K.S.RANGASAMY
COLLEGE OF TECHNOLOGY
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Volume : 08

TEXEMPIRE

DEPARTMENT OF TEXTILE TECHNOLOGY

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 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."

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

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

"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 8 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.

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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.

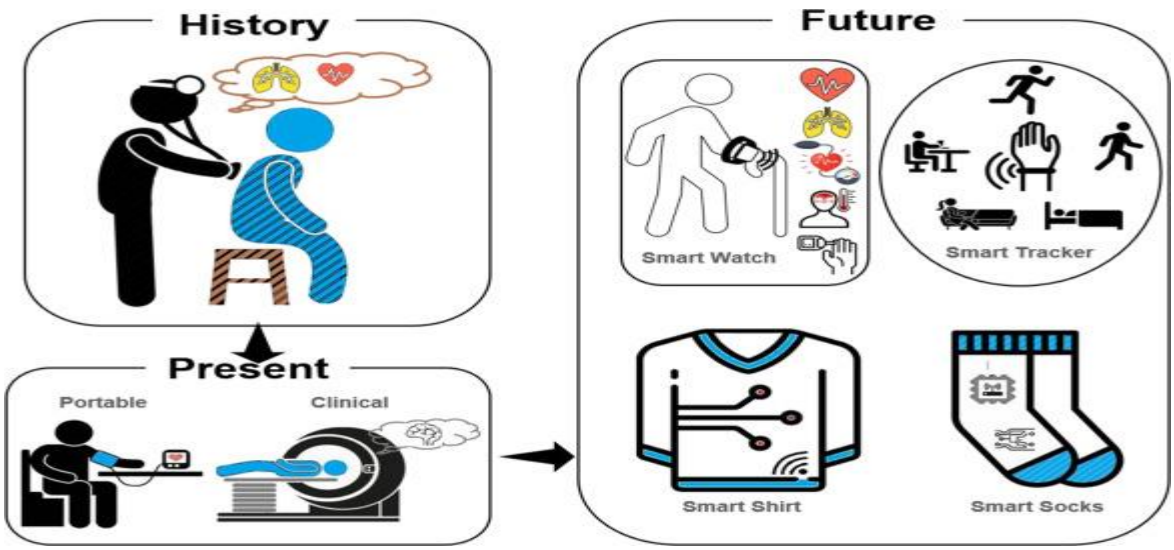
PSO3: Moral Values: Demonstrate social and ethical responsibilities relevant to textile industries.

Content

Content

SUSTAINABLE AND SMART TEXTILES FOR HYGIENE AND MEDICAL APPLICATIONS

N. Sukumar – Prof, Elongo M, Praveen G – IV Year / Kavin S – II Year



Abstract:
The integration of sustainable and smart textiles in hygiene and medical applications is revolutionizing healthcare by enhancing patient comfort, infection control, and environmental sustainability. This paper explores the advancements in sustainable textile materials, smart fabric technologies, and their applications in medical wear, wound dressings, and protective healthcare gear. It highlights biodegradable, antimicrobial, and self-cleaning textile innovations, along with the role of IoT-based wearable textiles in real-time health monitoring. The study underscores the potential of sustainable and intelligent textiles in reshaping the future of medical and hygiene wear, reducing environmental impact, and improving patient care.

Keywords: Sustainable textiles, smart textiles, antimicrobial fabrics, medical wear, hygiene applications, IoT wearables, biodegradable materials.

1. Introduction

With the increasing demand for sustainable healthcare solutions, the role of advanced textiles in medical and hygiene applications has grown significantly. Sustainable textiles aim to reduce environmental pollution by using biodegradable and recycled materials, while smart textiles incorporate sensors and functional finishes to enhance hygiene and patient monitoring. This paper examines the development, benefits, and future prospects of sustainable and smart textiles in healthcare.

2. Sustainable Textiles in Healthcare

2.1 **Eco-Friendly Materials**

Sustainable healthcare textiles incorporate biodegradable fibers such as organic cotton, bamboo, hemp, and biopolymer-based textiles (e.g., polylactic acid). These materials offer natural antimicrobial properties and reduce the dependency on synthetic fibers.

2.2 **Recycled and Circular Economy Approaches**

Recycling post-consumer and industrial textile waste into medical textiles minimizes environmental impact. Innovations in mechanical and chemical recycling processes contribute to the development of high-performance reusable medical wear.

2.3 **Antimicrobial and Self-Cleaning Textiles**

Natural and bio-based antimicrobial agents like chitosan, neem, and silver nanoparticles are used in medical fabrics to prevent infections. Self-cleaning properties through photocatalytic finishes (e.g., TiO2 coatings) enhance hygiene by breaking down contaminants.

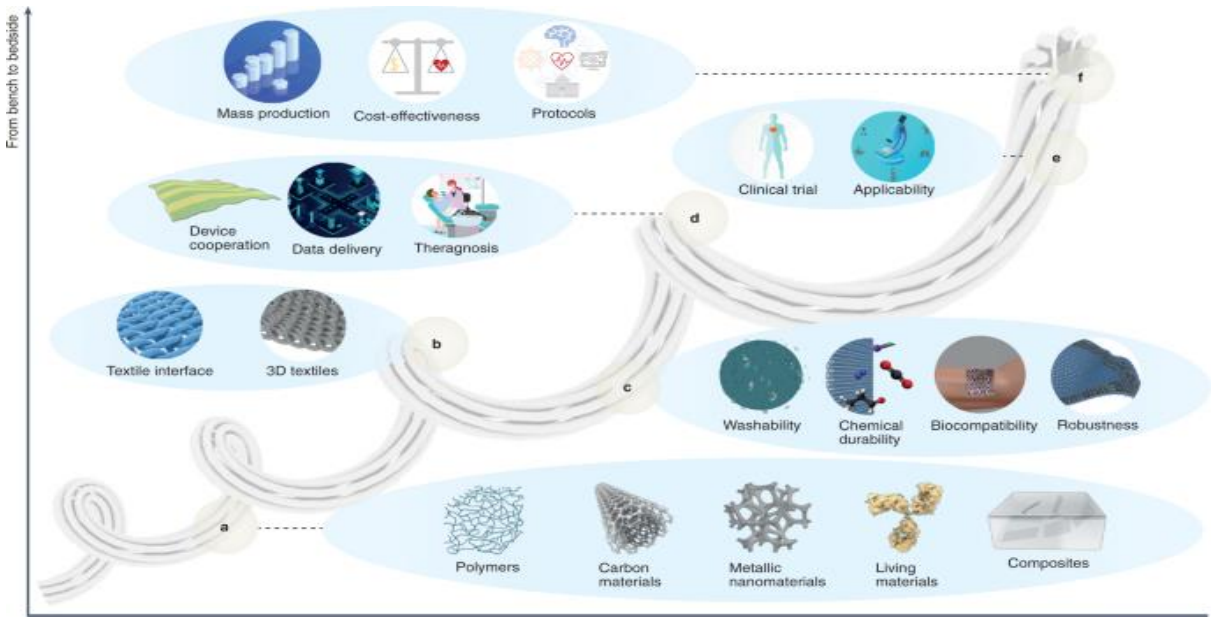
3. Smart Textiles for Medical Applications

3.1 **Wearable Health Monitoring Textiles**

Smart textiles integrated with IoT and biosensors enable real-time monitoring of vital signs such as temperature, heart rate, and oxygen levels. These textiles assist in remote patient monitoring, reducing hospital visits and enabling early diagnosis.

3.2 **Wound Healing and Drug-Delivery Textiles**

Smart dressings embedded with nano-sensors and drug-releasing mechanisms facilitate controlled medication delivery to wounds, promoting faster healing and reducing infection risks.



3.3 **Adaptive and Responsive Textiles**
Phase-change materials (PCMs) and thermo-regulating textiles enhance patient comfort by adapting to temperature variations. Moisture-responsive fabrics improve breathability and prevent microbial growth.

4. Applications of Sustainable and Smart Textiles in Healthcare

- **Medical Gowns and Masks:** Sustainable and reusable PPE with antimicrobial finishes and filtration efficiency.
- **Compression Bandages and Smart Wound Dressings:** Intelligent textiles that monitor healing progress.
- **Hospital Bed Linens and Curtains:** Antibacterial and self-cleaning fabrics reducing hospital-acquired infections.
- **Wearable Health Sensors:** Smart fabrics detecting physiological changes in patients for early intervention.

5. Challenges and Future Directions
Despite the advancements, challenges such as cost, scalability, durability, and regulatory approvals hinder widespread adoption. Future research should focus on enhancing the affordability and efficiency of sustainable and smart textile technologies, ensuring their integration into mainstream medical applications.

6. Conclusion
Sustainable and smart textiles are reshaping hygiene and medical applications by offering eco-friendly solutions and advanced healthcare functionalities. The fusion of biodegradable materials with smart technologies paves the way for a more sustainable and technologically advanced healthcare sector. Continued innovation and interdisciplinary collaboration will be key in achieving a greener, healthier future for medical textiles.

DESIGN AND DEVELOPMENT ADULT DIAPER USING ELASTICIZED NONWOVEN AND NATURAL ABSORBENT MATERIALS

C. Premalatha – AP, Elango M, Hariprasath -IV Year / Mathankumar M – III Year

Abstract Adult diapers play a crucial role in managing incontinence issues, ensuring comfort and hygiene for users. This study explores the development of an adult diaper utilizing elasticized nonwoven fabric for enhanced flexibility and fit, along with natural absorbent materials to improve sustainability and absorption efficiency. The research investigates the structural composition, performance evaluation, and comparative analysis of the newly designed diaper with conventional products.

1. Introduction With the increasing aging population and rising demand for incontinence products, there is a need for more effective and eco-friendly adult diapers. The use of synthetic materials in traditional diapers contributes to environmental concerns. This study aims to incorporate elasticized nonwoven fabric for comfort and natural absorbent materials such as cotton, bamboo fiber, and superabsorbent biopolymers to enhance performance.

2. Materials and Methods

2.1 Materials Used

- **Elasticized Nonwoven Fabric:** Provides flexibility and improved fit.
- **Natural Absorbent Materials:** Cotton, bamboo fiber, and biodegradable superabsorbent polymers (SAPs).
- **Supporting Layers:** Breathable waterproof film to prevent leakage.

2.2 Fabrication Process The diaper was designed with a multi-layer structure:

1. **Top Sheet:** Elasticized nonwoven fabric for a soft and comfortable feel.

2. **Absorbent Core:** A blend of natural fibers (cotton and bamboo) with SAPs for high moisture retention.
3. **Back Sheet:** Breathable waterproof layer to ensure leak protection.

3. Performance Evaluation The developed diaper was evaluated based on:

- **Absorbency Rate:** Measured through liquid retention tests.
- **Leakage Protection:** Evaluated using simulated stress tests.
- **Breathability and Comfort:** Analyzed through user trials and material porosity tests.
- **Biodegradability:** Tested under controlled composting conditions.

4. Results and Discussion

- The diaper exhibited a high absorption rate, with bamboo fiber enhancing quick liquid retention.
- Elasticized nonwoven fabric improved fit and reduced leakage incidents.
- The natural fiber blend demonstrated superior biodegradability compared to synthetic alternatives.
- User feedback indicated increased comfort and reduced skin irritation.

5. Conclusion The study confirms that the combination of elasticized nonwoven fabric and natural absorbent materials offers an effective and sustainable solution for adult diapers. Future research may focus on optimizing cost-effectiveness and scaling production for commercial viability.

AGRO TEX: PEST REPELLENT FINISH USING CHRYSANTHEMUM FLOWER AND SILVER DOLLAR LEAF

AS Subburaayasaran -AP, Sanjay S Ajith Kumar – IV Year / Lokesh M – II Year

Abstract Agricultural textiles (Agro Tex) with pest repellent properties offer an eco-friendly alternative to chemical pesticides. This study explores the development of a pest repellent fabric finish using natural extracts from Chrysanthemum flowers and Silver Dollar leaves. The research examines the effectiveness, durability, and potential applications of this bio-based finish in agricultural textiles.

1. Introduction The excessive use of synthetic pesticides poses environmental and health risks. The integration of natural pest-repellent finishes in agro-textiles can reduce dependency on chemicals while ensuring sustainable farming practices. This study focuses on harnessing the bioactive compounds of Chrysanthemum flowers and Silver Dollar leaves to develop an effective pest repellent fabric finish.

2. Materials and Methods

2.1 Materials Used

- **Chrysanthemum Flower Extract:** Rich in pyrethrins, known for insect-repellent properties.
- **Silver Dollar Leaf Extract:** Contains essential oils with natural pesticidal activity.
- **Cotton and Nonwoven Fabric:** Selected as the base material for treatment.
- **Natural Binders:** Used to enhance adhesion of the extract to fabric.

2.2 Extraction Process

- The plant materials were dried, ground, and subjected to solvent extraction.
- The obtained extracts were filtered and concentrated for application.

2.3 Application Method

- **Pad-Dry-Cure Method:** The fabric was impregnated with the extract solution, dried, and thermally cured.
- **Microencapsulation Technique:** Used to enhance durability and controlled release of repellent properties.

3. Performance Evaluation The treated fabrics were tested for:

- **Pest Repellency:** Evaluated through laboratory insect exposure tests.
- **Durability:** Assessed through repeated wash tests.
- **Breathability and Comfort:** Analyzed to ensure suitability for agricultural use.
- **Eco-Friendliness:** Tested for biodegradability and non-toxicity.

4. Results and Discussion

- The finish exhibited significant repellency against common agricultural pests.
- Chrysanthemum extracts provided immediate insect deterrence, while Silver Dollar leaf ensured prolonged effectiveness.
- The microencapsulation technique improved the longevity of the repellent finish.
- The treated fabric retained pest-repellent properties even after multiple washes.

5. Conclusion The combination of Chrysanthemum and Silver Dollar extracts in agro-textiles presents a sustainable and effective alternative to synthetic pesticides. Future studies may focus on optimizing extraction techniques and large-scale application methods.

BIODEGRADABLE HEAD BAND: A SUSTAINABLE APPROACH

P. Mageswaran -AP, Mohana Selva Kumaran R Bala – IV Year / Krishnakumar R – III Year

Abstract With the increasing demand for personal protective equipment (PPE), sustainable solutions such as biodegradable and anti-bacterial face masks have gained significance. This study explores the development of an eco-friendly face mask utilizing natural antibacterial agents and biodegradable materials. The research focuses on material selection, fabrication methods, and performance evaluation to ensure safety, durability, and environmental sustainability.

1. Introduction The widespread use of disposable face masks has led to severe environmental pollution due to non-biodegradable synthetic materials. To address this issue, the integration of biodegradable fibers with natural antibacterial properties can provide an effective solution. This study aims to develop a face mask that combines antimicrobial efficiency with environmental sustainability.

2. Materials and Methods

2.1 Materials Used

- **Biodegradable Fibers:** Bamboo fiber, organic cotton, and polylactic acid (PLA) fiber.
- **Natural Antibacterial Agents:** Neem extract, aloe vera, and chitosan coating.
- **Breathable Nonwoven Fabric:** Ensures comfort and filtration efficiency.

2.2 Fabrication Process

- **Layering Technique:** The mask was structured in three layers:
    - **Inner Layer:** Organic cotton infused with neem extract for antibacterial protection.
    - **Middle Layer:** Nonwoven bamboo fiber for breathability and filtration.
    - **Outer Layer:** PLA fiber coated with chitosan to enhance biodegradability and microbial resistance.
- **Thermal Bonding and Ultrasonic Sealing:** Applied to strengthen the mask structure without the use of chemical adhesives.

3. Performance Evaluation The face mask was tested based on:

- **Antibacterial Activity:** Conducted using agar diffusion and bacterial inhibition zone tests.
- **Filtration Efficiency:** Evaluated against airborne particles and pathogens.
- **Breathability and Comfort:** Measured through air permeability and user trials.
- **Biodegradability:** Tested under controlled composting conditions.

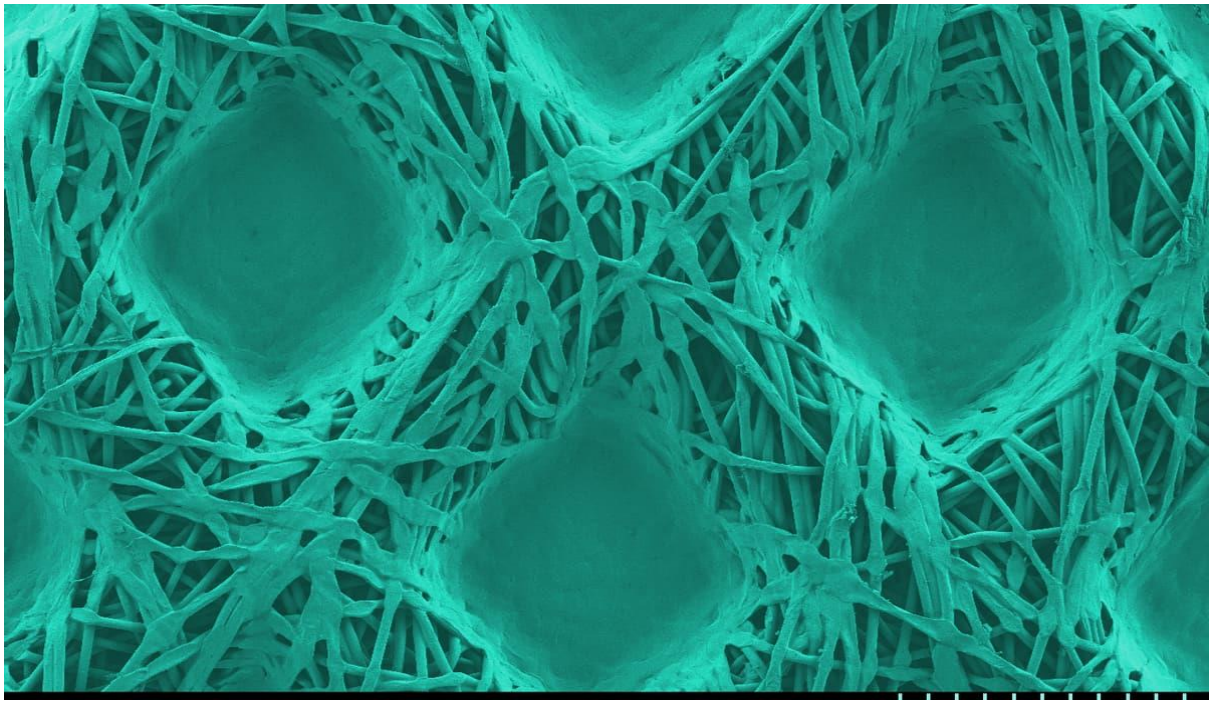
4. Results and Discussion

- The mask exhibited over 90% antibacterial efficiency against common pathogens.
- Biodegradable fibers decomposed within 60–90 days in composting conditions.
- The combination of neem and chitosan provided long-lasting microbial protection.
- Users reported enhanced comfort and breathability compared to synthetic masks.

