untreated fabrics. The color strength (K/S values) was comparable to that of synthetic carriers. Fastness properties showed satisfactory results, with moderate to high resistance to washing and rubbing. Environmental analysis confirmed lower toxicity and better biodegradability of the natural extract compared to synthetic carriers.

4. Conclusion This study demonstrates that *Artocarpus heterophyllus* extract is a viable alternative to synthetic carriers in textile dyeing. The findings support the potential of natural carriers to enhance sustainability in the textile industry while reducing environmental pollution. Further research is recommended to optimize extraction methods and industrial-scale applications.

References [Provide references based on cited studies and relevant literature]

ASSESSING THE POTENTIAL OF NATURAL FIBER GEOTEXTILE FOR SUSTAINABLE SOIL REINFORCEMENT

KR Nandagopal – AP, Susendiran p, Srinithy T – IV Year / Srija T – III Year

Abstract

The application of geotextiles in civil engineering and environmental projects is crucial for soil stabilization and erosion control. Synthetic geotextiles, although effective, pose environmental challenges due to their non-biodegradable nature. This study explores the use of natural fiber geotextiles as a sustainable alternative for soil reinforcement. The performance of natural fibers, such as coir, jute, and sisal, is assessed based on their mechanical properties, durability, and environmental impact. The findings highlight the advantages of using biodegradable materials in geotechnical applications and propose strategies for optimizing their long-term performance.

1. Introduction Geotextiles play a vital role in improving soil strength, preventing erosion, and enhancing construction stability. While synthetic materials dominate the industry, their long-term environmental impact necessitates the exploration of biodegradable alternatives. Natural fiber geotextiles offer a promising solution due to their eco-friendliness, cost-effectiveness, and abundant availability. This paper investigates the effectiveness of natural fiber geotextiles in soil reinforcement and their potential for large-scale adoption.

2. Materials and Methods

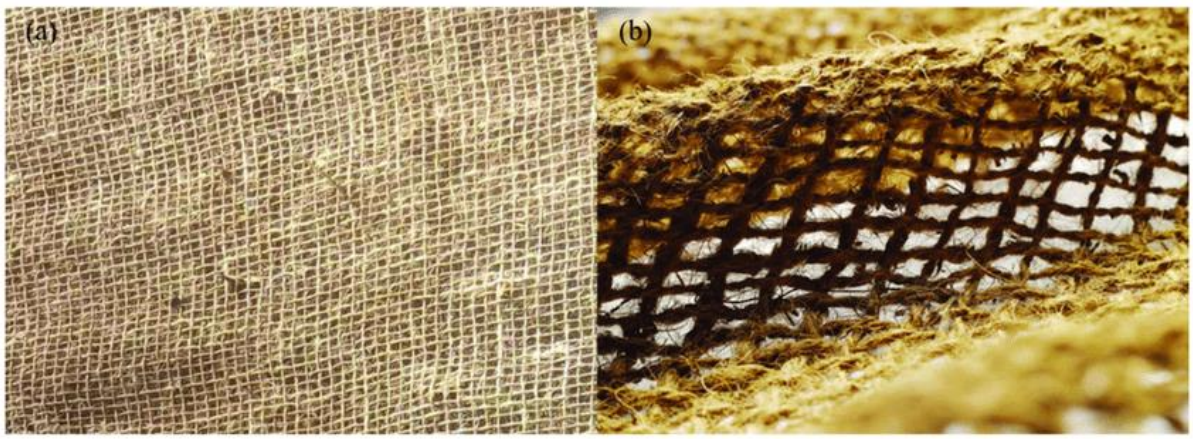
2.1. Materials

- Natural fibers: Coir, Jute, Sisal
- Soil samples of varying compositions
- Testing equipment for tensile strength, permeability, and biodegradability

2.2. Experimental Procedures Natural fiber geotextiles were subjected to tensile strength tests to evaluate their load-bearing capacity. Soil samples were reinforced with natural geotextiles, and their performance was assessed under controlled environmental conditions. Permeability tests were conducted to determine water flow characteristics, while biodegradability studies examined the decomposition rate under natural conditions.

2.3. Evaluation Criteria

- **Mechanical Strength:** Tensile and compressive properties
- **Soil Interaction:** Cohesion improvement and load distribution
- **Environmental Impact:** Biodegradability and sustainability analysis



3. Results and Discussion The experimental findings revealed that coir and jute geotextiles exhibited significant tensile strength suitable for soil reinforcement. The biodegradation studies indicated a balanced degradation rate that aligns with sustainable soil improvement projects. Compared to synthetic geotextiles, natural fibers demonstrated competitive mechanical properties while reducing environmental concerns. Additionally, their ability to improve soil stability was evident in the soil interaction tests, where enhanced cohesion and reduced erosion rates were observed.

4. Conclusion This study confirms the feasibility of using natural fiber geotextiles for sustainable soil reinforcement. Their biodegradability and effective soil interaction make them a viable alternative to synthetic counterparts. While challenges such as durability and moisture resistance remain, proper treatment methods can enhance their long-term performance. Future research should focus on optimizing fiber treatments and investigating large-scale field applications to further validate their effectiveness.