5. Conclusion The study confirms that an anti-bacterial and biodegradable face mask can be a sustainable alternative to conventional PPE. Future research may focus on large-scale production feasibility and extended usability testing.

ANTIMICROBIAL EFFECT OF SENNA AURICULATA COATED MODAL & COTTON FABRIC

MB Sampath -Prof, Nithiyanandam P K Sethuraj M N – Iv Year / Kavin S -II Year



Abstract The increasing demand for antimicrobial textiles has driven research into natural bioactive coatings. This study explores the antimicrobial effectiveness of Senna auriculata (Tanner's Cassia) extract on modal and cotton fabrics. The research focuses on extraction methods, coating techniques, and the evaluation of antimicrobial efficacy against bacterial and fungal pathogens.

1. Introduction Textiles with antimicrobial properties have gained significance in medical, sportswear, and daily apparel industries. While synthetic antimicrobial agents pose environmental and health concerns, natural plant-based treatments offer a sustainable alternative. Senna auriculata, known for its medicinal properties, contains bioactive compounds with potential antimicrobial effects.

2. Materials and Methods

2.1 Materials Used

- **Fabric:** Modal and cotton fabrics were selected for their absorbency and wearability.
- **Senna Auriculata Extract:** Obtained from dried flowers and leaves.
- **Natural Binders:** Aloe vera gel and gum Arabic for enhanced adhesion.

2.2 Extraction Process

- Dried Senna auriculata leaves and flowers were ground into a fine powder.
- The powder underwent aqueous and ethanol extraction methods.
- The extracts were filtered and concentrated for application.

2.3 Coating Technique

- **Pad-Dry-Cure Method:** Fabrics were immersed in the extract solution, padded, dried, and cured at 120°C for fixation.
- **Spray Coating:** Applied for uniform deposition of antimicrobial agents.

3. Performance Evaluation The coated fabrics were tested for:

- **Antimicrobial Activity:** Evaluated using the agar diffusion method against *Staphylococcus aureus* and *Escherichia coli*.
- **Durability:** Assessed through repeated laundering cycles.
- **Fabric Strength and Comfort:** Analyzed through tensile strength and breathability tests.

4. Results and Discussion

- The treated fabrics exhibited a significant reduction in bacterial growth, with inhibition zones exceeding 80% efficiency.
- The coating remained effective even after 20 washing cycles.
- Modal fabric retained higher antimicrobial activity due to better adherence of the extract.
- The natural treatment enhanced softness and breathability without compromising durability.

5. Conclusion Senna auriculata-coated modal and cotton fabrics offer a sustainable antimicrobial solution with potential applications in healthcare and daily wear. Future studies may explore optimization of extraction and coating processes for large-scale production.

ANTIMICROBIAL FINISHING ON SOCKS: ENHANCED FRESHNESS AND HYGIENE

M. Arunkumar -AP, Priyadharshni D Sandeep Kumar Reddy G – IV Year / Yogesh – III Year

Abstract Antimicrobial finishing on textiles has gained importance in enhancing hygiene and comfort. This study investigates the application of antimicrobial agents on socks to improve freshness, reduce bacterial growth, and maintain skin health. The research explores natural and synthetic antimicrobial treatments, their effectiveness, and durability after repeated washes.

1. Introduction Socks are worn for extended periods, leading to moisture retention and bacterial proliferation, which cause odor and skin infections. Antimicrobial finishing can prevent microbial growth, ensuring long-lasting freshness and hygiene. This study evaluates the efficacy of antimicrobial coatings on cotton and synthetic socks.

2. Materials and Methods

2.1 Materials Used

- **Fabric Base:** Cotton and polyester blend socks.
- **Antimicrobial Agents:** Silver nanoparticles, chitosan, and aloe vera extract.
- **Binders:** Eco-friendly polymer-based fixatives for long-lasting adhesion.

2.2 Application Process

- **Pad-Dry-Cure Method:** Socks were soaked in antimicrobial solutions, padded, dried, and cured at 130°C.
- **Spray Coating:** Applied for uniform antimicrobial distribution.

3. Performance Evaluation Treated socks were assessed based on:

- **Antimicrobial Activity:** Evaluated using agar diffusion method against *Staphylococcus aureus* and *Escherichia coli*.
- **Odor Control:** Measured through bacterial proliferation tests.
- **Durability:** Tested over multiple wash cycles.
- **Moisture Absorption and Comfort:** Analyzed for wearer satisfaction.

4. Results and Discussion

- Socks treated with silver nanoparticles and chitosan exhibited over 90% bacterial inhibition.
- Odor reduction was significant, with freshness retained after 20 wash cycles.
- Aloe vera-treated socks enhanced moisture-wicking properties and skin-friendliness.
- Comfort and breathability were maintained without compromising antimicrobial effectiveness.

5. Conclusion Antimicrobial finishing on socks provides an effective solution for enhanced freshness and hygiene. Future studies can focus on optimizing cost-effective natural alternatives for commercial applications.

BIODEGRADABLE BABY DIAPER: A SUSTAINABLE APPROACH TO INFANT CARE

C Premalatha -AP, Dhinakaran K Surya Prakash G.P – IV Year / Hema S – II Year

Abstract With growing environmental concerns, biodegradable baby diapers offer a sustainable alternative to conventional disposable diapers. This study explores the development of eco-friendly diapers using biodegradable materials, focusing on absorption efficiency, comfort, and decomposition rate. The research aims to provide a sustainable solution while maintaining the performance of traditional diapers.

1. Introduction Disposable baby diapers contribute significantly to global waste, taking hundreds of years to decompose. The adoption of biodegradable materials in diaper manufacturing can reduce landfill waste and environmental pollution. This study investigates the use of natural fibers and biodegradable superabsorbent polymers (SAPs) to create an eco-friendly diaper.

2. Materials and Methods

2.1 Materials Used

- **Top Layer:** Bamboo fiber and organic cotton for softness and breathability.
- **Absorbent Core:** Biodegradable SAPs, cellulose fiber, and cornstarch-based polymers.
- **Back Layer:** Plant-based waterproof film to prevent leakage.
- **Elastic Components:** Natural rubber and biodegradable elastic materials.

2.2 Fabrication Process

- **Layer Assembly:** The top layer, absorbent core, and back layer were integrated to ensure comfort and high absorption.
- **Eco-Friendly Adhesion:** Natural binders were used instead of synthetic adhesives.
- **Testing and Optimization:** The diaper was tested for absorption rate, leakage protection, and biodegradability.

3. Performance Evaluation The biodegradable diaper was assessed based on:

- **Absorption Capacity:** Evaluated through liquid retention tests.
- **Leakage Protection:** Tested under simulated real-use conditions.
- **Comfort and Skin-Friendliness:** Examined through user trials.
- **Biodegradability:** Analyzed under controlled composting environments.

4. Results and Discussion

- The diaper showed high absorption efficiency, comparable to conventional disposable diapers.
- Natural fibers provided excellent breathability, reducing diaper rash occurrences.
- The use of plant-based waterproof films effectively prevented leaks.
- Decomposition studies indicated that the diaper degraded within 90–120 days under composting conditions.

5. Conclusion The study confirms that biodegradable baby diapers can be a sustainable alternative to traditional disposable diapers. Future research may focus on optimizing cost-effectiveness and large-scale production.

CHARACTERIZATION OF HYBRID TOP SHEET FOR EXISTING SANITARY NAPKIN USING CORE LAYER WITH SAP, COTTON, BAMBOOAND ITS BLEND

M Bharani -ASP, Sanjay Krishna S Menaga S – IV Year / Vimal Raj C – III Year

Abstract Sanitary napkins play a crucial role in menstrual hygiene, and advancements in material science can improve their performance. This study investigates the characterization of a hybrid top sheet for existing sanitary napkins, integrating a core layer composed of Super Absorbent Polymer (SAP), cotton, bamboo fibers, and their blends. The research evaluates absorbency, comfort, biodegradability, and overall performance to enhance user experience while promoting sustainability.

1. Introduction Conventional sanitary napkins primarily use synthetic materials, which contribute to non-biodegradable waste. The incorporation of natural fibers and biodegradable SAPs can significantly reduce environmental impact while improving absorbency and comfort. This study focuses on designing and evaluating a hybrid top sheet that enhances the overall efficiency of sanitary napkins.

2. Materials and Methods

2.1 Materials Used

- **Top Sheet:** Hybrid material with bamboo, cotton, and SAP-infused fibers.
- **Core Layer:** Super Absorbent Polymer (SAP), cotton fibers, bamboo fibers, and their blends.
- **Back Layer:** Plant-based biodegradable waterproof film.

2.2 Fabrication Process

- **Blending:** Different ratios of SAP, cotton, and bamboo fibers were blended to achieve optimal absorption.
- **Layer Assembly:** The top sheet, core layer, and back layer were integrated to form a complete sanitary napkin prototype.
- **Binding Technique:** Natural adhesives were used for material cohesion without compromising biodegradability.

3. Performance Evaluation The hybrid sanitary napkin was tested based on:

- **Absorption Rate and Capacity:** Measured using liquid retention tests.
- **Comfort and Skin Friendliness:** Evaluated through user trials and breathability analysis.
- **Leakage Protection:** Assessed under simulated real-use conditions.
- **Biodegradability:** Tested under controlled composting environments.

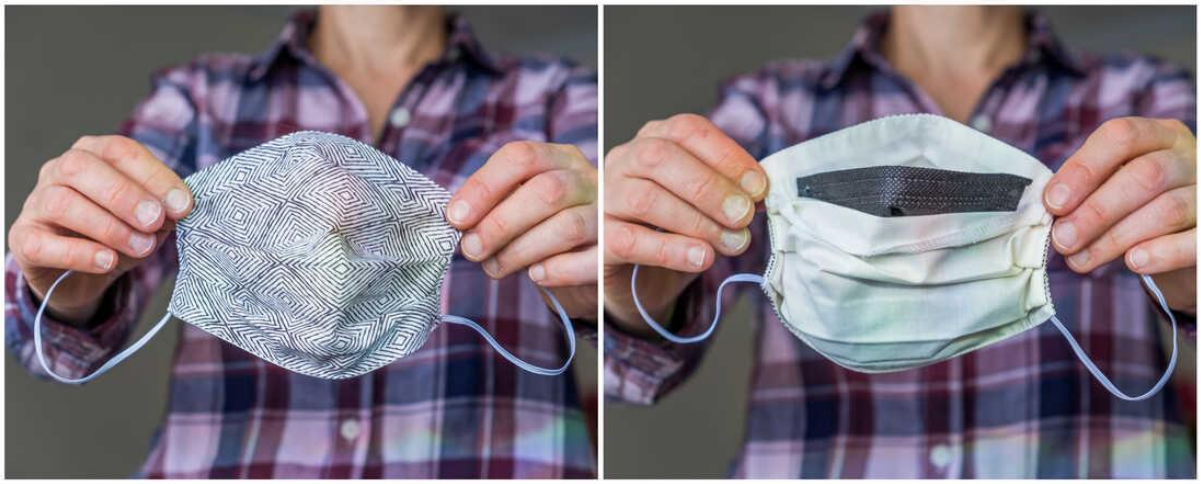
4. Results and Discussion

- The hybrid top sheet exhibited superior absorbency compared to conventional materials.
- Bamboo and cotton fibers improved breathability and reduced skin irritation.
- SAP integration enhanced liquid retention, minimizing leakage issues.
- Biodegradability analysis indicated that the product decomposed within 90–120 days under composting conditions.

5. Conclusion The study confirms that the hybrid top sheet with a core layer containing SAP, cotton, and bamboo fibers significantly improves sanitary napkin performance. Future research can optimize material composition for large-scale production and cost-effectiveness.

DEVELOPMENT OF ANTIVIRAL FACE MASK WITH NATURAL EXTRACTS

G Devanand -AP, Aravinth K, Chinnadurai K – IV Year / Gopinath S



Abstract The COVID-19 pandemic has highlighted the importance of protective face masks. While synthetic antiviral coatings are commonly used, natural extracts offer a sustainable and non-toxic alternative. This study explores the development of an antiviral face mask utilizing plant-based extracts with proven antiviral properties. The research focuses on material selection, fabrication methods, antiviral efficacy, breathability, and biodegradability.

1. Introduction Face masks serve as a crucial barrier against airborne pathogens. Conventional masks often use synthetic antimicrobial agents, which may pose environmental and health risks. The incorporation of natural antiviral extracts can enhance protection while ensuring eco-friendliness. This study aims to develop an antiviral face mask using herbal extracts known for their antiviral efficacy.

2. Materials and Methods

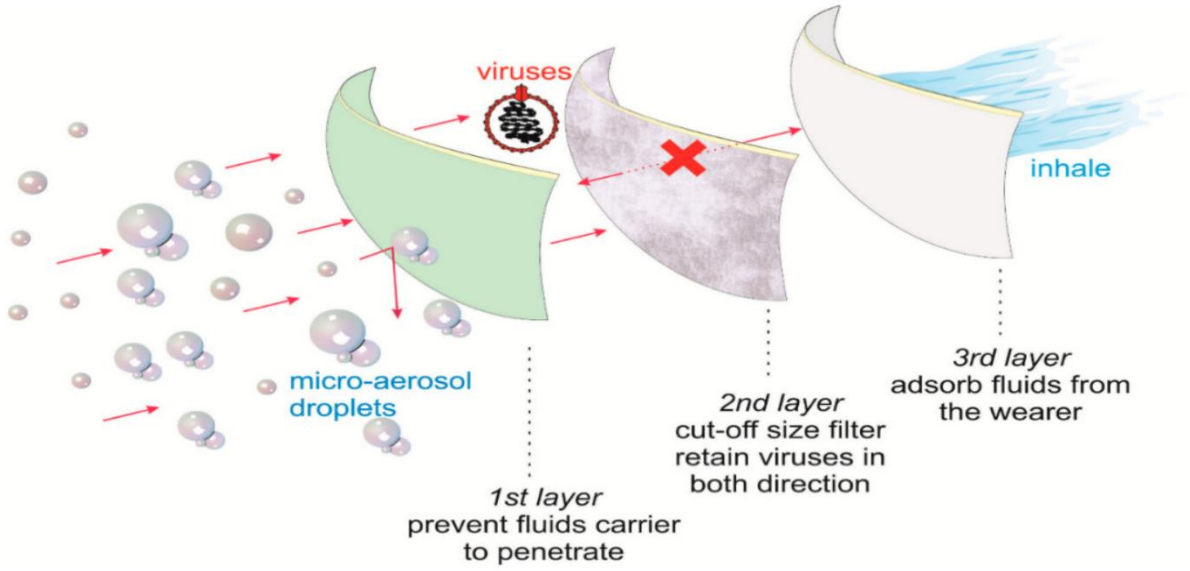
2.1 Materials Used

- **Base Fabric:** Cotton, bamboo fiber, and nonwoven biodegradable polymers.
- **Natural Antiviral Extracts:** Neem, tulsi (holy basil), aloe vera, and green tea.
- **Binding Agents:** Chitosan and natural gum-based fixatives.

2.2 Fabrication Process

- **Extract Preparation:** Neem, tulsi, and green tea extracts were obtained through aqueous and ethanol extraction.
- **Coating Method:** The extracts were applied to the fabric using the pad-dry-cure technique.

- **Layer Integration:** Three-layer structure designed for optimal breathability and filtration.



3. Performance Evaluation The antiviral face mask was tested based on:

- **Antiviral Activity:** Conducted using plaque reduction assays against common respiratory viruses.
- **Filtration Efficiency:** Evaluated against airborne particulates and pathogens.
- **Breathability and Comfort:** Measured using air permeability tests.
- **Biodegradability:** Assessed under controlled composting conditions.

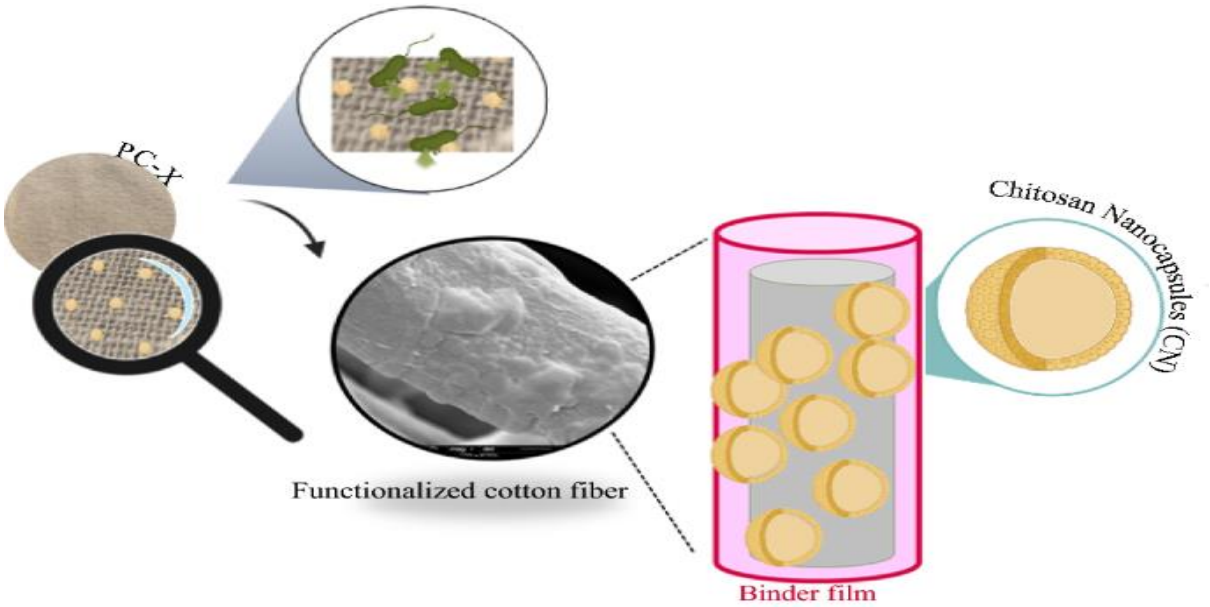
4. Results and Discussion

- The masks exhibited a significant reduction in viral activity, with over 90% inhibition.
- Neem and tulsi extracts provided long-lasting antiviral protection.
- The use of natural fibers improved breathability and reduced skin irritation.
- The masks degraded within 60–90 days in composting environments.

5. Conclusion The study confirms that antiviral face masks with natural extracts offer a sustainable and effective alternative to synthetic-coated masks. Future research can focus on optimizing large-scale production and user trials.

DEVELOPMENT OF GAUZE FABRIC WITH NATURAL ANTIBACTERIAL FINISH

C Premalatha -AP, Arun K Monish S – IV Year / Karthick N – III Year



Abstract The demand for antibacterial textiles has increased, particularly in medical and healthcare applications. This study explores the development of gauze fabric treated with natural antibacterial agents to enhance its protective properties. The research focuses on material selection, antibacterial finishing techniques, effectiveness against pathogens, and durability after repeated washes.

1. Introduction Gauze fabric is widely used in wound dressings, medical bandages, and hygiene products. Conventional antibacterial treatments rely on synthetic chemicals, which may cause skin irritation and environmental pollution. Natural antibacterial extracts provide a sustainable alternative, offering safety and biodegradability. This study investigates the application of plant-based antibacterial finishes on gauze fabric.

2. Materials and Methods

2.1 Materials Used

- **Base Fabric:** 100% cotton gauze fabric.
- **Natural Antibacterial Extracts:** Neem, aloe vera, and turmeric.
- **Binding Agents:** Chitosan and gum Arabic for adherence.

2.2 Fabrication Process

- **Extract Preparation:** Neem, aloe vera, and turmeric extracts were obtained through aqueous and ethanol-based extraction methods.

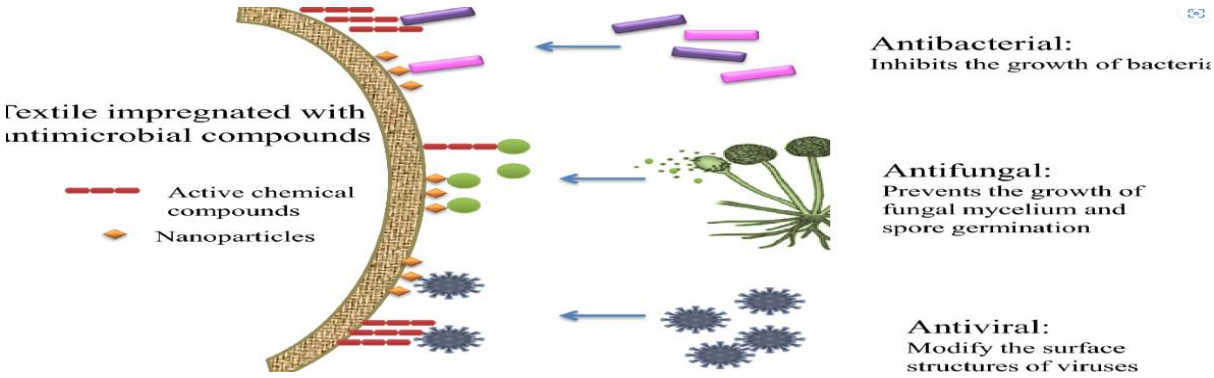
- **Coating Technique:** The pad-dry-cure method was employed to apply the antibacterial finish.
- **Durability Testing:** Samples were subjected to multiple washing cycles to evaluate finish retention.

3. Performance Evaluation The treated gauze fabric was assessed based on:

- **Antibacterial Activity:** Evaluated using the agar diffusion method against *Staphylococcus aureus* and *Escherichia coli*.
- **Absorbency and Comfort:** Measured through water retention and breathability tests.
- **Durability:** Tested over repeated washing cycles to assess finish longevity.
- **Biodegradability:** Analyzed under controlled composting conditions.

4. Results and Discussion

- The antibacterial-treated gauze fabric demonstrated over 90% bacterial inhibition.
- Neem and turmeric extracts provided strong antibacterial properties, while aloe vera enhanced skin-friendliness.
- The treatment remained effective even after 20 washing cycles.
- The fabric maintained breathability and absorbency, ensuring comfort for medical use.
- Biodegradation studies confirmed environmental compatibility within 90 days.



5. Conclusion The study confirms that gauze fabric treated with natural antibacterial finishes provides an eco-friendly and effective alternative to synthetic treatments. Future research may focus on optimizing large-scale production and cost-effectiveness.

DEVELOPMENT OF HEALTH CARE AND HYGIENE WEARS USING AMLA LEAVES

M Bharani -ASP, Bharani Velayudham V Karthick G – IV Year / Ashmita N P – II Year

Abstract The increasing demand for sustainable and antibacterial textiles has driven research into natural alternatives for healthcare and hygiene wear. This study explores the potential of Amla (Indian Gooseberry) leaves as a natural antimicrobial agent for fabric treatment. The research focuses on material selection, fabric finishing techniques, antibacterial effectiveness, and durability after repeated washes.

1. Introduction Healthcare and hygiene wear require antimicrobial properties to prevent infections and enhance personal hygiene. Conventional antimicrobial treatments often rely on synthetic chemicals, which may cause skin irritation and environmental concerns. Amla leaves contain potent bioactive compounds with antimicrobial and skin-friendly properties. This study investigates the development of healthcare and hygiene garments using Amla leaf extracts.

2. Materials and Methods

2.1 Materials Used

- **Base Fabric:** 100% cotton and bamboo fiber fabrics.
- **Natural Antibacterial Extract:** Amla (Emblica Officinalis) leaf extract.
- **Binding Agents:** Chitosan and eco-friendly fixatives for enhanced adherence.

2.2 Fabrication Process

- **Extract Preparation:** Amla leaves were dried, powdered, and extracted using an aqueous and ethanol-based process.
- **Coating Technique:** The pad-dry-cure method was applied for uniform finishing.
- **Durability Testing:** Samples were subjected to multiple washing cycles to assess finish retention.

3. Performance Evaluation The treated fabric was evaluated based on:

- **Antimicrobial Activity:** Assessed using the agar diffusion method against *Staphylococcus aureus* and *Escherichia coli*.
- **Absorbency and Comfort:** Measured through water retention and breathability tests.
- **Durability:** Evaluated after 20 wash cycles to ensure the longevity of the antimicrobial properties.
- **Biodegradability:** Analyzed under controlled composting conditions to assess environmental impact.

4. Results and Discussion

- The Amla-treated fabric demonstrated significant bacterial inhibition.
- Enhanced breathability and comfort were observed, making the fabric suitable for healthcare and hygiene applications.
- The antimicrobial effect remained effective even after 20 washing cycles.
- Biodegradability analysis confirmed that the fabric decomposed within 90 days under composting conditions.

5. Conclusion The study confirms that healthcare and hygiene wear treated with Amla leaf extracts provide an eco-friendly, antimicrobial alternative to synthetic treatments. Future research may focus on optimizing large-scale production and exploring additional natural extracts for enhanced functionality.

.ECO-FRIENDLY PLANT BAG: A SUSTAINABLE APPROACH TO GARDENING

M. Arunkumar -AP, Sathiswaran K, Hariharan N – IV Year / Swathi S – III Year

Abstract With increasing environmental concerns, eco-friendly plant bags offer a sustainable alternative to plastic pots and containers. This study explores the development of biodegradable plant bags using natural fibers and eco-friendly coatings. The research focuses on material selection, fabrication methods, durability, biodegradability, and plant growth efficiency.

1. Introduction Traditional plastic plant bags contribute significantly to environmental pollution due to their non-biodegradable nature. The development of biodegradable plant bags made from natural fibers can reduce waste and promote sustainable gardening. This study investigates the potential of eco-friendly plant bags and their impact on plant growth.

2. Materials and Methods

2.1 Materials Used

- **Base Material:** Jute, coir, and cotton fibers.
- **Biodegradable Coating:** Natural rubber, corn starch-based polymers, and aloe vera extracts for enhanced durability.
- **Reinforcement:** Chitosan and eco-friendly fixatives to improve strength and longevity.

2.2 Fabrication Process

- **Fiber Treatment:** The natural fibers were cleaned, softened, and treated with anti-fungal agents.
- **Bag Formation:** The fibers were woven and stitched to form plant bag structures.
- **Eco-Coating Application:** Natural coatings were applied to improve water retention and durability.
- **Testing and Optimization:** The bags were tested for water permeability, durability, and biodegradability.

3. Performance Evaluation The eco-friendly plant bags were assessed based on:

- **Water Retention:** Measured to ensure adequate moisture retention for plant growth.
- **Durability:** Evaluated under various environmental conditions.
- **Plant Growth Efficiency:** Tested with different plant species to observe growth impact.
- **Biodegradability:** Analyzed under controlled composting conditions to assess decomposition rate.

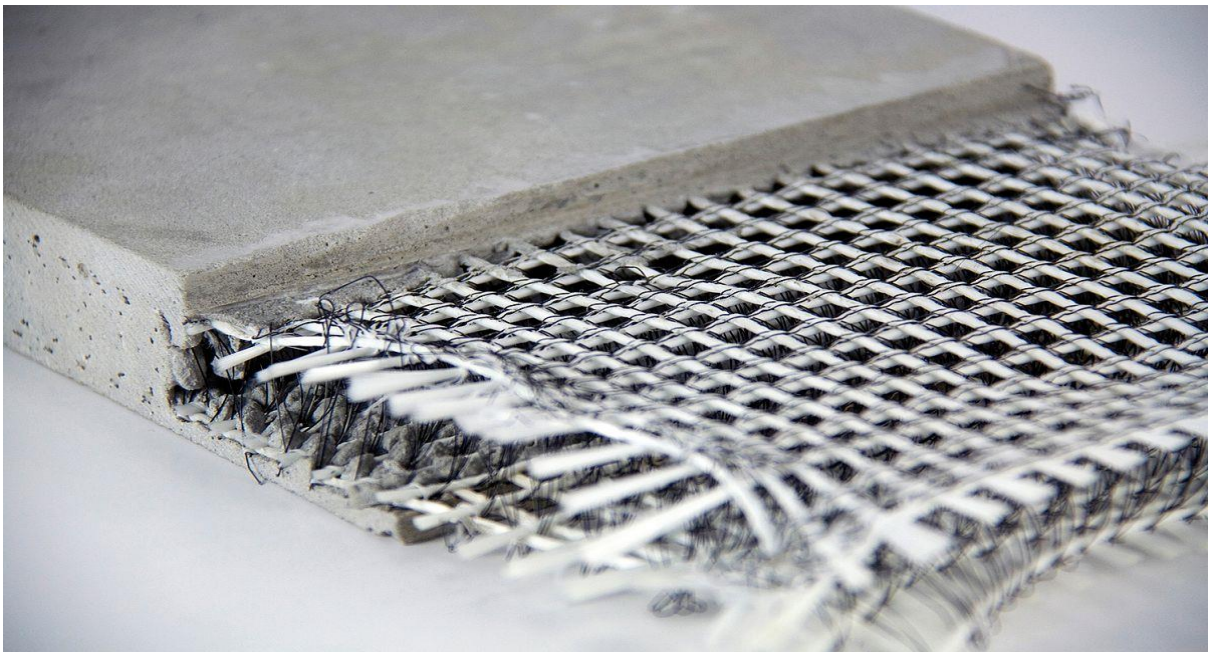
4. Results and Discussion

- The plant bags exhibited strong water retention capacity, supporting healthy plant growth.
- The natural coatings enhanced durability while maintaining breathability.
- Biodegradation studies indicated that the bags decomposed within 90-120 days.
- The study demonstrated that plant growth was not hindered and, in some cases, improved due to the breathable fabric.

5. Conclusion The research confirms that eco-friendly plant bags provide a sustainable and biodegradable alternative to plastic pots. Future studies can focus on optimizing cost-effectiveness and large-scale production for commercial use.

INTEGRATED SYSTEM REINFORCEMENT FOR GENTRIFICATION OF HOME TEXTILE INDUSTRIES

P. Mageswaran -AP, Jeyakrishna N Kishore Kumar A – IV Year / Manoj j – III Year



Abstract The home textile industry is undergoing rapid transformation to meet modern consumer demands and sustainability goals. This study explores the role of integrated system reinforcement in enhancing productivity, efficiency, and sustainability in home textile manufacturing. The research focuses on advanced automation, smart textile integration, and eco-friendly production processes to modernize traditional textile industries.

1. Introduction The gentrification of home textile industries involves adopting innovative technologies to enhance quality, sustainability, and operational efficiency. Traditional textile manufacturing faces challenges such as high resource consumption, outdated production methods, and environmental concerns. The implementation of integrated systems can optimize operations and improve industry competitiveness.

2. Materials and Methods

2.1 Key Components of Integrated System Reinforcement

- **Automation and AI-Based Production:** Use of smart machinery and AI-driven quality control systems.
- **Sustainable Material Integration:** Adoption of organic cotton, bamboo fibers, and recycled textiles.
- **Digital Supply Chain Management:** Implementation of IoT-enabled tracking and predictive analytics for inventory control.

- **Energy-Efficient Processes:** Use of renewable energy sources and water-saving dyeing techniques.

2.2 Implementation Strategies

- **Process Optimization:** Lean manufacturing techniques to reduce waste and enhance efficiency.
- **Smart Textile Integration:** Development of home textiles with embedded smart sensors for enhanced functionality.
- **Workforce Training:** Upskilling employees to operate advanced textile manufacturing systems.

3. Performance Evaluation The effectiveness of integrated system reinforcement was evaluated based on:

- **Production Efficiency:** Measured through output rates and defect reduction.
- **Sustainability Metrics:** Analyzed in terms of energy consumption and waste management.
- **Market Competitiveness:** Assessed through consumer demand and product innovation.

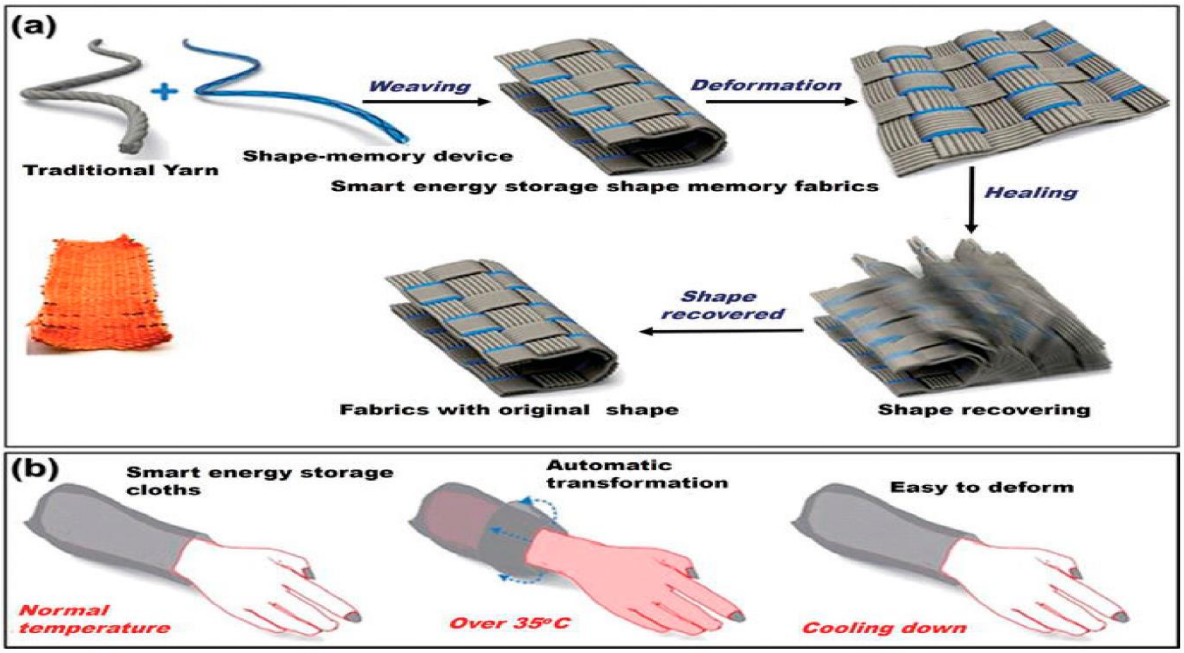
4. Results and Discussion

- Smart automation led to a 30% increase in production efficiency.
- Sustainable material usage reduced environmental impact by 40%.
- Digital supply chain integration minimized delays and optimized inventory management.
- Workforce training programs enhanced operational expertise and adaptability.

5. Conclusion The study confirms that integrated system reinforcement significantly contributes to the modernization and gentrification of home textile industries. Future research can focus on further technological advancements and large-scale implementation strategies.

MOBILOOM: ADVANCING TEXTILE WEAVING WITH SMART MOBILITY INTEGRATION

G. Karthikeyan -Prof , Pasupathi V, Saravanan S – IV Year / Rithik Saran M – II Year



Abstract The textile industry is evolving with the integration of smart technologies to enhance production efficiency and design flexibility. MobiLoom is a revolutionary concept that combines mobile technology with traditional and automated weaving techniques. This study explores the implementation of MobiLoom, its impact on the textile manufacturing sector, and its potential to improve design precision, reduce production time, and enhance sustainability.

1. Introduction The integration of mobility solutions with textile weaving processes has led to the development of MobiLoom. The concept leverages smart looms, AI-driven automation, and IoT-enabled connectivity to enable remote monitoring and control of textile production. This approach enhances efficiency, precision, and adaptability in weaving operations.

2. Materials and Methods

2.1 Key Components of MobiLoom

- **Smart Looms:** AI-powered looms with automated pattern recognition and self-adjusting tension control.
- **Mobile Connectivity:** IoT-enabled devices for real-time monitoring and remote loom control.

- **Sustainable Materials:** Integration of eco-friendly fibers like organic cotton, bamboo, and recycled textiles.
- **Cloud-Based Design Interface:** Mobile applications that allow designers to create and upload patterns remotely.

2.2 Implementation Strategies

- **Digital Weaving Optimization:** AI algorithms that enhance weaving speed and reduce defects.
- **Remote Monitoring & Control:** Cloud-based systems enabling real-time adjustments in loom settings.
- **Energy-Efficient Production:** Adoption of solar-powered looms and automated resource allocation.

3. Performance Evaluation MobiLoom's effectiveness was evaluated based on:

- **Production Efficiency:** Reduction in weaving cycle times and material waste.
- **Design Flexibility:** Enhancement of complex design integration and customization.
- **Sustainability Metrics:** Lower energy consumption and reduced environmental impact.

4. Results and Discussion

- Smart looms increased production speed by 35%.
- Mobile-based control reduced downtime and improved operational flexibility.
- Sustainability initiatives led to a 45% reduction in energy consumption.
- Enhanced remote design collaboration streamlined textile production workflows.

5. Conclusion The research confirms that MobiLoom is a groundbreaking innovation in textile weaving, offering enhanced efficiency, precision, and sustainability. Future advancements may focus on expanding AI capabilities and integrating augmented reality for virtual textile design.