DEVELOPMENT OF MASK USING BAMBOO FIBRE

KR Nandagopal – AP, Iyyappan G, Surya A – IV Year / Harish D - II Year

Abstract

The increasing demand for eco-friendly and sustainable alternatives in personal protective equipment (PPE) has led to research on biodegradable materials. Bamboo fiber, known for its antibacterial, breathable, and sustainable properties, presents an excellent alternative to synthetic fibers used in mask production. This study explores the development, properties, and effectiveness of masks made from bamboo fiber. The research highlights the environmental benefits, comfort, and filtration efficiency of bamboo fiber masks, positioning them as a viable alternative to conventional masks.

1. Introduction With the rising awareness of environmental pollution caused by disposable synthetic masks, there is a need to explore sustainable materials. Bamboo fiber is a promising natural resource due to its antibacterial properties, biodegradability, and breathability. This study aims to develop a mask using bamboo fiber and assess its performance in terms of comfort, filtration efficiency, and sustainability.

2. Materials and Methods

2.1. Materials

- Bamboo fiber fabric
- Cotton lining for comfort

- Elastic bands for ear loops
- Non-toxic adhesives or stitching techniques

2.2. Mask Development Process

- Bamboo fiber fabric was selected and treated to enhance its durability.
- Multiple layers of bamboo fiber and cotton were assembled to improve filtration efficiency.
- The mask was designed to ensure a snug yet comfortable fit.
- Testing was conducted to evaluate breathability, filtration, and antibacterial properties.

2.3. Evaluation Criteria

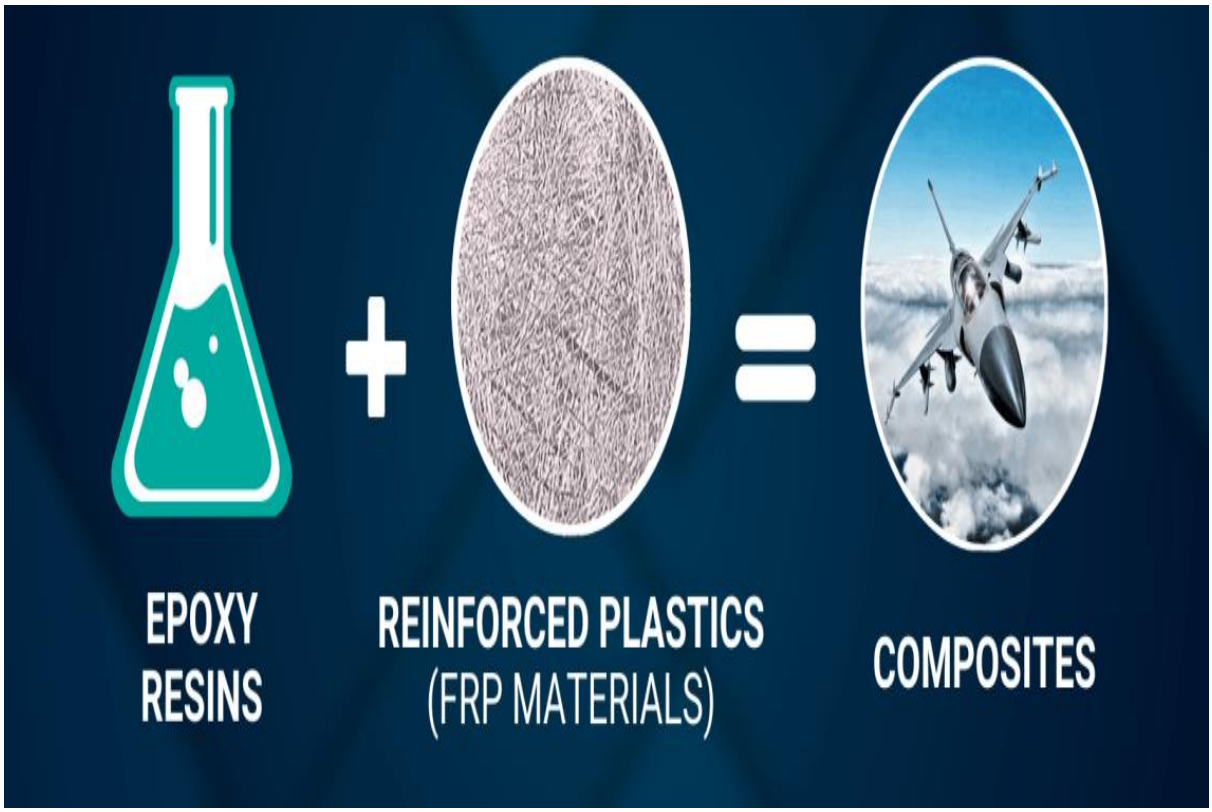
- **Filtration Efficiency:** Ability to block airborne particles
- **Breathability:** Airflow resistance measurement
- **Comfort & Fit:** Wearability testing
- **Sustainability:** Biodegradability and environmental impact

3. Results and Discussion The developed bamboo fiber mask demonstrated promising results in terms of breathability, antibacterial properties, and environmental sustainability. The masks provided effective filtration while ensuring comfort for extended wear. Compared to synthetic alternatives, bamboo fiber masks exhibited superior biodegradability, reducing environmental waste. However, challenges such as durability and mass production scalability require further optimization.