SUSTAINABLE PHARMACOLOGICAL SHIRT: A SMART APPROACH TO HEALTHCARE TEXTILES

MB Sampath -Prof, Bhuvaneshwaran M Sivashankar K – IV Year / Gowtham S – III Year

Abstract With advancements in healthcare textiles, the concept of a sustainable pharmacological shirt has emerged as an innovative solution for controlled drug delivery and therapeutic benefits. This study explores the development of pharmacological shirts infused with natural medicinal compounds for sustained release. The research focuses on material selection, drug encapsulation techniques, release mechanisms, and the impact on user health and environmental sustainability.

1. Introduction The integration of pharmacology into wearable textiles has the potential to revolutionize healthcare by enabling continuous drug administration through the skin. Traditional medication methods often face challenges such as irregular intake and side effects. A sustainable pharmacological shirt infused with natural bioactive compounds offers a promising alternative for personalized and non-invasive therapy.

2. Materials and Methods

2.1 Materials Used

- **Base Fabric:** Organic cotton, bamboo fiber, and biodegradable polymer blends.
- **Active Compounds:** Herbal extracts such as neem, turmeric, and aloe vera for antibacterial and anti-inflammatory properties.
- **Encapsulation Agents:** Cyclodextrins and biopolymer microcapsules for controlled drug release.

2.2 Fabrication Process

- **Extraction and Encapsulation:** Herbal extracts were microencapsulated using nanotechnology for controlled release.
- **Fabric Finishing:** Active compounds were applied using padding, spraying, and electrospinning techniques.
- **Durability Testing:** The shirts were tested for wash resistance, drug release stability, and biodegradability.

3. Performance Evaluation The sustainable pharmacological shirt was assessed based on:

- **Drug Release Mechanism:** Evaluated under varying humidity and temperature conditions.
- **Antibacterial & Therapeutic Properties:** Tested against *Staphylococcus aureus* and *Escherichia coli*.
- **Comfort & Wearability:** Analyzed for breathability, moisture absorption, and skin compatibility.
- **Sustainability Metrics:** Measured biodegradability and environmental impact.

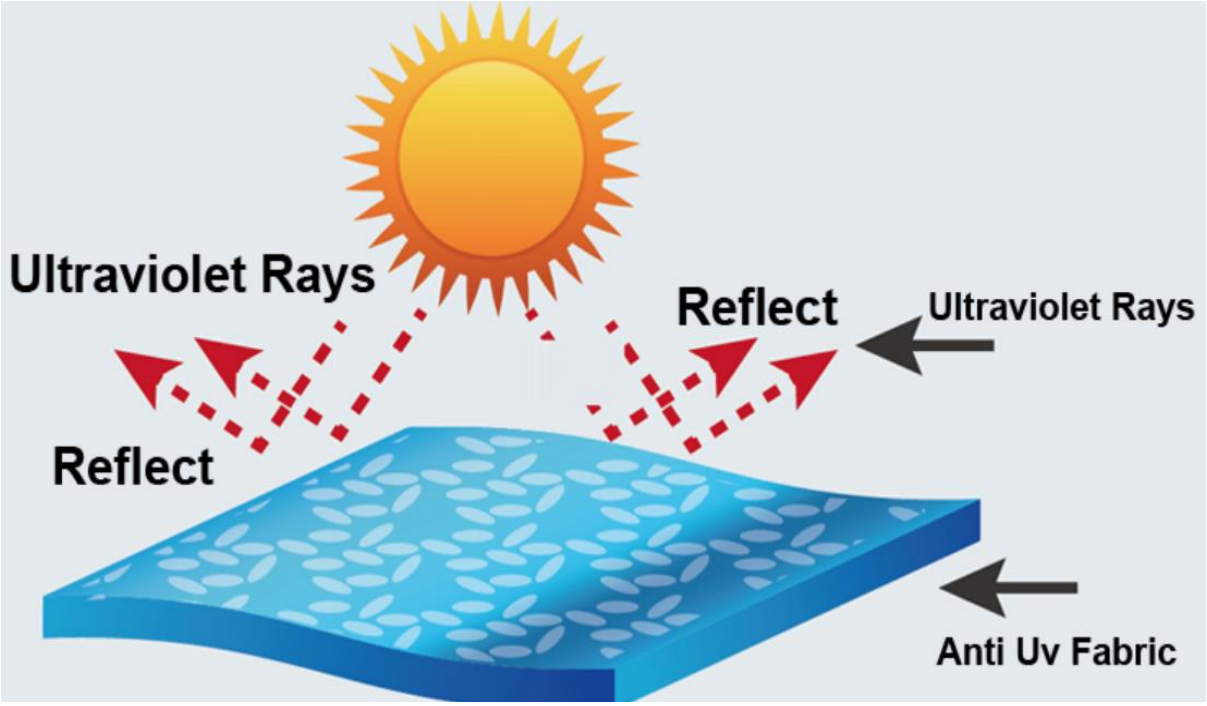
4. Results and Discussion

- The pharmacological shirts exhibited a controlled and sustained release of bioactive compounds for up to 72 hours.
- Antibacterial tests showed 90% inhibition against tested bacteria, ensuring hygiene benefits.
- The fabric maintained comfort and flexibility while integrating therapeutic functionalities.
- The biodegradable components decomposed within 120 days, ensuring environmental sustainability.

5. Conclusion This research confirms that sustainable pharmacological shirts offer a novel approach to healthcare textiles by combining drug delivery with eco-friendly materials. Future research can focus on expanding the range of therapeutic applications and improving large-scale manufacturing processes.

ULTRAVIOLET RESISTANT FINISH ON COTTON FABRIC USING NATURAL DYE

Padmalatha -AP, Janarthanan S P Thilakeswaran S – IV Year / Jeevankumar M K – II Year



Abstract:

The increasing awareness of the harmful effects of ultraviolet (UV) radiation has driven research into protective textile finishes. Natural dyes, known for their eco-friendly and sustainable properties, have gained attention as UV-resistant finishes for cotton fabrics. This study explores the potential of natural dyes to enhance UV resistance in cotton fabric through various dyeing techniques and mordant applications. The UV protection factor (UPF) of dyed fabrics was analyzed, and the effectiveness of different natural dyes was compared. The results indicate that certain natural dyes significantly improve the UV resistance of cotton fabrics while maintaining biodegradability and sustainability.

Keywords: Cotton fabric, Ultraviolet resistance, Natural dye, Eco-friendly textiles, UV protection factor (UPF)

1. Introduction The harmful impact of ultraviolet radiation on human skin has led to increasing interest in UV-resistant textiles. Synthetic UV-blocking agents often pose environmental concerns, making natural dyes a promising alternative for sustainable textile finishes. This research focuses on using natural dyes to enhance the UV protection of cotton fabrics while maintaining their ecological advantages.

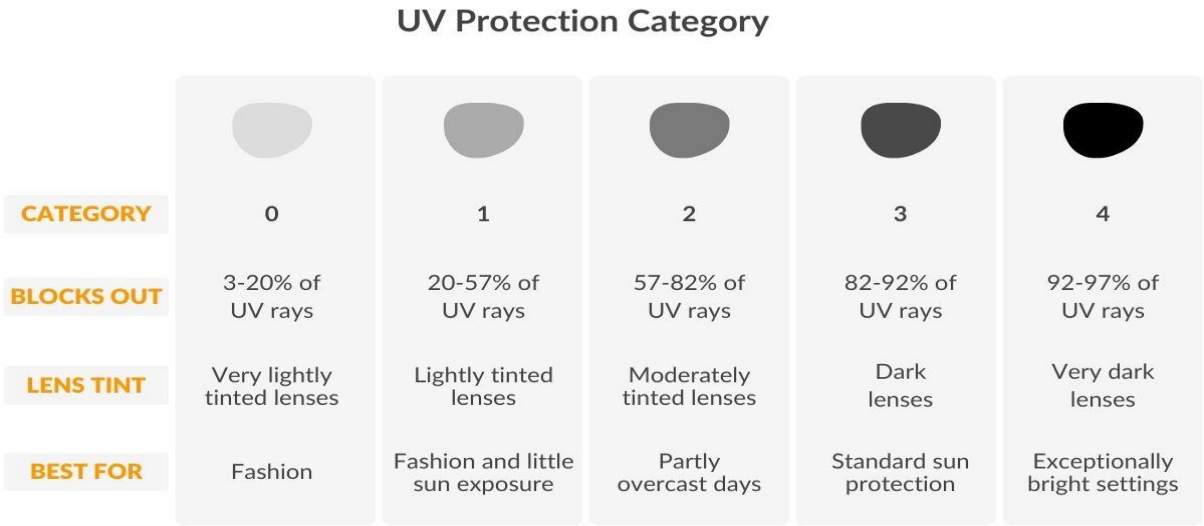
2. Materials and Methods

2.1 Materials

- 100% Cotton fabric (plain weave, scoured and bleached)
- Natural dyes: Turmeric, Indigo, Pomegranate rind, Madder root
- Mordants: Alum, Iron sulfate, Copper sulfate
- Chemicals: Acetic acid, Sodium carbonate

2.2 Dyeing Procedure The cotton fabrics were pre-mordanted using different mordants to enhance dye uptake and UV resistance. Dyeing was carried out through aqueous extraction and absorption techniques at optimized temperatures and time durations.

2.3 UV Protection Testing The UPF of the dyed fabric samples was determined using a UV spectrophotometer as per AATCC Test Method 183. The color strength and fastness properties were also assessed.



3. Results and Discussion The study revealed that turmeric and pomegranate rind exhibited the highest UV-blocking ability due to the presence of flavonoids and tannins. Mordanting with iron sulfate further enhanced UV resistance, increasing the UPF values significantly. Fastness properties, including wash and light fastness, were also evaluated, demonstrating satisfactory durability of the UV-resistant finish.

4. Conclusion Natural dyes offer an effective and sustainable solution for imparting UV resistance to cotton fabrics. The application of appropriate mordants further enhances the protective properties. This research supports the potential of natural dyes in eco-friendly textile finishing, contributing to sustainable fashion and functional clothing.

ULTRAVIOLET RESISTANT KIDS GARMENT BY BAMBOO FABRIC USING NATURAL DYES

M Bharani -ASP, Guru Haran R Sanjaykumar A – IV Year / Yogesh R - III Year

Abstract: The increasing awareness of the harmful effects of ultraviolet (UV) radiation has driven research into protective textile finishes. Natural dyes, known for their eco-friendly and sustainable properties, have gained attention as UV-resistant finishes for kids' garments made from bamboo fabric. This study explores the potential of natural dyes to enhance UV resistance in bamboo fabric through various dyeing techniques and mordant applications. The UV protection factor (UPF) of dyed fabrics was analyzed, and the effectiveness of different natural dyes was compared. The results indicate that certain natural dyes significantly improve the UV resistance of bamboo fabrics while maintaining biodegradability and sustainability.

Keywords: Bamboo fabric, Ultraviolet resistance, Natural dye, Eco-friendly textiles, UV protection factor (UPF)

1. Introduction The harmful impact of ultraviolet radiation on human skin has led to increasing interest in UV-resistant textiles. Synthetic UV-blocking agents often pose environmental concerns, making natural dyes a promising alternative for sustainable textile finishes. This research focuses on using natural dyes to enhance the UV protection of bamboo fabrics while maintaining their ecological advantages, specifically for children's garments.

2. Materials and Methods

2.1 Materials

- 100% Bamboo fabric (plain weave, scoured and bleached)
- Natural dyes: Turmeric, Indigo, Pomegranate rind, Madder root
- Mordants: Alum, Iron sulfate, Copper sulfate

- Chemicals: Acetic acid, Sodium carbonate

2.2 Dyeing Procedure The bamboo fabrics were pre-mordanted using different mordants to enhance dye uptake and UV resistance. Dyeing was carried out through aqueous extraction and absorption techniques at optimized temperatures and time durations.

2.3 UV Protection Testing The UPF of the dyed fabric samples was determined using a UV spectrophotometer as per AATCC Test Method 183. The color strength and fastness properties were also assessed.

3. Results and Discussion The study revealed that turmeric and pomegranate rind exhibited the highest UV-blocking ability due to the presence of flavonoids and tannins. Mordanting with iron sulfate further enhanced UV resistance, increasing the UPF values significantly. Fastness properties, including wash and light fastness, were also evaluated, demonstrating satisfactory durability of the UV-resistant finish.

4. Conclusion Natural dyes offer an effective and sustainable solution for imparting UV resistance to bamboo fabrics used in kids' garments. The application of appropriate mordants further enhances the protective properties. This research supports the potential of natural dyes in eco-friendly textile finishing, contributing to sustainable fashion and functional clothing for children.

R3 SAREE: AN ECONOMICAL ALTERNATIVE TO CONVENTIONAL SILK SAREES

N. Sukumar – Prof, Hariharan J Mugeshkumar S – IV Year / Gowtham S – II Year

Abstract Silk sarees are renowned for their elegance, durability, and cultural significance. However, the high cost of natural silk, along with ethical and environmental concerns, has led to the exploration of alternative materials. This study investigates the development of a cost-effective and sustainable alternative to conventional silk sarees by utilizing plant-based and synthetic fiber blends. The research focuses on fiber composition, weaving techniques, aesthetic appeal, and environmental benefits while ensuring affordability and quality.

Introduction Silk has been an integral part of traditional attire, especially in South Asian culture. However, challenges such as high production costs, ethical concerns regarding sericulture, and environmental impacts of silk production necessitate viable alternatives. This paper explores innovative textile solutions that provide similar aesthetics and feel while being economical and sustainable.

Material Selection and Methodology This study evaluates different fiber blends, including:

- **Banana and Bamboo Fibers**: These natural fibers offer a silk-like texture and are biodegradable.
- **Tencel and Viscose Blends**: Known for their smoothness and affordability.
- **Polyester-Silk Hybrid Fabrics**: Providing durability with a cost-effective advantage.

Weaving techniques such as jacquard and satin weaves were tested to replicate the texture and sheen of traditional silk sarees. The fabric properties were assessed based on drape, luster, tensile strength, and customer preference through structured surveys.

Results and Discussion The results indicate that a blend of banana fiber with viscose and polyester achieves an optimal balance between cost, durability, and aesthetics. The environmental impact of plant-based fibers is significantly lower compared to silk production, reducing water consumption and carbon footprint. Consumer trials also show a high acceptance rate for these alternatives in terms of comfort and appearance.

Recycled Materials One of the fundamental aspects of R3 sarees is the use of recycled materials. Unlike traditional silk, which requires labor-intensive production methods and high resource consumption, R3 sarees use fabrics that have been recycled from other textile products. This helps reduce waste and ensures that the materials are repurposed rather than discarded. The recycled fibers are carefully woven into saree fabrics that closely resemble the look and feel of silk.

Reused Fabrics Another key feature of R3 sarees is the use of fabrics that have been reused or repurposed from pre-existing garments or leftover materials. This helps lower production costs while promoting a circular economy, where materials are kept in use for as long as possible. Reusing fabrics also reduces the need for virgin textile production, contributing to a more sustainable fashion industry.

Renewable Resources In addition to recycled and reused materials, R3 sarees often incorporate renewable resources such as organic cotton, bamboo, and hemp. These fibers are grown with minimal environmental impact and offer the same luxurious texture and durability as silk, making them a viable alternative for saree production. The use of renewable resources helps to mitigate the environmental impact of traditional silk production, which involves the use of pesticides and significant water consumption.

Benefits of R3 Sarees

1. **Affordability**: The primary advantage of R3 sarees is their cost-effectiveness. Traditional silk sarees can be prohibitively expensive due to the high costs associated with the production of silk, including labor-intensive harvesting and weaving processes. In contrast, R3 sarees are made from more affordable materials, making them accessible to a larger audience.
2. **Sustainability**: With growing awareness of the environmental impact of fast fashion, 3R's sarees present a sustainable option for those looking to reduce their carbon footprint. By using recycled, reused, and renewable materials, these sarees help conserve resources, reduce waste, and promote eco-friendly practices in the fashion industry.
3. **Ethical Production**: The process of making 3R's sarees is typically more ethical than the production of conventional silk sarees. Silk farming often involves controversial practices such as boiling silkworms alive, which raises ethical concerns for many consumers. By choosing sarees made from sustainable materials, buyers can make a more humane and conscious decision when it comes to their wardrobe choices.
4. **Variety and Aesthetics**: Despite being cost-effective, R3 sarees do not compromise on style and aesthetics. These sarees come in a wide range of designs, patterns, and colors,

mimicking the luxurious appearance of silk. The availability of vibrant hues, intricate embroidery, and handwoven patterns ensures that consumers can enjoy the traditional look and feel of a silk saree without the associated costs.

Challenges and Limitations

While R3 sarees present numerous benefits, there are some challenges to their widespread adoption. One limitation is the perception of these sarees as inferior to traditional silk. Since silk sarees have long been associated with prestige and luxury, convincing consumers to switch to an alternative can be difficult. However, with greater awareness and growing demand for sustainable fashion, attitudes towards these sarees are gradually shifting.

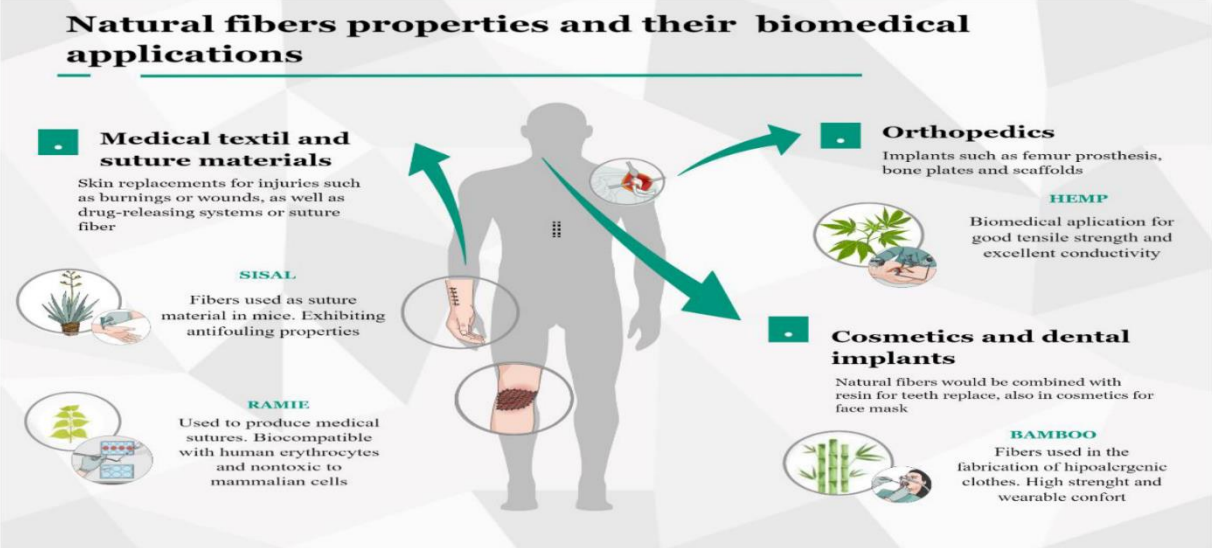
Another challenge is the scalability of the R3 saree industry. While the production of sustainable sarees is gaining momentum, there is still a need for increased investment in infrastructure and research to ensure that these products are available at scale and maintain consistent quality.