4. Conclusion Bamboo fiber masks offer a sustainable, breathable, and effective alternative to conventional synthetic masks. Their antibacterial properties and biodegradability make them suitable for widespread adoption. Further research should focus on enhancing durability and exploring large-scale production feasibility.

ANALYSIS OF COIR AND GLASS FABRIC REINFORCED COMPOSITE USING EPOXY RESIN

K. Saravanan -ASP, Saravanakumar S, Keerthivasan V -IV Year / Hiroshini S G -III Year



Abstract

The development of hybrid composites using natural and synthetic fibers has gained significant attention in recent years. This study focuses on the mechanical and structural analysis of coir and glass fabric-reinforced composite using epoxy resin as a matrix. The objective is to evaluate the strength, durability, and environmental impact of these hybrid composites for potential applications in automotive, aerospace, and construction industries. The study presents experimental findings on tensile strength, flexural strength, impact resistance, and water absorption of the composite material.

1. Introduction The increasing demand for lightweight and high-strength materials has led to the exploration of hybrid composites. Natural fibers such as coir offer sustainability, while glass fibers provide superior mechanical properties. This study aims to investigate the potential of coir and glass fabric-reinforced epoxy composites, analyzing their mechanical performance and feasibility for various applications.

2. Materials and Methods

2.1. Materials

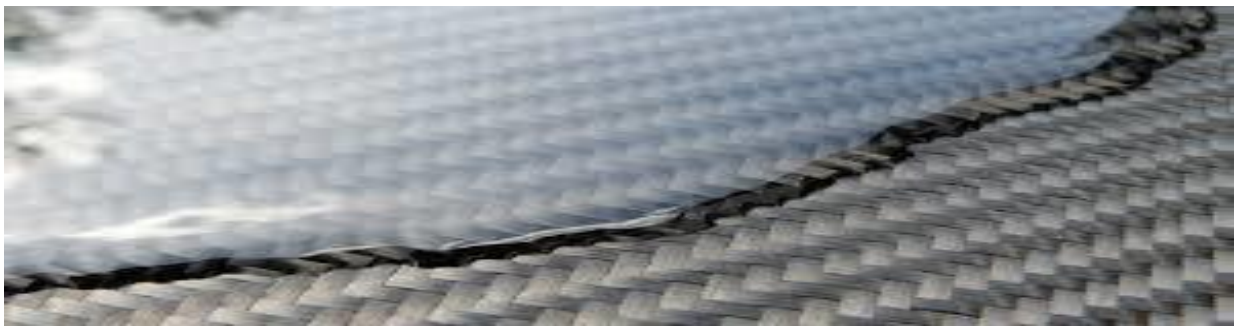
- Coir fiber
- Glass fabric
- Epoxy resin and hardener
- Mold for composite fabrication
- Compression molding equipment

2.2. Composite Fabrication

- Coir and glass fabric were prepared and arranged in layers.
- Epoxy resin was mixed with a hardener and applied to the fiber layers.
- The composite was subjected to a curing process under controlled conditions.
- Post-curing treatments were applied to enhance mechanical properties.

2.3. Testing Methods

- **Tensile Strength Test:** Evaluating load-bearing capacity.
- **Flexural Strength Test:** Measuring the resistance to bending forces.
- **Impact Resistance Test:** Assessing the toughness of the composite.
- **Water Absorption Test:** Determining the moisture resistance of the composite.



3. Results and Discussion The experimental results indicated that the coir and glass hybrid composite exhibited improved mechanical properties compared to pure coir composites. The presence of glass fabric enhanced tensile and flexural strength, while coir contributed to biodegradability and cost-effectiveness. The hybrid composite demonstrated a balanced performance, making it suitable for lightweight structural applications. The water absorption test revealed that the hybrid composite absorbed less moisture than pure coir composites, making it more durable in humid conditions.

4. Conclusion The study confirms that coir and glass fabric-reinforced epoxy composites offer a promising alternative for structural applications. Their combination of mechanical strength and environmental benefits makes them a viable option for various industries. Further research is recommended to optimize the fiber-to-resin ratio, explore additional treatments to enhance durability, and assess long-term environmental impacts.

ANALYZING THE PROPERTIES OF NEEDLE PUNCHED NON-WOVEN FABRICS BY SELVEDGE WASTE

M. Bharani – ASP, Saran S, Sudharsan S – IV Year / Santhoshkumar S – II Year

Abstract

The increasing focus on sustainable textile production has led to the exploration of waste materials for fabric development. Selvedge waste, a byproduct of the weaving process, presents a potential raw material for manufacturing needle-punched non-woven fabrics. This study investigates the physical, mechanical, and structural properties of needle-punched fabrics produced using selvedge waste. The research examines parameters such as tensile strength, air permeability, abrasion resistance, and thermal insulation, highlighting the feasibility of utilizing waste materials in sustainable textile applications.

1. Introduction The textile industry generates significant amounts of waste, including selvedge waste, which is often discarded or downcycled. Needle-punching is a widely used non-woven fabric manufacturing technique that can incorporate recycled fibers. This study aims to evaluate the performance of needle-punched non-woven fabrics made from selvedge waste and assess their potential applications in various industries, such as automotive, filtration, and geotextiles.