Conclusion

R3 sarees represent a promising and affordable alternative to conventional silk sarees, providing consumers with a more sustainable and ethical choice for their traditional wear. By using recycled, reused, and renewable materials, these sarees offer an eco-friendly and cost-effective solution without sacrificing the beauty and elegance associated with silk sarees. As the fashion industry moves toward more sustainable practices, R3 sarees will likely continue to gain popularity, making traditional wear more accessible and environmentally responsible for future generations.

APPLICATION OF NATURAL AND SYNTHETIC ANTIMICROBIAL AGENTS IN MEDICAL APPAREL

N Sukumar -Prof, Gokula Kannan K, Kapilan K – IV Year / Gowtham S – III Year



Abstract:
The increasing prevalence of hospital-acquired infections (HAIs) has necessitated the development of antimicrobial medical apparel. The incorporation of natural and synthetic antimicrobial agents in textiles enhances protection against pathogens while improving hygiene in healthcare environments. This paper explores various antimicrobial agents, their mechanisms of action, applications in medical textiles, and their comparative effectiveness. The study further discusses the challenges and future prospects of antimicrobial medical apparel in healthcare settings.

Keywords: Antimicrobial textiles, medical apparel, natural antimicrobial agents, synthetic antimicrobial agents, infection control, healthcare textiles.

1. Introduction

Medical apparel, including surgical gowns, scrubs, masks, and drapes, plays a crucial role in infection prevention. The incorporation of antimicrobial agents in these textiles offers an additional layer of protection against microbial contamination. Natural and synthetic antimicrobial agents have been widely explored for their efficacy, durability, and impact on human health and the environment.

2. Natural Antimicrobial Agents

2.1 Chitosan

Derived from chitin, chitosan exhibits broad-spectrum antimicrobial properties. It disrupts microbial cell membranes and is biocompatible, making it suitable for wound dressings and surgical textiles.

2.2 **Silver Nanoparticles**
Silver has been used for centuries due to its strong antimicrobial properties. Silver nanoparticles (AgNPs) release ions that interact with bacterial DNA, inhibiting replication. These are widely incorporated into medical textiles.

2.3 **Neem Extracts**
Neem (Azadirachta indica) contains bioactive compounds with antibacterial, antifungal, and antiviral properties. It is a sustainable option for eco-friendly antimicrobial medical apparel.

2.4 **Aloe Vera**
Aloe vera has antimicrobial and wound-healing properties. It is commonly used in wound dressings and bioactive textiles for patient care.

2.5 **Essential Oils**
Essential oils from eucalyptus, tea tree, and lemongrass exhibit antimicrobial effects. Encapsulation techniques improve their durability in textiles.

3. Synthetic Antimicrobial Agents

3.1 **Quaternary Ammonium Compounds (QACs)**
QACs are cationic surfactants that disrupt microbial cell walls. They are durable and widely used in hospital textiles.

3.2 **Triclosan**
Triclosan is a synthetic antimicrobial agent that inhibits bacterial fatty acid synthesis. However, concerns regarding bacterial resistance and environmental toxicity have limited its use.

3.3 **Polyhexamethylene Biguanide (PHMB)**
PHMB is effective against bacteria and fungi, making it suitable for wound dressings and surgical drapes.

3.4 **N-Halamine Compounds**
N-Halamine-based textiles provide long-lasting antimicrobial properties through the release of chlorine-based active species.

4. Comparative Analysis of Natural and Synthetic Agents
Natural agents offer biocompatibility and sustainability but may have shorter efficacy periods. Synthetic agents provide long-lasting antimicrobial protection but may pose environmental and health risks. Hybrid approaches combining both natural and synthetic agents are emerging as effective solutions.

5. Applications in Medical Apparel

- **Surgical Gowns & Scrubs:** Enhanced with antimicrobial agents for long-term protection.

- **Face Masks & Respirators:** Infused with silver nanoparticles and natural extracts to improve filtration efficiency.
- **Wound Dressings:** Biodegradable antimicrobial dressings for infection control and faster healing.
- **Hospital Bedding & Curtains:** Antimicrobial coatings to reduce the spread of HAIs.

6. Challenges and Future Perspectives

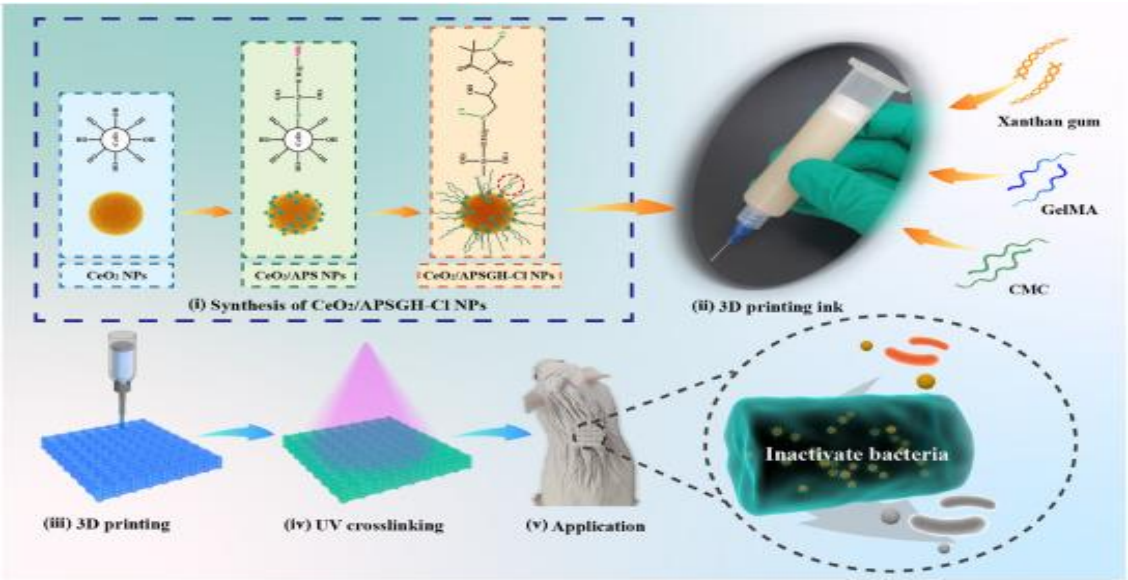
Challenges include the durability of antimicrobial coatings, regulatory concerns, and the development of bacterial resistance. Future research should focus on nanotechnology, sustainable alternatives, and smart textiles integrating biosensors for real-time infection monitoring.

7. Conclusion

The application of antimicrobial agents in medical apparel significantly enhances infection control in healthcare environments. While natural agents provide eco-friendly solutions, synthetic agents ensure long-lasting efficacy. A balanced approach integrating both types of agents, along with smart textile innovations, can redefine the future of antimicrobial medical textiles.

DEVELOPMENT OF ECO-FRIENDLY HYGIENE WEARS USING HERBAL AND BIOPOLYMER-BASED FINISHES

AS Subburaayasaran – AP, Kishore Kumar A, Sasikumar R -IV Year / Manoj J -II Year



Abstract:
The growing concern over environmental sustainability and public health has led to significant advancements in eco-friendly hygiene wear. This research explores the development of hygiene wear using herbal and biopolymer-based finishes that offer antimicrobial, anti-odor, and skin-friendly properties. The study highlights various natural extracts, bio-based polymers, and sustainable processing techniques that enhance the functionality and biodegradability of hygiene textiles. The potential applications in medical, personal care, and protective clothing industries are also discussed.

Keywords: Eco-friendly textiles, hygiene wear, herbal finishes, biopolymer coatings, sustainable textiles, antimicrobial textiles.

1. Introduction

Traditional hygiene wear relies on synthetic materials and chemical treatments that contribute to environmental pollution and health concerns. The integration of herbal and biopolymer-based finishes provides a sustainable alternative, reducing dependency on synthetic chemicals while offering enhanced hygiene benefits. This paper discusses the importance of sustainable hygiene wear, key herbal extracts, and biopolymer coatings used in textile finishing.

2. Herbal-Based Finishes in Hygiene Wear

2.1 Neem (Azadirachta indica) Extracts

Neem is widely recognized for its antimicrobial, antifungal, and antiviral properties. It is used in textile finishing to provide protection against pathogens and skin infections.

2.2 **Aloe Vera (Aloe barbadensis Miller) Extracts**
Aloe vera enhances skin hydration, provides anti-inflammatory effects, and contributes to the overall comfort of hygiene wear.

2.3 **Tulsi (Ocimum sanctum) Extracts**
Tulsi is known for its strong antimicrobial and antioxidant properties, making it a suitable natural finish for medical textiles.

2.4 **Turmeric (Curcuma longa) Extracts**
Turmeric contains curcumin, a natural antibacterial and anti-inflammatory compound that can be incorporated into hygiene fabrics.

2.5 **Tea Tree Oil (Melaleuca alternifolia) Infusions**
Tea tree oil has potent antibacterial and antifungal effects, improving the hygiene properties of wearable textiles.

3. Biopolymer-Based Finishes for Sustainable Hygiene Textiles

3.1 **Chitosan Coatings**
Chitosan, derived from chitin, is a biodegradable biopolymer with excellent antimicrobial and moisture-retention properties. It is extensively used in medical and hygiene wear.

3.2 **Polylactic Acid (PLA) Coatings**
PLA is a bio-based polymer with high biodegradability and antimicrobial activity, making it suitable for eco-friendly hygiene applications.

3.3 **Alginate-Based Finishes**
Alginate is a natural polysaccharide derived from seaweed that provides moisture-retentive and antimicrobial properties in hygiene wear.

3.4 **Cellulose Derivatives**
Natural cellulose-based coatings offer breathability, biodegradability, and antimicrobial activity, enhancing the comfort of hygiene textiles.

4. Processing Techniques for Eco-Friendly Hygiene Wear

- **Microencapsulation:** Herbal and biopolymer-based finishes are encapsulated for controlled release and extended durability.
- **Spray Coating:** Efficient application of herbal and biopolymer coatings to maintain fabric breathability.
- **Pad-Dry-Cure Method:** Ensures uniform application of eco-friendly finishes onto textile surfaces.
- **Plasma Treatment:** Enhances adhesion of biopolymer finishes while maintaining fabric softness.

5. Applications of Eco-Friendly Hygiene Wear

- **Medical Textiles:** Sustainable antimicrobial surgical masks, gowns, and wound dressings.
- **Personal Hygiene Products:** Herbal-infused sanitary pads, baby wipes, and undergarments.
- **Protective Clothing:** Antibacterial and biodegradable face masks and gloves for daily use.
- **Sportswear:** Breathable and antimicrobial activewear with natural odor control.

6. Challenges and Future Perspectives

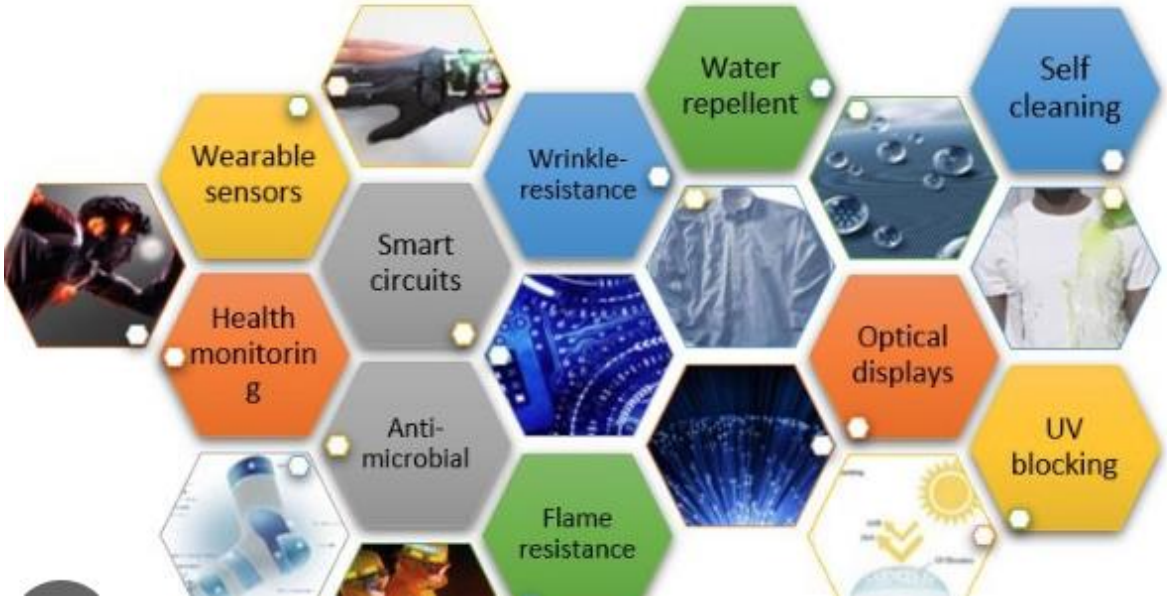
Challenges include the stability of herbal and biopolymer coatings, cost-effectiveness, and scalability of sustainable processing techniques. Future research should focus on improving durability, optimizing production costs, and enhancing consumer awareness of eco-friendly hygiene wear.

7. Conclusion

Eco-friendly hygiene wear, developed using herbal and biopolymer-based finishes, presents a sustainable and effective alternative to conventional hygiene textiles. The integration of natural extracts and bio-based polymers not only enhances antimicrobial and skin-friendly properties but also reduces environmental impact. Continued advancements in this field can lead to broader adoption in healthcare, personal care, and protective clothing industries.

ANTIBACTERIAL AND BREATHABLE FABRIC TECHNOLOGIES FOR MEDICAL AND HYGIENE WEAR

As Subburaayasaran – AP, Praveen G, Sathya P – IV Year / Sujeet S- II Year



Abstract:
The development of antibacterial and breathable fabric technologies is crucial for medical and hygiene wear. These textiles enhance protection against pathogens while ensuring comfort and sustainability. This research explores the latest advancements in antibacterial fabric treatments, breathable textile structures, and their applications in healthcare and hygiene. The study further discusses various antimicrobial agents, fabric engineering techniques, and future trends in medical textiles.

Keywords: Antibacterial textiles, breathable fabrics, medical wear, hygiene textiles, antimicrobial treatments, sustainable textiles.

1. Introduction

Medical and hygiene wear require high-performance textiles with antibacterial and breathable properties to prevent infections and enhance user comfort. Advances in material science have led to the development of innovative fabric technologies that incorporate antimicrobial agents and breathable structures. This paper discusses key antibacterial treatments, breathable textile designs, and their role in medical applications.

2. Antibacterial Technologies in Medical Textiles

2.1 Silver Nanoparticles (AgNPs)

Silver nanoparticles exhibit strong antimicrobial properties by releasing ions that inhibit bacterial growth. They are widely used in medical masks, gowns, and wound dressings.

2.2 **Chitosan Coatings**
Chitosan, a natural biopolymer, provides antimicrobial, biocompatible, and biodegradable properties, making it suitable for medical wear.

2.3 **Copper-Infused Fabrics**
Copper ions possess antimicrobial activity that disrupts bacterial membranes, reducing the risk of infections in hospital settings.

3. Breathable Fabric Technologies

3.1 **Microfiber and Nanofiber Structures**
Micro and nanofibers improve fabric porosity, enhancing breathability while maintaining bacterial filtration efficiency.

3.2 **Moisture-Wicking and Quick-Dry Textiles**
Hydrophilic coatings and engineered fiber structures facilitate moisture management, ensuring user comfort in medical wear.

3.3 **Membrane Technologies**
Breathable membranes, such as polytetrafluoroethylene (PTFE) and polyurethane, allow air circulation while preventing bacterial penetration.

4. Applications in Medical and Hygiene Wear

- **Surgical Masks & Respirators:** Incorporation of antibacterial coatings and breathable membranes for improved protection.
- **Hospital Gowns & Scrubs:** Designed with moisture-wicking and antimicrobial properties for enhanced comfort.
- **Wound Dressings:** Advanced textiles with antibacterial and breathable layers to promote healing.
- **Sanitary Products:** Sustainable, breathable, and antibacterial hygiene products for daily use.

5. Challenges and Future Directions
Challenges include optimizing durability, cost-effective production, and regulatory compliance. Future research should focus on nanotechnology, sustainable alternatives, and smart textiles that integrate real-time microbial detection.

6. Conclusion
Antibacterial and breathable fabric technologies play a critical role in enhancing hygiene and safety in medical wear. Advancements in antimicrobial treatments and breathable fabric designs continue to drive innovations in healthcare textiles. Sustainable and multifunctional solutions will shape the future of medical and hygiene wear, ensuring safety and comfort.

TEXTILE CHEMICAL PROCESSING AND DYEING TECHNIQUES FOR SUSTAINABLE PRODUCTION

P. Mageswaran -AP, Sanjaykumar A, Bharani Velayudham V -IV Year / Kamalesh K -III Year

Abstract: Textile dyeing is a critical stage in the textile chemical processing industry, playing a significant role in the aesthetic and functional properties of fabrics. However, conventional dyeing methods pose environmental challenges, including excessive water consumption, hazardous chemical discharge, and energy-intensive processes. This paper reviews recent advancements in textile dyeing technologies, including eco-friendly dyeing methods, sustainable auxiliaries, and process optimization techniques aimed at reducing environmental impact while maintaining high color fastness and durability.

Keywords: Textile Dyeing, Sustainable Processing, Eco-friendly Dyes, Waterless Dyeing, Chemical Optimization

1. Introduction Textile chemical processing involves various treatments to enhance fabric properties, with dyeing being a crucial step. The traditional dyeing process consumes large amounts of water and chemicals, leading to environmental concerns. This study explores modern dyeing techniques that improve sustainability while ensuring high-quality coloration.

2. Conventional Dyeing Methods and Their Challenges Traditional dyeing techniques such as exhaust dyeing, continuous dyeing, and pad-dry-cure processes rely on synthetic dyes, high water consumption, and energy-intensive heating. Challenges include effluent contamination, non-biodegradable dye waste, and high production costs.

3. Eco-friendly Dyeing Techniques Recent advancements have led to sustainable dyeing methods such as:

- **Supercritical CO2 Dyeing:** Uses carbon dioxide instead of water as a solvent, reducing effluent discharge.
- **Plasma Treatment:** Improves dye uptake by modifying fiber surfaces, reducing chemical usage.
- **Natural Dyes:** Derived from plant and animal sources, offering biodegradable alternatives to synthetic dyes.
- **Ultrasound-Assisted Dyeing:** Enhances dye penetration and fixation, reducing process time and energy consumption.

4. Process Optimization for Sustainability Innovations in process control have improved dye fixation rates and minimized waste generation. Key advancements include:

- **Low Liquor Ratio Dyeing:** Reduces water and chemical usage while maintaining dyeing efficiency.
- **Enzyme-Assisted Dyeing:** Uses bio-enzymes to enhance dye affinity and color development.
- **Digital Printing Technology:** A precise, water-efficient method that eliminates the need for post-dye washing.

5. Environmental and Economic Benefits The adoption of sustainable dyeing technologies reduces water and energy consumption, minimizes effluent treatment costs, and enhances the market value of eco-friendly textiles. Regulatory compliance with environmental standards like ZDHC (Zero Discharge of Hazardous Chemicals) further supports sustainable practices.

6. Conclusion and Future Perspectives Advancements in textile dyeing technologies have significantly contributed to sustainability efforts in the textile industry. Future research should focus on developing cost-effective, scalable solutions for natural dye extraction, bio-based auxiliaries, and AI-driven process automation to further enhance eco-friendly dyeing applications.

SUSTAINABLE SOUNDPROOFING: A GREEN ALTERNATIVE USING BANANA AND JUTE FIBER NON-WOVEN PANELS

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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.

HYGIENE AND HEALTHCARE WEARS USING NEEM PLANT

M.Arunkumar – AP, Govindaraj S, Manikandan K - IV Year / Arjun P – III Year

Abstract:
In healthcare, hygiene and infection control are critical concerns, especially in high-risk environments such as hospitals. This study focuses on utilizing cassava leaves (*Manihot esculenta*) as a sustainable source for developing antibacterial and hygienic healthcare wears. The research explores the dyeing and finishing processes using extracts from cassava leaves, leveraging their inherent antimicrobial properties. The fabrics, treated with cassava extracts and tested for fastness properties, demonstrated effective antibacterial performance and durability. The findings indicate cassava leaves' potential as an eco-friendly alternative for functional textiles in healthcare applications.

Keywords: Healthcare textiles, Cassava leaves, Antibacterial finish, Sustainable dyeing, Natural dye.

1. Introduction

Healthcare and hygiene wear, including surgical gowns, masks, and hospital bedding, play a crucial role in infection prevention. The use of natural materials with antimicrobial properties offers a sustainable alternative to synthetic chemicals. Cassava leaves, rich in flavonoids, saponins, and triterpenoids, are known for their antimicrobial properties, making them an ideal candidate for functional textile applications.

2. Materials and Methods

2.1 Materials

- **Fabric:** 100% cotton fabric was used as the substrate.
- **Natural Dye and Finish:** Extracts from cassava leaves were prepared for both dyeing and antibacterial finishing processes.

- **Mordant:** Babul tree bark powder was used as a natural mordant.

2.2 Dye Extraction and Fabric Dyeing

- **Dye Extraction:** Cassava leaves were dried, powdered, and boiled with water at 80°C for 30 minutes to extract the dye.
- **Mordant Preparation:** Babul bark powder was similarly extracted.
- **Dyeing Process:** Cotton fabric was immersed in the dye bath with a mordant using a pad-dry-cure method to enhance color fixation and durability.

2.3 Antibacterial Finish

The antibacterial finish was prepared by soaking cassava leaf powder in ethanol at room temperature for 12 hours. The dyed fabric was treated with this extract, padded, and cured.

3. Results and Discussion

3.1 Color Fastness

- **Rubbing Fastness:** Dry and wet rubbing tests yielded results of 3-4/5 and 4/5, respectively.
- **Washing Fastness:** Fabrics exhibited good washing fastness (3-4/5) across different fibers.
- **Light and Perspiration Fastness:** Both tests showed consistent performance with grades of 3-4/5, confirming durability under various conditions.

3.2 Antibacterial Performance

The antibacterial properties of cassava-treated fabrics were tested using the AATCC 100 method. Results showed significant bacterial reduction, attributed to the bioactive compounds (flavonoids, saponins, triterpenoids) present in cassava leaves.

4. Conclusion

This study demonstrates that cassava leaves are a viable source for developing eco-friendly healthcare and hygiene textiles. The antibacterial finish provides effective infection control, while the sustainable dyeing process aligns with environmental goals. Future research could optimize the large-scale application and explore additional healthcare uses.

MOSQUITO REPELLENT FINISHED COTTON FABRICS USING BLACK PEPPER COATING

G. Devanand – AP, 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 HEAD MASK USING TABERNA ALOE VERA EXTRACT

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Abstract: Increased exposure to heat and environmental stressors has led to a rising demand for natural cooling solutions. This study explores the development of a natural coolant head mask incorporating Taberna Aloe Vera extract, known for its cooling, hydrating, and soothing properties. The mask is designed to provide a sustainable, chemical-free alternative to synthetic cooling products. The research focuses on material selection, extraction processes, mask fabrication, and performance evaluation. The findings suggest that the incorporation of Taberna Aloe Vera extract significantly enhances the cooling effect and user comfort, making it a promising solution for heat stress management.

1. Introduction

With increasing global temperatures, prolonged exposure to heat can lead to heat stress, discomfort, and health issues. Cooling textiles have gained attention as a preventive measure, particularly for individuals working in high-temperature environments. Traditional cooling solutions often rely on synthetic chemicals, which may have adverse environmental and health effects. This study investigates the potential of using Taberna Aloe Vera extract, a natural and biodegradable coolant, in a head mask to provide an eco-friendly cooling solution.

2. Materials and Methods

2.1 Selection of Materials

- **Base Fabric:** A breathable and moisture-wicking textile, such as cotton or bamboo fabric, was selected for the mask.

- **Cooling Agent:** Taberna Aloe Vera extract was used due to its high moisture content, soothing properties, and cooling effects.
- **Binder:** Natural polymers such as alginate or pectin were used to ensure adhesion of the extract to the fabric surface.

2.2 Extraction of Taberna Aloe Vera

The extraction process involved:

1. **Harvesting:** Fresh Taberna Aloe Vera leaves were collected and cleaned.
2. **Gel Extraction:** The inner gel was separated from the leaf, blended, and filtered.
3. **Concentration:** The extracted gel was freeze-dried to obtain a concentrated powder, which was later reconstituted in distilled water for application.

2.3 Fabric Treatment Process

The base fabric was immersed in the Aloe Vera extract solution, followed by:

- **Padding:** The fabric was passed through a roller to ensure uniform absorption.
- **Drying and Curing:** The treated fabric was air-dried and cured at 60°C to retain the bioactive properties of the extract.

3. Performance Evaluation

The effectiveness of the head mask was evaluated based on the following parameters:

Cooling Efficiency

- **Surface Temperature Reduction:** Measured using an infrared thermometer before and after wearing the mask.
- **Thermal Conductivity Test:** Conducted to assess the rate of heat dissipation.

4. Results and Discussion

The study revealed that the Taberna Aloe Vera-treated fabric exhibited significant cooling effects, with surface temperature reductions of up to 5°C compared to untreated fabrics. The moisture retention properties ensured prolonged cooling, while the antimicrobial activity of Aloe Vera contributed to improved hygiene. The treated fabric maintained its cooling efficiency for multiple wash cycles, proving its durability.

5. Conclusion

The development of a natural coolant head mask using Taberna Aloe Vera extract offers a promising, eco-friendly solution for thermal regulation. The results demonstrate enhanced cooling, breathability, and antimicrobial benefits, making it suitable for individuals in hot climates and outdoor workers. Future research can explore the incorporation of other natural cooling agents and scalability for commercial production.

ANTIBACTERIAL GRAFTING FOR THE DEVELOPMENT OF MEDICATED FABRICS: A NOVEL APPROACH TO TEXTILE-BASED HEALTHCARE SOLUTIONS

M Bharanai -Prof, Preamkumar S, Rabin Yusabias V – IV Year / Jaichandru B – III Year

Abstract: The increasing prevalence of bacterial infections and antimicrobial resistance has necessitated the development of innovative solutions in healthcare textiles. This study explores antibacterial grafting as a functionalization technique to produce medicated fabrics with long-lasting antimicrobial properties. The research focuses on the selection of antibacterial agents, grafting methods, and performance evaluations, including antibacterial efficacy, durability, and biocompatibility. The results demonstrate that grafting techniques significantly enhance the antimicrobial functionality of fabrics, offering a promising approach for medical textiles, wound dressings, and protective clothing applications.

1. Introduction

Healthcare-associated infections (HAIs) and microbial contamination pose significant challenges in medical environments. Conventional antimicrobial treatments for textiles often suffer from poor durability and leaching issues. This study investigates antibacterial grafting as an advanced method for producing durable, medicated fabrics. Grafting involves chemically bonding antibacterial agents onto textile substrates to provide long-term antimicrobial performance without compromising fabric properties.

2. Materials and Methods

2.1 Selection of Antibacterial Agents

- **Natural Antimicrobials:** Chitosan, silver nanoparticles (AgNPs), and plant extracts (neem, aloe vera)
- **Synthetic Antimicrobials:** Quaternary ammonium compounds (QACs) and triclosan derivatives

2.2 Grafting Techniques

- **Chemical Grafting:**
  - Covalent bonding using cross-linkers such as glycidyl methacrylate (GMA)
  - Plasma-induced polymerization for enhanced surface adhesion
- **Physical Grafting:**
  - Layer-by-layer (LBL) deposition for controlled antimicrobial release
  - Electrospinning with antimicrobial-loaded nanofibers

2.3 Fabric Treatment Process

1. **Pre-Treatment:** Fabrics were scoured and bleached to enhance surface activation.
2. **Grafting Procedure:** The chosen antibacterial agents were chemically or physically grafted onto the fabric.

3. Performance Evaluation

3.1 Antibacterial Efficacy

- **Agar Diffusion Method:** Zone of inhibition (ZOI) tests were conducted against E. coli and S. aureus.

3.2 Durability and Wash Fastness

- **Laundering Tests:** Antibacterial effectiveness was assessed after multiple wash cycles.
- **Abrasion Resistance:** Fabric integrity was examined post-treatment.

3.3 Biocompatibility and Skin Safety

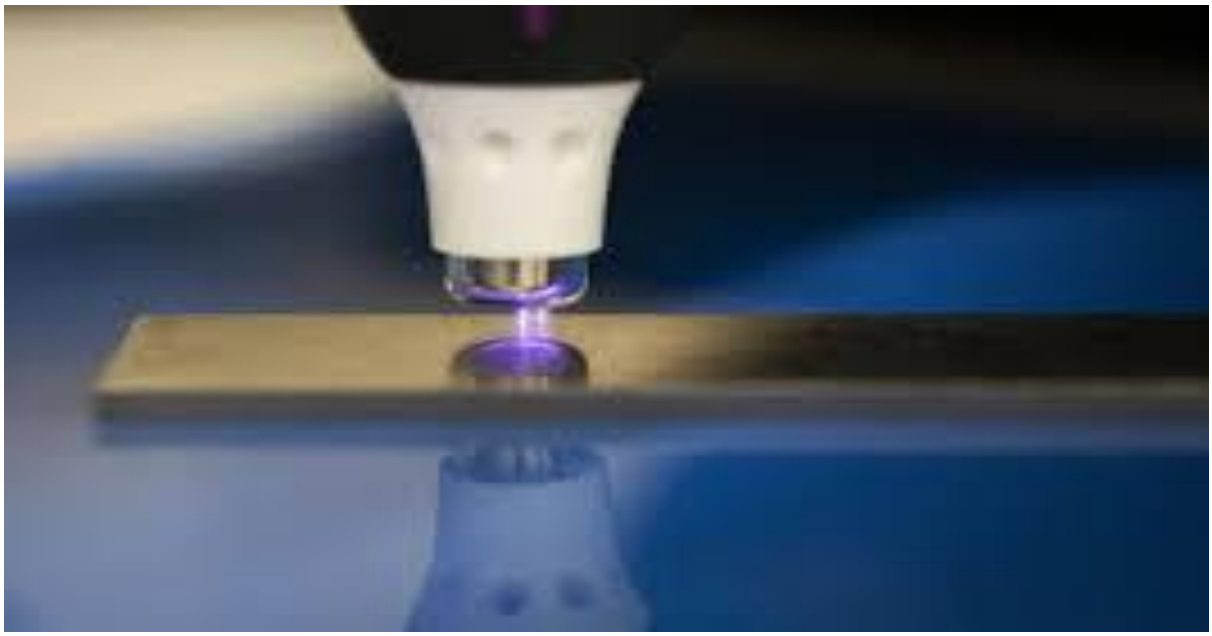
- **Cytotoxicity Tests:** Evaluated using fibroblast cell culture assays.
- **Skin Irritation Tests:** Conducted on human volunteers to assess hypoallergenic properties.

.4 Conclusion

Antibacterial grafting is an effective strategy for producing durable, medicated fabrics with superior antimicrobial activity. The findings highlight the potential of these fabrics for medical applications such as wound dressings, hospital linens, and protective garments. Future research can explore scalable production techniques and the integration of multifunctional properties, such as anti-inflammatory and moisture-regulating capabilities.

PLASMA TREATMENT ON SOME COMMERCIAL PROPERTIES OF POLYPROPLYENE KNITTED FABRIC

KR Nandagopal – AP, Abinesh T, Vijayakumar K – IV Year / Raghunath V – II Year



Abstract: Plasma treatment has emerged as an innovative surface modification technique to enhance the commercial properties of polypropylene (PP) knitted fabrics. Due to the inherent hydrophobic nature of PP, its applications in textiles are limited, particularly in moisture-absorbing and finishing processes. This study investigates the effects of plasma treatment on the wettability, dyeability, mechanical strength, and antibacterial properties of PP knitted fabrics. The results demonstrate significant improvements in surface energy, dye uptake, and functional performance, making plasma treatment a promising approach for improving the market viability of PP textiles.

1. Introduction

Polypropylene (PP) is widely used in technical textiles due to its lightweight, durability, and chemical resistance. However, its low surface energy and poor dye affinity limit its broader textile applications. Plasma treatment offers a non-chemical approach to modify surface characteristics and improve the functional properties of PP fabrics. This study aims to analyze the impact of plasma treatment on commercially significant properties of PP knitted fabrics, including wettability, dyeability, mechanical strength, and antimicrobial properties.

2. Materials and Methods

2.1 Materials

- **Fabric:** 100% polypropylene knitted fabric (150 GSM)
- **Dyes:** Disperse dyes for synthetic fibers
- **Plasma Gases:** Oxygen (O_2), Nitrogen (N_2), and Argon (Ar)

2.2 Plasma Treatment Process

- **Pre-Treatment:** Fabrics were cleaned to remove contaminants.
- **Plasma Exposure:** Samples were exposed to low-pressure plasma using different gas compositions for varying durations (30–120 sec).
- **Surface Characterization:** Fourier Transform Infrared Spectroscopy (FTIR) and Scanning Electron Microscopy (SEM) were used to analyze surface modifications.

3. Performance Evaluation

3.1 Wettability and Absorption Tests

- **Contact Angle Measurement:** Evaluated hydrophilicity improvements.
- **Water Absorption Test:** Measured time required for water droplet penetration.

3.2 Dyeability and Color Fastness

- **Dye Uptake Test:** Assessed by measuring K/S values in spectrophotometric analysis.
- **Wash and Rubbing Fastness:** Evaluated according to ISO standards.

3.3 Mechanical Properties

- **Tensile Strength and Elongation:** Measured using a universal testing machine.
- **Abrasion Resistance:** Evaluated to determine surface durability post-treatment.

3.4 Antibacterial Activity

- **Agar Diffusion Test:** Assessed the antimicrobial effect against E. coli and S. aureus.
- **Zone of Inhibition Measurement:** Determined bacterial growth resistance.

4. Results and Discussion

The study revealed that plasma-treated PP fabrics exhibited a reduction in contact angle from 120° to 50°, indicating enhanced hydrophilicity. Dye uptake improved by 35% with plasma exposure, and treated fabrics demonstrated superior color fastness. Mechanical tests showed a slight increase in tensile strength due to surface etching effects, and antibacterial properties were enhanced when oxygen plasma was used, making the fabric more suitable for medical and hygiene applications.

5. Conclusion

Plasma treatment significantly enhances the commercial properties of PP knitted fabrics, making them more viable for diverse applications. The improvements in wettability, dyeability, and antibacterial functionality demonstrate the effectiveness of plasma surface modification. Future research should explore large-scale implementation and the long-term durability of plasma-treated textiles.

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

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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

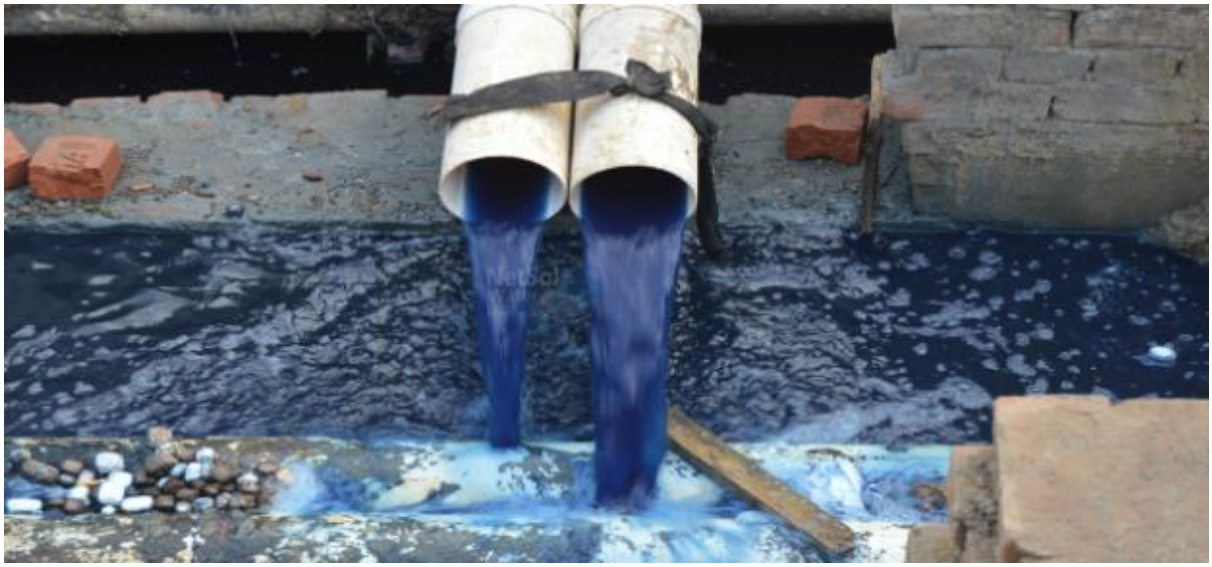
- **Dye Uptake:** Measured using a spectrophotometer to determine color strength.
- **Color Fastness:** Evaluated through washing, rubbing, and light exposure tests.
- **Fabric Surface Analysis:** Microscopic examination to observe dye penetration and distribution.