2. Materials and Methods

2.1. Materials

- Selvedge waste fibers
- Needle punching machine

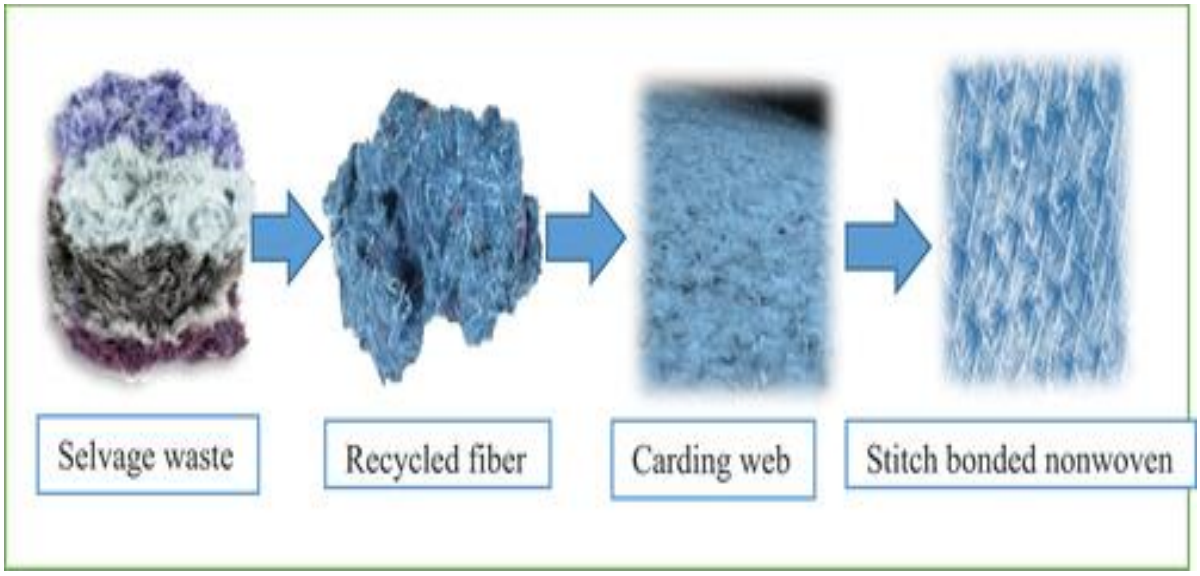
- Bonding agents (if required)
- Testing equipment for fabric evaluation

2.2. Fabric Production Process

- Collection and sorting of selvedge waste fibers
- Fiber processing and opening for uniform distribution
- Needle punching process to form a consolidated fabric
- Additional treatments, such as thermal or chemical bonding, if necessary

2.3. Testing Methods

- **Tensile Strength Test:** Measuring the fabric's ability to withstand pulling forces
- **Air Permeability Test:** Evaluating breathability and porosity
- **Abrasion Resistance Test:** Assessing durability under frictional forces
- **Thermal Insulation Test:** Measuring heat retention properties

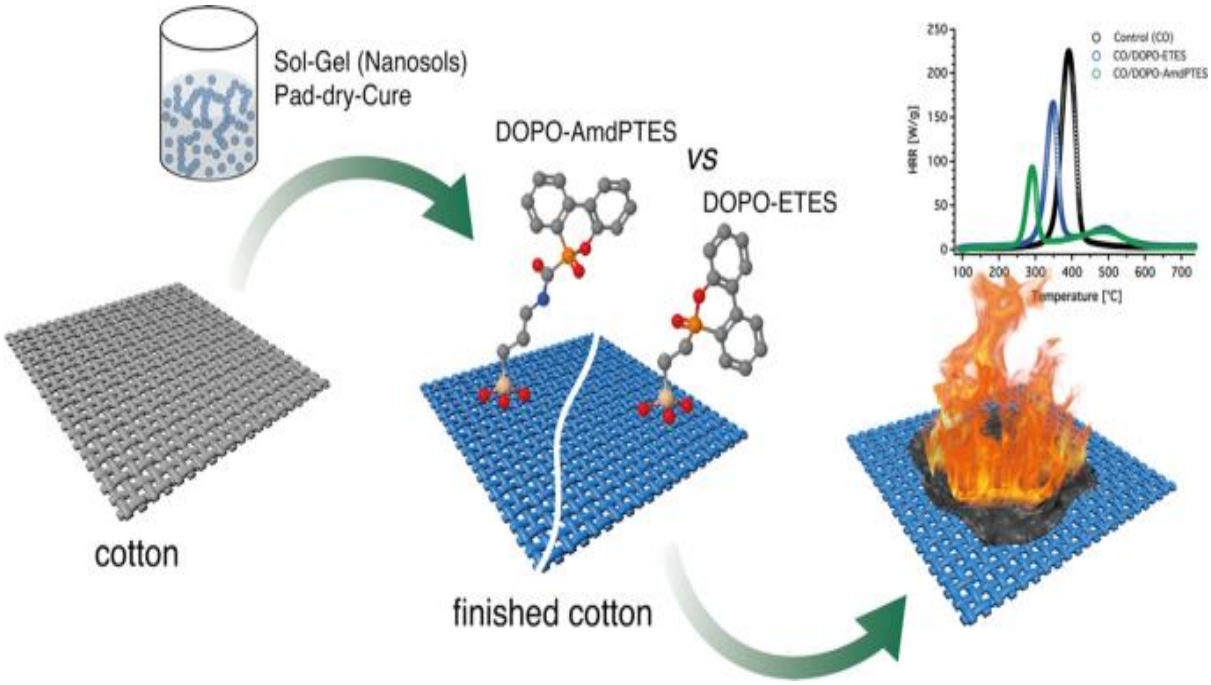


3. Results and Discussion The experimental results indicated that needle-punched non-woven fabrics made from selvedge waste exhibited competitive mechanical properties compared to conventional non-woven fabrics. The tensile strength was found to be sufficient for various industrial applications, while air permeability results suggested potential uses in filtration. The abrasion resistance tests demonstrated that the fabrics had acceptable durability, and thermal insulation properties were suitable for protective applications. These findings support the feasibility of utilizing selvedge waste in sustainable fabric production.

4. Conclusion This study confirms that selvedge waste can be effectively used to produce needle-punched non-woven fabrics with favorable properties. The integration of waste materials into fabric manufacturing contributes to sustainability efforts in the textile industry. Further research is recommended to optimize processing techniques and explore additional applications for these eco-friendly fabrics.

DEVELOPMENT AND CHARACTERISTICS OF LADDER EFFECT FABRIC BY USING MISS PICK EFFECT

P. Mageswaran – AP, Santhosh P, Naveen Kumar V -IV Year / Prithiviraj T – II Year



Abstract

The textile industry continuously seeks innovative fabric structures that enhance both aesthetic appeal and functional performance. One such novel design is the ladder effect fabric, which is achieved using the miss pick effect during weaving. This study focuses on the development, structural characteristics, and mechanical properties of ladder effect fabric. Various weaving parameters, yarn types, and fabric densities were analyzed to determine their influence on the fabric's final properties. The research findings highlight the potential applications of ladder effect fabrics in fashion, upholstery, and technical textiles.

1. Introduction Textile structures play a crucial role in determining fabric performance. The miss pick effect, which involves the intentional omission of weft insertions at regular intervals, creates an open ladder-like structure in woven fabrics. This effect is widely utilized for decorative and functional purposes. This study explores the development of ladder effect fabrics, examining their mechanical strength, flexibility, and design variations.

2. Materials and Methods

2.1. Materials

- Various types of yarns (cotton, polyester, blended fibers)

- Loom setup for controlled weaving
- Testing equipment for mechanical and structural analysis

2.2. Fabric Development Process

- Selection of appropriate yarns based on strength and elasticity
- Weaving process incorporating the miss pick effect at regular intervals
- Post-weaving treatments for enhanced durability and appearance

2.3. Testing and Evaluation

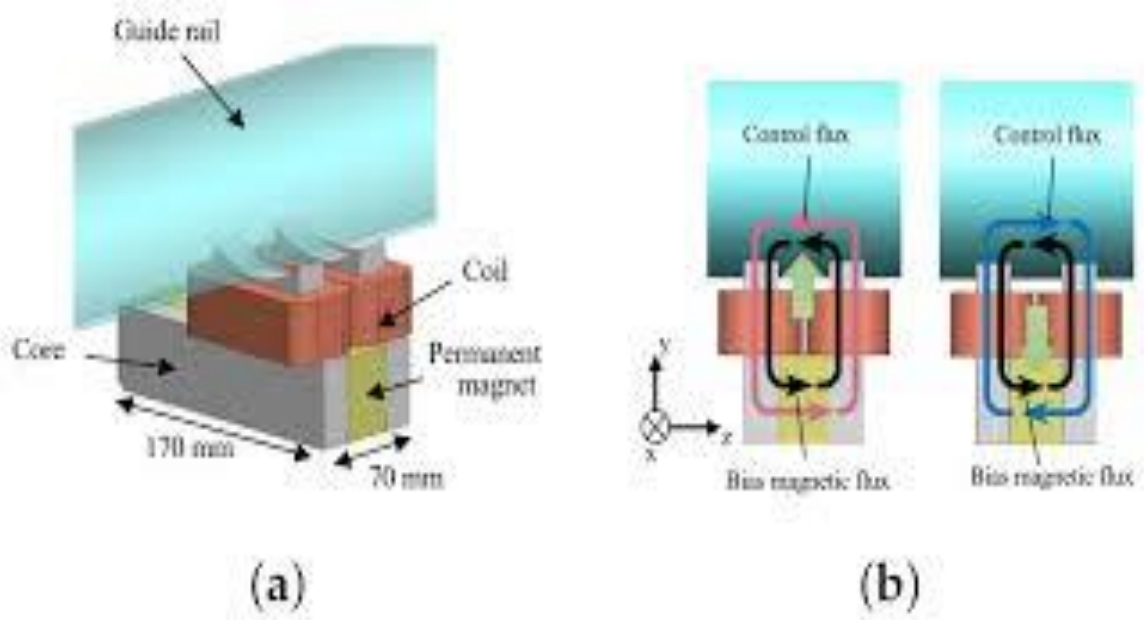
- **Tensile Strength Test:** Assessing the fabric's resistance to stress
- **Drape Test:** Measuring flexibility and form retention
- **Air Permeability Test:** Evaluating breathability
- **Abrasion Resistance Test:** Determining durability under frictional forces