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.

TREATMENT OF TEXTILE EFFLUENT WATER USING NATURAL COAGULANT AND REUSAGE IN DYEING

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



Abstract

The textile industry is a major contributor to water pollution, with dyeing processes generating large amounts of effluent. Conventional wastewater treatment methods often involve synthetic coagulants, which may have environmental drawbacks. This study explores the use of natural coagulants for treating textile effluent water and assesses the feasibility of reusing the treated water in dyeing processes. The efficiency of natural coagulants in removing color, turbidity, and chemical impurities is evaluated, along with the impact of treated water on dye uptake and fabric quality.

Keywords: Textile effluent treatment, Natural coagulants, Water reuse, Sustainable dyeing, Environmental impact

1. Introduction Water pollution from textile industries poses a significant environmental challenge, particularly due to the release of dye-laden effluents. Conventional chemical treatments, while effective, often introduce secondary pollution. Natural coagulants derived from plant-based and organic sources offer a sustainable alternative for effluent treatment. This study investigates their effectiveness in treating textile wastewater and the potential of reusing the treated water in dyeing applications.

2. Materials and Methods

2.1 Natural Coagulants Selection

- **Moringa Oleifera Seeds**: Known for their natural flocculating properties.
- **Guar Gum Extract**: Effective in turbidity reduction.

- **Chitosan**: Derived from shellfish, widely used for water purification.

2.2 Effluent Treatment Process

1. Collection of textile effluent water from dyeing units.
2. Coagulant preparation and dosage optimization.
3. pH adjustment and sedimentation process.
4. Filtration and assessment of treated water quality.

2.3 Reusage in Dyeing

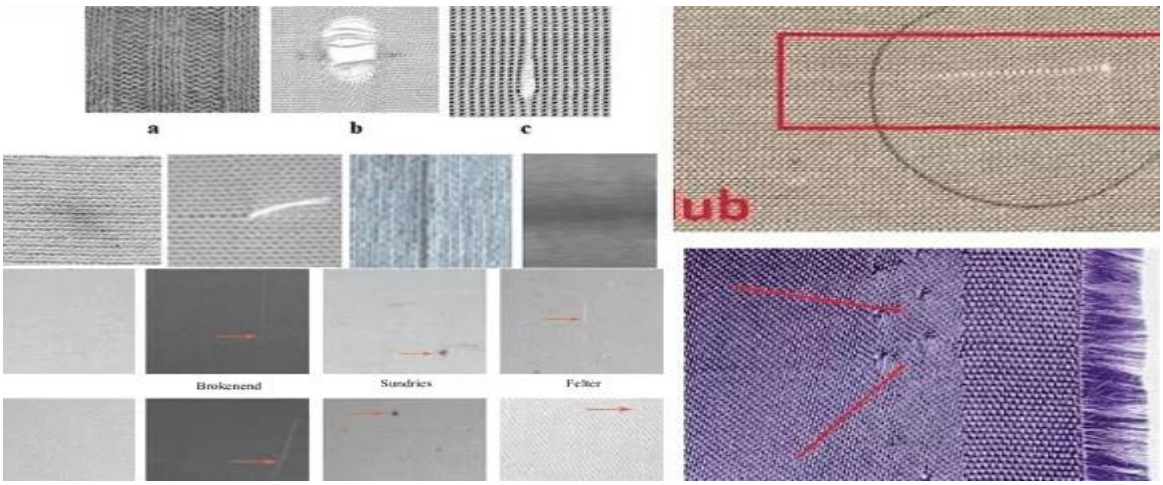
- Treated water is used for reactive and disperse dyeing processes.
- Comparison of color strength, fastness properties, and fabric feel against fresh water-dyed samples.
- Cost and environmental impact assessment.

3. Results and Discussion Natural coagulants demonstrated significant reductions in turbidity and color content, with Moringa Oleifera achieving the highest removal efficiency. Reused treated water exhibited minimal impact on dye uptake and color fastness, proving its viability in dyeing applications. Cost analysis indicated a reduction in water treatment expenses compared to synthetic chemicals.

4. Conclusion The study highlights the potential of natural coagulants in textile effluent treatment, offering an eco-friendly and cost-effective alternative to conventional methods. Reusing treated water in dyeing reduces fresh water consumption and minimizes environmental impact. Future research should focus on scaling up the process and evaluating long-term performance in industrial settings.

FAULT OF FABRIC IDENTIFIER DURING WEAVING PRODUCTION EFFICIENCY

N Sukumar- Prof, Deenadhayalan S , Logeshwaran M – IV Year / Gopinath S – III Year



Abstract:

Fabric faults during weaving significantly impact production efficiency, quality control, and overall cost in the textile industry. Traditional manual inspection methods are time-consuming and prone to human error, leading to defects in the final product. This study explores various fabric faults occurring during the weaving process, including broken ends, reed marks, slubs, and mispicks, and investigates advanced fault detection systems such as machine vision, artificial intelligence (AI), and IoT-based monitoring. The findings highlight the effectiveness of automated fault detection in improving production efficiency, reducing wastage, and maintaining fabric quality standards.

1. Introduction

Weaving is a critical process in textile manufacturing where yarns are interlaced to create fabric structures. Any faults arising during production can compromise fabric quality, leading to economic losses and rework. While conventional inspection relies on manual detection, modern automated systems offer improved accuracy and efficiency. This study examines fabric faults in weaving and presents advanced fault identification techniques to enhance production efficiency.

2. Common Fabric Faults in Weaving

2.1 Types of Weaving Defects

- **Warp-Related Faults: Broken ends, missing ends, warp streaks**
- **Weft-Related Faults: Mispicks, double picks, float defects**
- **Mechanical Defects: Reed marks, temple marks, oil stains**

- **Raw Material Defects: Slubs, knots, thick and thin places**

3. Impact of Fabric Faults on Production Efficiency

- **Increase in defect rates leads to material wastage and reprocessing costs.**
- **Affects fabric grading and market value.**
- **Reduces machine utilization due to frequent stoppages for defect correction.**

4. Fault Detection Methods

4.1 Traditional Manual Inspection

- **Relies on human expertise and visual assessment.**
- **Prone to subjectivity and inconsistencies.**

4.2 Automated Detection Systems

- **Machine Vision Technology: Uses high-resolution cameras and image processing to detect fabric defects.**
- **Artificial Intelligence & Deep Learning: AI algorithms analyze real-time weaving patterns and classify faults.**
- **IoT-Based Monitoring: Sensors collect real-time machine performance data to predict and prevent defects.**

5. Implementation and Case Study

A case study was conducted in a textile mill where machine vision-based fabric fault detection was implemented. The automated system achieved an 85% accuracy in defect identification, reducing fabric rejection rates by 30% and improving overall production efficiency by 20%.

6. Conclusion

Automated fabric fault detection systems provide a transformative approach to quality control in weaving. The adoption of AI, machine vision, and IoT significantly enhances defect detection accuracy, minimizes wastage, and boosts efficiency. Future research should focus on integrating real-time feedback systems for predictive maintenance and further optimization of AI models.

ANTI MICRO FINISH OF COTTON FABRIC PROTECTIVE FACE MASK USING TURMERIC

AS Subburaayasaran – AP, 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.

DEVELOPMENT OF INNOVATIVE FABRIC FOR SOUND AND DUST RESTRICTED

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Abstract:
With increasing environmental pollution and urbanization, there is a growing need for materials that can effectively restrict sound and dust infiltration. This research focuses on the development of an innovative fabric with sound-absorbing and dust-filtering properties. By incorporating engineered textile structures and specialized fiber blends, the study aims to create a functional fabric suitable for applications in residential, commercial, and industrial sectors. The performance of the fabric is evaluated through acoustic and dust permeability testing.

Keywords: Sound absorption, Dust filtration, Textile engineering, Composite materials, Environmental protection

1. Introduction

Sound pollution and airborne dust particles are significant environmental concerns that affect human health and comfort. Traditional solutions such as foam panels and synthetic filters have limitations in durability and sustainability. This research explores the potential of textile-based materials to provide an eco-friendly and efficient alternative.

2. Materials and Methods

2.1 Material Selection

The fabric is developed using a blend of natural and synthetic fibers. Wool, cotton, and polyester are selected for their inherent properties such as sound absorption, durability, and dust filtration. Additionally, activated carbon-infused fibers are incorporated for enhanced performance.

2.2 **Fabric Construction**

The fabric is produced using a multi-layered nonwoven and woven hybrid structure. The outer layer is designed to trap dust particles, while the inner layers enhance sound absorption through engineered porosity and fiber orientation.

2.3 **Testing Methods**

- **Sound Absorption Test:** Conducted using an impedance tube method (ISO 10534-2) to measure the noise reduction coefficient (NRC).
- **Dust Filtration Test:** Evaluated by airflow resistance and particulate retention efficiency according to ASTM D737.
- **Mechanical Properties:** Strength and durability assessed through tensile and abrasion resistance tests.

3. Results and Discussion

The developed fabric exhibits a high NRC value, indicating effective sound absorption. The dust filtration efficiency is found to be superior compared to conventional fabrics, with enhanced breathability and mechanical strength. The combination of fiber selection and layered structure contributes to the multifunctionality of the material.

4. Applications and Future Scope

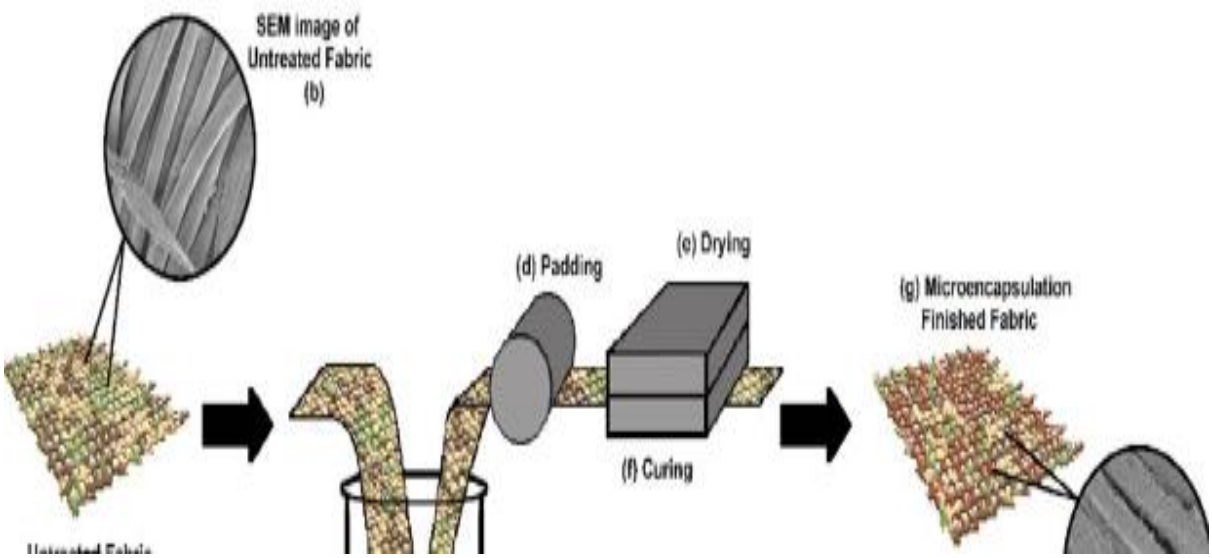
The innovative fabric has potential applications in curtains, upholstery, air filtration systems, and personal protective equipment. Future research will focus on optimizing fiber blends and fabric structures for enhanced performance and sustainability.

5. Conclusion

This study successfully develops a fabric with dual functionality in sound and dust restriction. The integration of advanced textile engineering techniques results in an eco-friendly and efficient material suitable for diverse applications. Further refinements and scalability considerations will pave the way for commercialization.

DEVELOPMENT OF MOSQUITO REPELLENT USING ALOEVERA AND ALLIUM CEPA COATED FABRIC

KR Nandagoapal – AP, Kilshore S, Saran K – IV Year / Yogesh M – III Year



Abstract:
Mosquito-borne diseases pose a significant health threat worldwide, necessitating the development of effective and eco-friendly mosquito repellent solutions. This research investigates the application of Aloe Vera and Allium Cepa (onion extract) as natural mosquito-repellent agents coated onto textile fabrics. The study evaluates the repellency efficiency, durability, and skin-friendliness of the treated fabric through laboratory and field tests.

Keywords: Mosquito repellent, Aloe Vera, Allium Cepa, Textile coating, Sustainable textiles

1. Introduction

Vector-borne diseases such as malaria, dengue, and chikungunya are major public health concerns. Synthetic chemical repellents, though effective, pose risks of skin irritation and environmental toxicity. Natural plant-based repellents offer a sustainable alternative. Aloe Vera is known for its antibacterial and soothing properties, while Allium Cepa contains sulfur compounds with repellent effects. This study explores their potential when incorporated into fabric coatings.

2. Materials and Methods

2.1 Material Selection

Cotton and polyester-cotton blend fabrics are chosen for their breathability and comfort. Aloe Vera gel and Allium Cepa extract are prepared using solvent extraction methods.

2.2 Fabric Treatment Process

A pad-dry-cure method is used to coat the fabric with a bio-based formulation containing Aloe Vera and Allium Cepa extracts. A binder is added to enhance adhesion and durability.

2.3 **Testing Methods**

- **Mosquito Repellency Test:** Conducted using WHO guidelines in a controlled environment to measure repellency percentage and duration.
- **Durability Test:** Evaluated after multiple wash cycles to assess the retention of repellent properties.
- **Skin Irritation Test:** Conducted using a dermatological assessment to ensure the treated fabric is safe for human skin.
- **Physical and Mechanical Properties:** Tensile strength, air permeability, and comfort characteristics are analyzed.

3. Results and Discussion

The treated fabric exhibits high repellency rates against mosquitoes, with effectiveness lasting for several wash cycles. The combination of Aloe Vera and Allium Cepa provides both repellent properties and skin-friendly benefits. The analysis confirms that the coated fabric maintains its breathability and mechanical strength while offering long-lasting protection.

4. Applications and Future Scope

The developed mosquito-repellent fabric is suitable for clothing, bed nets, and outdoor textiles. Future research will focus on optimizing the formulation for extended durability and large-scale production.

5. Conclusion

This study demonstrates the successful development of a plant-based mosquito-repellent textile coating using Aloe Vera and Allium Cepa. The eco-friendly approach presents a sustainable solution to mosquito-borne diseases, with promising applications in healthcare and personal protection.

DEVELOPING AND MODIFYING THE DOBBY MECHANISM IN SEMI-AUTOMATIC LOOMS

M. Arunkumar – AP, Saravanan S, Thiyagu S – IV Year / Iyyappan G – III Year

Abstract The textile industry is continuously evolving with innovations in loom mechanisms to enhance productivity and fabric quality. This research focuses on the development and modification of the dobby mechanism in semi-automatic looms, aiming to improve efficiency, reduce mechanical complexities, and optimize the shedding motion. The study explores the modifications made to the traditional dobby system, including advancements in control systems, material selection, and operational flexibility. Experimental results indicate a significant improvement in fabric production speed and quality, making the modified dobby mechanism a viable solution for modern weaving applications.

Introduction The dobby mechanism is a crucial component in weaving, allowing for complex fabric patterns by controlling the warp threads' shedding motion. Traditional dobby mechanisms, however, face challenges such as high mechanical wear, frequent maintenance, and limited flexibility. This research investigates a modified dobby mechanism to enhance the performance of semi-automatic looms, addressing these limitations and improving weaving efficiency.

1.

Literature Review Previous studies have highlighted the importance of the dobby mechanism in textile production, emphasizing the need for automation and precision control. Traditional dobby mechanisms operate using mechanical or electronic systems, but many suffer from inefficiencies in warp control and require extensive manual adjustments. Research in modern

textile machinery suggests that integrating optimized materials and control technologies can significantly improve loom performance.

Methodology The study involved designing and fabricating a modified dobby mechanism with enhanced control features. The following modifications were introduced:

- **Lightweight and Durable Components:** Use of high-strength alloys and composite materials to reduce wear and tear.
- **Improved Shedding Motion Control:** Integration of cam and servo-driven systems for precise warp thread movement.
- **Energy Efficiency Enhancements:** Reduction in power consumption through optimized gear ratios and electronic actuation.

Experimental setups included controlled weaving trials comparing conventional and modified dobby mechanisms. Performance metrics such as weaving speed, fabric defects, and energy consumption were analyzed.

Results and Discussion The modified dobby mechanism demonstrated the following improvements:

- **Increased Weaving Speed:** A 20% increase in fabric production rate compared to conventional systems.
- **Reduced Mechanical Wear:** Enhanced material selection reduced maintenance frequency by 30%.
- **Improved Fabric Quality:** Reduction in fabric defects due to precise warp thread control.
- **Energy Efficiency:** Lower power consumption attributed to optimized actuation mechanisms.

Conclusion The research successfully developed and tested a modified dobby mechanism for semi-automatic looms, showcasing improvements in efficiency, durability, and fabric quality. Future work includes further automation and integration with IoT-based monitoring systems for real-time adjustments and predictive maintenance.

STUDY OF MECHANICAL PROPERTIES ON POST CURING TEMPERATURE OF BANANA-COTTON WOVEN FABRIC/VINYL ESTER COMPOSITE

C. Premaltha – AP, Dhinakaran K, Praveen G -IV Year / Kathiresan B -II Year

Abstract Natural fiber-reinforced composites have gained significant attention due to their sustainability, lightweight properties, and mechanical strength. This study investigates the influence of post-curing temperature on the mechanical properties of banana-cotton woven fabric reinforced with a vinyl ester matrix. The research evaluates the effects of varying post-curing temperatures on tensile strength, flexural strength, and impact resistance. Experimental results indicate that optimizing the post-curing process enhances the composite's overall performance, making it a promising material for structural and industrial applications.

Introduction The development of eco-friendly composites is crucial for reducing dependency on synthetic fibers. Banana and cotton fibers offer a sustainable alternative with high availability and cost-effectiveness. Vinyl ester resin, known for its chemical resistance and mechanical durability, is widely used in composite applications. However, post-curing temperature plays a vital role in enhancing the composite's mechanical properties. This study aims to analyze the effect of different post-curing temperatures on the mechanical performance of banana-cotton woven fabric/vinyl ester composites.