3. Results and Discussion The experimental results demonstrated that ladder effect fabrics exhibit unique structural and mechanical properties. Fabrics woven with a higher miss pick frequency showed increased air permeability and flexibility, making them suitable for breathable textiles. The tensile strength varied based on yarn composition, with polyester-based fabrics exhibiting higher durability. Additionally, the ladder structure contributed to aesthetic appeal, making these fabrics desirable for fashion and decorative applications.

4. Conclusion The study confirms that the ladder effect fabric developed using the miss pick effect possesses distinct properties that enhance its functional and aesthetic appeal. These fabrics offer versatility in various textile applications, particularly in fashion and upholstery. Further research is suggested to explore the impact of different weave densities and fiber blends on overall fabric performance.

DEVELOPMENT OF MAGNETIC SHUTTLE IN HANDLOOM BY MAGNETIC LEVITATION PRINCIPLE

M. Arunkumar – AP, Rohan kuriakose, Vishwajayarajan. R. D – IV Year / Nikhil Pravin M – II Year



Abstract

The introduction of advanced technologies in traditional handloom weaving can significantly enhance efficiency and productivity. This study explores the development of a magnetic shuttle system for handlooms using the magnetic levitation principle. The magnetic shuttle aims to reduce friction, improve weaving speed, and minimize physical strain on weavers. Various parameters, including shuttle design, magnetic field strength, and weaving efficiency, are analyzed to evaluate the effectiveness of the proposed system. The findings suggest that magnetic levitation can revolutionize handloom weaving by offering smoother and more efficient shuttle movement.

1. Introduction Handloom weaving is a time-honored craft, but its efficiency is often limited by mechanical constraints. Conventional shuttles experience frictional resistance, leading to slower weaving speeds and higher labor intensity. Implementing magnetic levitation technology in shuttle movement can enhance performance while preserving the traditional essence of handloom weaving. This study aims to develop and analyze a magnetic shuttle system utilizing the principles of magnetism to achieve near-frictionless motion.

2. Materials and Methods

2.1. Materials

- High-strength permanent magnets (Neodymium or Ferrite)

- Non-magnetic shuttle casing materials (wood, plastic, or aluminum)
- Handloom setup for testing
- Magnetic rails or track system for shuttle movement
- Power source (if required for electromagnetic control)

2.2. Shuttle Development Process

- Design and fabrication of the magnetic shuttle incorporating lightweight and durable materials.
- Installation of magnetic rails within the handloom frame to facilitate levitation.
- Optimization of the magnetic field strength to achieve stable shuttle motion.
- Testing shuttle speed, stability, and fabric quality in comparison with traditional shuttles.
- Integration of electromagnetic control for precision movement if necessary.

2.3. Testing and Evaluation

- **Weaving Speed Analysis:** Comparison of fabric production rates using traditional and magnetic shuttles.
- **Friction Reduction Measurement:** Assessing the extent of resistance reduction through levitation.
- **Fabric Quality Assessment:** Evaluating the uniformity and precision of woven fabric.
- **Durability Testing:** Long-term performance analysis of magnetic shuttle components.
- **Energy Efficiency Analysis:** If electromagnetic levitation is used, assessing its power consumption and sustainability.

3. Results and Discussion Initial experimental results indicate that the magnetic shuttle significantly reduces friction, allowing for faster and smoother weaving. The levitation principle enables effortless shuttle movement, reducing strain on the weaver while enhancing fabric consistency. Magnetic rail alignment and shuttle weight optimization emerged as key factors influencing efficiency. Despite the promising outcomes, challenges such as stability under variable weaving conditions, cost-effectiveness, and energy consumption require further exploration.

4. Conclusion The development of a magnetic shuttle using magnetic levitation presents a promising innovation in handloom weaving. The reduced friction and improved efficiency can modernize traditional weaving practices without compromising their artisanal value. Future research should focus on refining shuttle design, reducing production costs, optimizing energy efficiency, and exploring hybrid approaches integrating automation with handloom techniques.

FABRICATION OF COMPOSITE FOR AUTOMOBILE APPLICATIONS

KR Nandagopal – AP, Rajkumar.R, Yogesh.R -IV Year / Hema - III Year

Abstract The demand for lightweight, high-strength materials in the automotive industry has led to extensive research in composite materials. This study focuses on the design and fabrication of advanced composites tailored for automobile applications. Various reinforcement materials, such as carbon fiber, glass fiber, and natural fibers, are combined with polymer matrices to achieve enhanced mechanical performance. The paper examines fabrication techniques, material properties, and the impact of composites on vehicle performance and fuel efficiency.

1. Introduction The automotive industry continuously seeks innovative materials to improve vehicle efficiency, safety, and sustainability. Traditional metals, such as steel and aluminum, are being increasingly replaced by composite materials due to their superior strength-to-weight ratio, corrosion resistance, and design flexibility. This paper explores the development and application of composite materials in automotive engineering, focusing on structural and functional components.

2. Materials and Methods

2.1. Materials Used

- **Reinforcement Materials:** Carbon fiber, glass fiber, natural fiber (e.g., jute, flax)
- **Matrix Materials:** Epoxy resin, polyester resin, thermoplastics
- **Additives:** Fillers and nanoparticles to enhance properties

2.2. Fabrication Techniques

- **Hand Lay-up Method:** Manual layering of fiber and resin
- **Resin Transfer Molding (RTM):** Automated injection of resin into a preformed fiber structure
- **Compression Molding:** High-pressure forming for uniform composites
- **Vacuum Bagging:** Improved fiber-to-resin ratio and mechanical properties

2.3. Testing and Evaluation

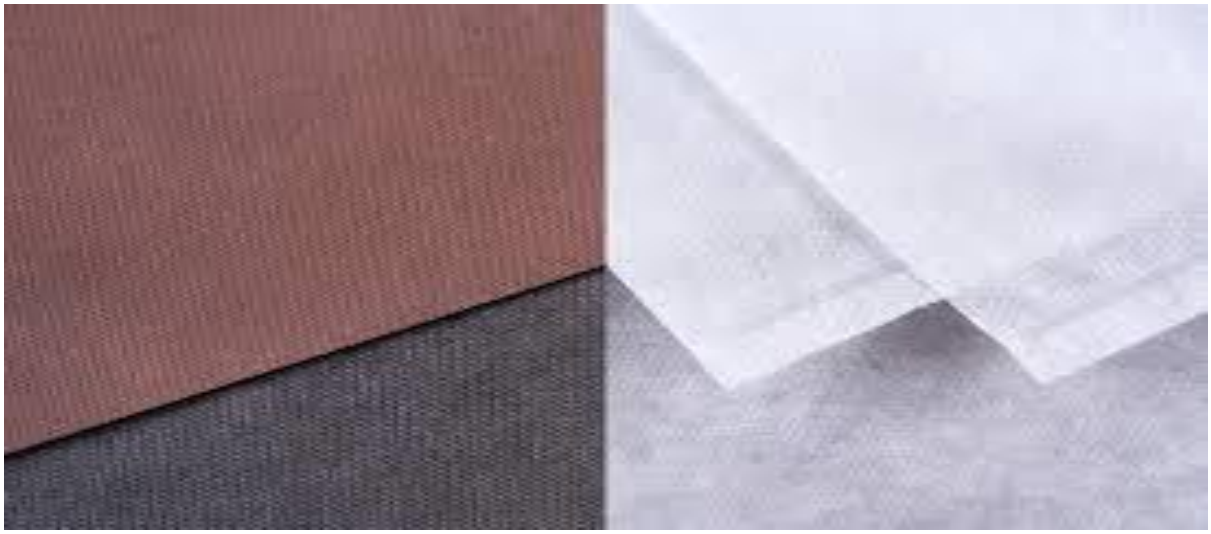
- **Tensile and Flexural Strength:** Determining load-bearing capacity
- **Impact Resistance:** Assessing durability under sudden forces
- **Thermal Stability:** Evaluating resistance to high temperatures
- **Fatigue Testing:** Measuring long-term performance under cyclic loading

3. Results and Discussion The experimental results indicate that composite materials significantly enhance vehicle performance by reducing weight while maintaining structural integrity. Carbon fiber composites exhibited the highest strength-to-weight ratio, while natural fiber composites provided eco-friendly alternatives with acceptable mechanical properties. The study also highlights cost considerations and manufacturability, discussing potential trade-offs in selecting the ideal composite for specific automotive components.

4. Conclusion The research confirms that composite materials are highly beneficial for automobile applications due to their strength, lightweight properties, and resistance to environmental degradation. While challenges such as cost and recyclability remain, ongoing advancements in material science and manufacturing techniques continue to improve the feasibility of composites in the automotive sector. Future studies should focus on hybrid composites and sustainable manufacturing practices.

MECHANICAL PROPERTIES OF CHEMICALLY BONDED NONWOVEN FABRIC

N. Sukumar – Prof, Ragul R , Dinesh V – IV Year / Rubanraj N – III Year



Abstract

The increasing demand for sustainable textile production has encouraged the utilization of waste materials in fabric manufacturing. This study investigates the mechanical properties of chemically bonded nonwoven fabrics produced using selvedge waste. Various bonding agents and process parameters are analyzed to determine their impact on tensile strength, elongation, abrasion resistance, and air permeability. The findings highlight the feasibility of incorporating selvedge waste into nonwoven fabric production while maintaining mechanical integrity for potential industrial applications.

1. Introduction Nonwoven fabrics play a crucial role in various industries, including automotive, filtration, and medical applications. Chemical bonding is a widely used technique in nonwoven fabric manufacturing, where binders enhance fiber cohesion. Utilizing selvedge waste—a byproduct of woven fabric production—offers an eco-friendly approach to textile waste management. This study aims to evaluate the mechanical performance of chemically bonded nonwoven fabrics derived from selvedge waste, emphasizing sustainability and efficiency.

2. Materials and Methods

2.1. Materials

- Selvedge waste fibers sourced from textile manufacturing units
- Chemical binders (Acrylic, Styrene-Butadiene, Polyvinyl Acetate) with varied concentrations

- Nonwoven fabric processing equipment, including bonding ovens and fiber orientation machines
- Testing apparatus for comprehensive mechanical evaluation

2.2. Fabrication Process

- Collection, sorting, and preparation of selvedge waste fibers to ensure uniformity
- Application of chemical binders using spray or dip-coating methods followed by controlled curing
- Heat curing and drying processes optimized to enhance fiber adhesion
- Cutting and conditioning of samples under standardized atmospheric conditions for accurate testing

2.3. Testing Methods

- **Tensile Strength Test:** Evaluating load-bearing capacity under applied stress
- **Elongation Test:** Measuring fabric stretchability and deformation characteristics
- **Abrasion Resistance Test:** Assessing durability under continuous friction
- **Air Permeability Test:** Analyzing breathability for potential industrial applications such as filtration and insulation
- **Moisture Retention Test:** Examining the fabric's ability to retain and release moisture, relevant for hygiene and medical applications

3. Results and Discussion The experimental results indicate that selvedge waste-based chemically bonded nonwoven fabrics exhibit comparable mechanical properties to conventional nonwoven materials. The choice of binder, bonding conditions, and fiber composition significantly influence tensile strength and flexibility. Higher binder concentrations enhance strength but may reduce breathability. Additionally, optimized curing conditions improve abrasion resistance and durability. The study also discusses the environmental benefits of repurposing textile waste while ensuring performance standards.

4. Conclusion This research confirms that selvedge waste can be effectively utilized in chemically bonded nonwoven fabric production without compromising mechanical integrity. The findings contribute to sustainable textile innovations and encourage further exploration of waste-based nonwoven materials for diverse applications. Future research may focus on enhancing biodegradability, improving cost-effectiveness, and exploring alternative binders for greater environmental benefits.

DESIGN AND DEVELOPMENT OF NON-WOVEN USING KAPOK AND RECYCLED FIBERS FOR SOUND ABSORPTION

G Devanand – AP, Aravind E C, Monish R – IV Year / Nithish K -III Year

Abstract

Sound pollution is a growing concern in urban and industrial areas, necessitating the development of efficient sound-absorbing materials. This study explores the design and fabrication of non-woven sound-absorbing materials using kapok fiber and recycled fibers. The research focuses on optimizing fiber composition, fabric structure, and density to enhance sound absorption while maintaining sustainability. The results indicate that kapok and recycled fiber-based non-woven fabrics offer promising acoustic insulation properties suitable for various applications, including automotive, construction, and industrial environments.

1. Introduction With increasing noise pollution, the demand for eco-friendly and effective sound-absorbing materials has risen. Traditional synthetic acoustic materials, such as polyurethane foam, pose environmental concerns. Kapok fiber, known for its lightweight and hollow structure, offers natural sound-absorbing properties. By blending kapok with recycled fibers, this research aims to develop sustainable, high-performance non-woven materials with superior acoustic properties.

2. Materials and Methods

2.1. Materials Used

- **Kapok Fiber:** A natural, lightweight fiber with a hollow structure that enhances sound absorption.
- **Recycled Fibers:** Post-consumer textile waste and polyester fibers used for sustainability and strength.
- **Binder:** Eco-friendly adhesives for fiber cohesion.
- **Fabrication Equipment:** Carding machine, needle punching, and thermal bonding setup.

2.2. Fabrication Process

- **Fiber Blending:** Mixing kapok and recycled fibers in different ratios to optimize sound absorption and durability.
- **Web Formation:** Using carding and needle-punching techniques to create a uniform non-woven structure.
- **Thermal Bonding:** Applying heat to enhance structural integrity without compromising acoustic properties.
- **Surface Finishing:** Applying eco-friendly coatings for improved fire resistance and durability.

2.3. Testing and Evaluation

- **Sound Absorption Coefficient (SAC):** Measured using an impedance tube to determine the effectiveness of the material.
- **Porosity and Density Analysis:** Evaluating the impact of fiber composition on acoustic performance.
- **Mechanical Strength Test:** Assessing durability for long-term application.
- **Environmental Impact Assessment:** Analyzing the sustainability benefits of using recycled materials.

3. Results and Discussion The non-woven fabrics with higher kapok content exhibited superior sound absorption due to their hollow structure, effectively trapping sound waves. The optimal blend of kapok and recycled fibers demonstrated a balance between acoustic performance, mechanical strength, and sustainability. Density and porosity were identified as key factors influencing sound absorption, with medium-density fabrics performing the best.

4. Conclusion The study successfully developed a non-woven fabric using kapok and recycled fibers with excellent sound-absorbing properties. The findings support the use of sustainable materials in acoustic applications, reducing dependency on synthetic alternatives. Future research should explore additional fiber treatments and alternative bonding techniques to enhance performance further.

TEXEMPIRE 2023

Department of Textile Technology

K.S.Rangasamy College of Technology

(Autonomous)

Tiruchengode - 637215. Tamilnadu. India