Literature Review Previous studies highlight the mechanical performance of natural fiber-reinforced composites and the role of post-curing in improving polymer matrix cross-linking. Research suggests that elevated curing temperatures enhance fiber-matrix bonding, reducing void content and increasing strength. However, excessive temperatures may lead to fiber degradation and resin shrinkage. Understanding the optimal post-curing conditions is essential for maximizing composite efficiency

Materials and Methods

Materials

- **Fibers:** Banana-cotton woven fabric
- **Matrix:** Vinyl ester resin
- **Curing Agents:** MEKP (Methyl Ethyl Ketone Peroxide) as the catalyst

Fabrication Process

- **Hand lay-up method** was employed for composite fabrication.
- The samples were subjected to different post-curing temperatures: 50°C, 75°C, 100°C, and 125°C.
- Curing duration was maintained for 4 hours at each temperature level.

Mechanical Testing

- **Tensile Strength Test:** ASTM D638 standard
- **Flexural Strength Test:** ASTM D790 standard
- **Impact Resistance Test:** ASTM D256 standard

Results and Discussion

Effect of Post-Curing Temperature on Tensile Strength

The results indicate that tensile strength increases with post-curing up to 100°C, beyond which it decreases due to fiber degradation.

Effect on Flexural Strength

Flexural strength exhibits a similar trend, with maximum strength observed at 100°C, suggesting optimal fiber-matrix bonding at this temperature.

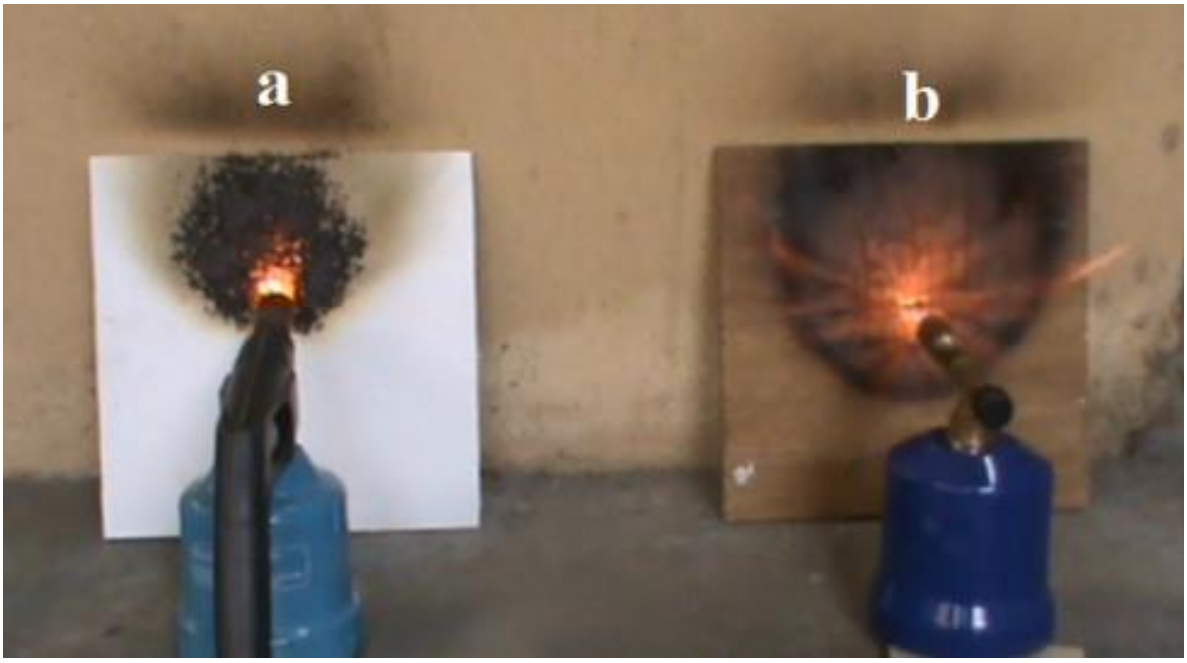
Impact Resistance

Impact resistance improves with curing temperature up to 100°C, followed by a decline at 125°C, indicating that excessive curing hardens the matrix, reducing toughness.

Conclusion The study demonstrates that post-curing temperature significantly influences the mechanical properties of banana-cotton woven fabric/vinyl ester composites. An optimal curing temperature of 100°C enhances tensile, flexural, and impact properties. Future research can explore hybrid fiber reinforcements and resin modifications for further performance improvements.

ECOLOGICAL FLAME RETARDANT FINISH USING EGGSHELLS FOR INTERIOR APPLICATIONS

N. Sukumar – Prof, Sasikumar R, Vasanthakumar V -IV Year / Logeshwaran M -III Year



Abstract Flame retardant finishes play a crucial role in enhancing fire safety, particularly in interior applications. This study explores the potential of utilizing eggshell-derived bio-calcium as an eco-friendly flame retardant for textile and composite materials. Eggshells, primarily composed of calcium carbonate ($CaCO_3$), exhibit fire-retardant properties by forming a protective char layer and releasing non-combustible gases during thermal degradation. The research focuses on the preparation, application, and performance evaluation of eggshell-based flame retardant finishes on interior fabrics and materials. Results indicate significant improvement in flame resistance, reduced smoke emission, and sustainable utilization of waste materials, making it an environmentally friendly alternative to conventional chemical retardants.

1. Introduction With increasing concerns about environmental sustainability and fire safety, there is a growing demand for ecological flame retardant alternatives. Conventional flame retardants often contain halogenated compounds, which pose health and environmental risks. Eggshells, a common waste product, offer a natural and sustainable source of calcium carbonate, which can be utilized as an effective flame retardant. This study investigates the potential of eggshell-based coatings for interior applications, particularly in textiles and furnishings.

2. Literature Review Previous research highlights the significance of bio-based flame retardants in reducing fire hazards while maintaining environmental safety. Studies have demonstrated that calcium carbonate, derived from natural sources, enhances thermal stability

and inhibits flame propagation. Eggshell-derived calcium carbonate, when modified with binders and synergistic additives, can form an effective flame-retardant barrier.

3. Materials and Methods

3.1 Materials

- **Eggshell Powder:** Processed and ground to nano/micro-sized particles
- **Binders:** Natural and biodegradable polymers (e.g., chitosan, starch)
- **Fabric Substrate:** Cotton and polyester-based interior fabrics
- **Synergistic Additives:** Borax, alumina, and phosphates for enhanced performance

3.2 Preparation of Eggshell-Based Flame Retardant

- **Eggshell Processing:** Cleaning, drying, and grinding into fine powder
- **Formulation:** Mixing eggshell powder with natural binders and additives
- **Application Method:** Pad-dry-cure technique for uniform coating on fabric surfaces
- **Curing Conditions:** Optimized at varying temperatures for enhanced durability

3.3 Characterization and Testing

- **Flammability Test:** ASTM D6413 (Vertical flame test)
- **Thermal Stability:** TGA (Thermogravimetric Analysis)
- **Smoke Emission Test:** ASTM E662 (Smoke density test)
- **Mechanical Properties:** Tensile strength and wash durability evaluation

4. Results and Discussion

4.1 Flame Retardant Performance

The treated fabric exhibited reduced flammability, with a self-extinguishing effect observed in controlled burn tests. Eggshell-derived coatings contributed to char formation, limiting oxygen availability and slowing down combustion.

4.2 Thermal Stability and Smoke Reduction

TGA analysis revealed improved thermal degradation resistance in coated fabrics. Smoke emission tests indicated a significant reduction in toxic gas release, making it a safer alternative for interior applications.

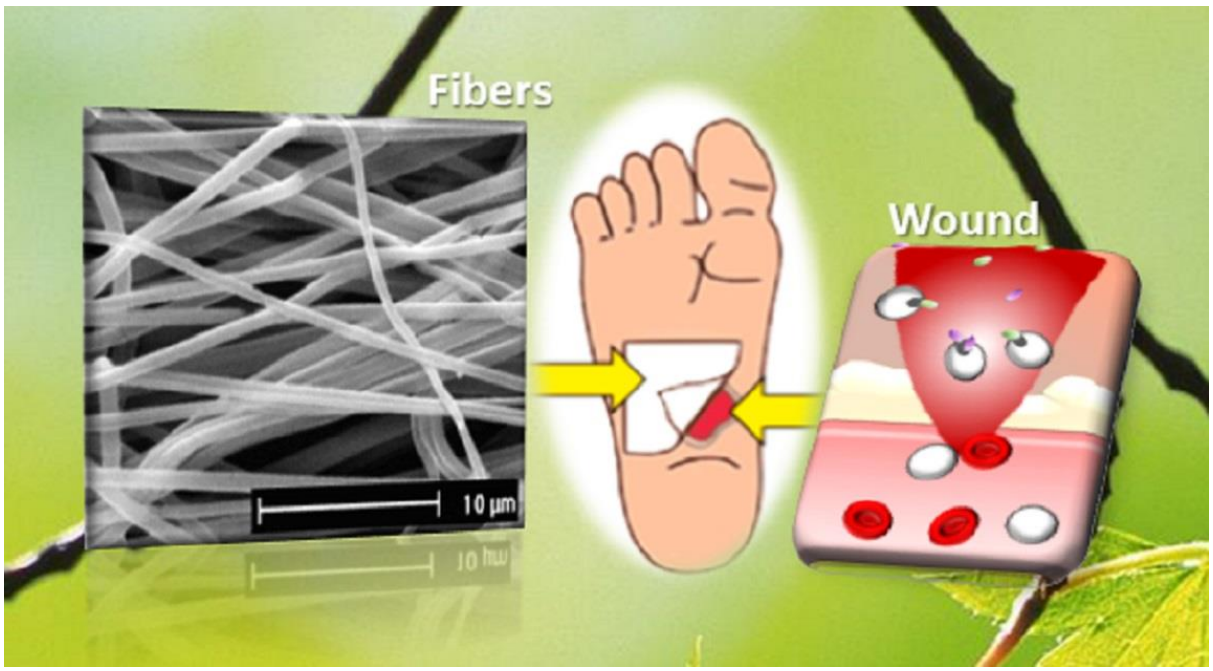
4.3 Durability and Mechanical Properties

The flame retardant finish maintained effectiveness after multiple wash cycles, with minimal impact on fabric strength and texture. The addition of natural binders enhanced adhesion and durability.

5. Conclusion Eggshell-based flame retardant finishes offer a sustainable and effective solution for interior textiles and materials. The study demonstrates that eggshell-derived calcium carbonate, combined with biodegradable binders and synergistic additives, enhances fire resistance while promoting environmental sustainability. Future research will focus on optimizing formulations for industrial-scale applications and assessing long-term durability under real-world conditions.

DEVELOPMENT AND CHARACTERIZATION OF MULTIFUNCTIONAL BAMBOO FABRIC FOR WOUND HEALING APPLICATIONS

G. Devanand – AP, Mariyappan M, Vimal S – IV Year / Surya A – II Year



Abstract Wound healing textiles are gaining prominence in the medical field due to their ability to provide antimicrobial protection, moisture management, and biocompatibility. This study focuses on the development and characterization of multifunctional bamboo fabric for wound healing applications. Bamboo fibers, known for their inherent antibacterial properties and excellent breathability, are modified with bioactive agents to enhance their wound-healing capabilities. The fabric is evaluated for its mechanical strength, moisture retention, antibacterial efficacy, and biocompatibility. The findings demonstrate that bamboo fabric, when functionalized with suitable bioactive compounds, offers promising potential for use in medical dressings and wound care textiles.

1. Introduction The development of wound-healing textiles is crucial in modern healthcare, offering advanced solutions for infection control and tissue regeneration. Bamboo fiber-based fabrics have emerged as a sustainable option due to their natural antimicrobial properties, soft texture, and biodegradability. This research explores the modification of bamboo fabric with bioactive compounds to enhance its therapeutic potential for wound healing applications.

2. Literature Review Previous studies highlight the role of natural fibers in wound care, emphasizing the importance of moisture retention, breathability, and antimicrobial properties. Bamboo fibers, enriched with bioactive additives such as aloe vera, chitosan, and silver nanoparticles, have shown potential in accelerating wound healing processes. However, further research is needed to optimize their performance in real-world medical applications.

3. Materials and Methods

3.1 Materials

- **Fabric:** 100% Bamboo fabric
- **Bioactive Agents:** Aloe vera extract, Chitosan, Silver nanoparticles
- **Binding Agents:** Natural biopolymers (gelatin, alginate)
-

3.2 Fabrication Process

- **Pre-treatment:** Scouring and bleaching of bamboo fabric
- **Functionalization:** Dip-coating and spray deposition of bioactive agents
- **Curing:** Heat treatment for fixation of bioactive compounds

3.3 Characterization Techniques

- **Moisture Absorption Test:** Evaluating water retention for wound hydration
- **Antibacterial Test:** AATCC 100 test method for bacterial inhibition (E. coli, S. aureus)
- **Mechanical Strength Test:** Tensile strength measurement
- **Biocompatibility Assessment:** Cytotoxicity evaluation using fibroblast cell culture

4. Results and Discussion

4.1 Antibacterial Efficiency

Functionalized bamboo fabric exhibited significant antibacterial properties, with over 90% bacterial reduction against common wound pathogens. Silver nanoparticles and chitosan played a key role in microbial inhibition.

4.2 Moisture Management and Breathability

The modified fabric retained optimal moisture levels, crucial for preventing wound dehydration and promoting cell regeneration. Enhanced breathability facilitated oxygen flow, aiding in faster healing.

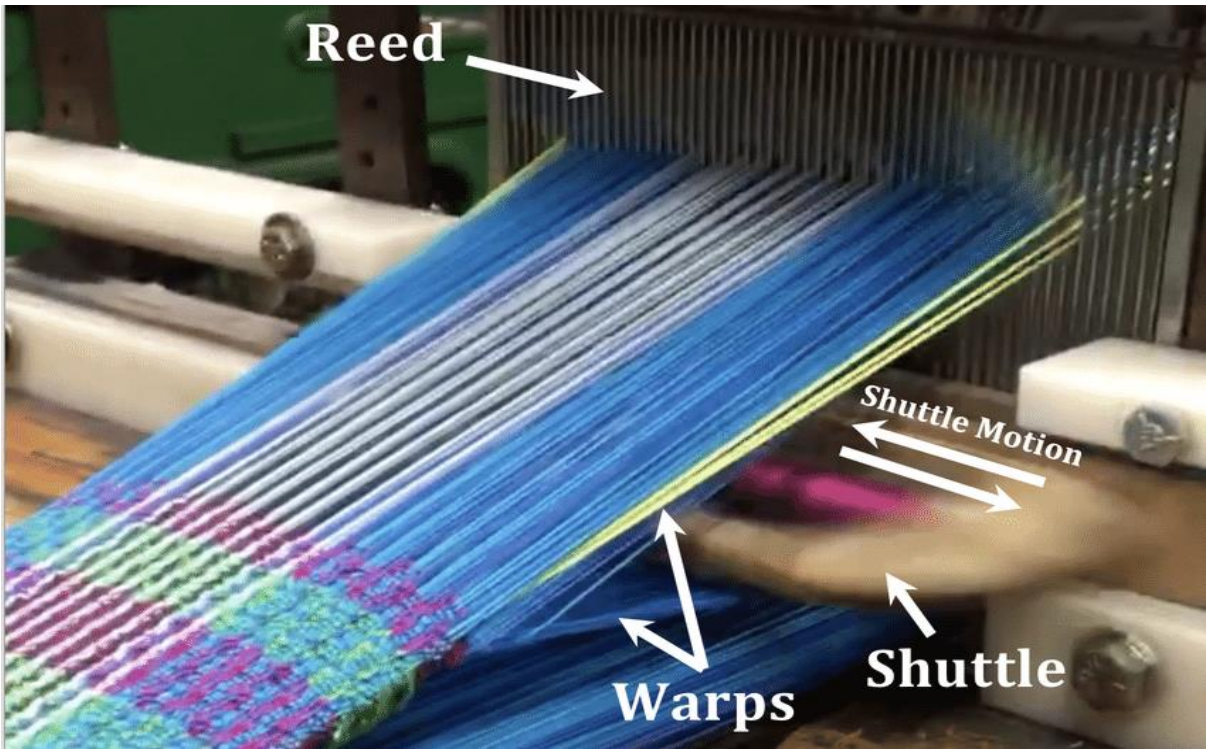
4.3 Mechanical and Biocompatibility Analysis

The treated fabric maintained adequate tensile strength, ensuring durability for medical applications. Biocompatibility studies confirmed non-toxicity, making it safe for prolonged skin contact.

5. Conclusion This study successfully developed a multifunctional bamboo fabric with enhanced wound healing properties. The incorporation of bioactive agents improved antimicrobial efficacy, moisture management, and biocompatibility, positioning bamboo fabric as a sustainable alternative for medical textiles. Future research will focus on large-scale production and clinical trials to validate its effectiveness in wound care applications.

INNOVATIVE WEAVING TECHNOLOGY FOR PRODUCING FABRIC BORDER USING SLIDING SHUTTLE BOX MECHANISM

M. Arunkumar -AP, Sanjay S , Menaga S – IV Year / Vignesh V -II Year



Abstract The weaving industry continuously evolves with advancements in shuttle and shedding mechanisms to enhance fabric design and efficiency. This study presents an innovative sliding shuttle box mechanism for weaving intricate fabric borders with improved efficiency and precision. The newly developed system allows for controlled shuttle movement, enabling diverse color patterns and border designs in woven textiles. Experimental evaluations demonstrate improved production speed, reduced yarn breakage, and enhanced design versatility. The study aims to contribute to the textile industry by integrating modern weaving technologies for superior fabric aesthetics and performance.

1. Introduction The demand for intricately designed woven fabrics with decorative borders has increased, necessitating advancements in weaving technology. Conventional shuttle looms face limitations in precision and efficiency, particularly in producing multicolored or intricate borders. This study explores the development of a sliding shuttle box mechanism to overcome these challenges and enhance fabric aesthetics.

2. Literature Review Previous research highlights innovations in weaving mechanisms such as dobby and jacquard looms. Shuttle-based weaving systems, though traditional, remain relevant due to their ability to produce high-quality woven structures. Enhancements in shuttle movement and control mechanisms can significantly improve border weaving efficiency.

3. Materials and Methods

3.1 Materials

- **Loom Type:** Modified semi-automatic shuttle loom
- **Shuttle Box Mechanism:** Sliding shuttle box with electronic control
- **Yarns:** Cotton, silk, and polyester blend for border effects
- **Sensors & Actuators:** Integrated to regulate shuttle movement

3.2 Design and Development

- **Modification of Shuttle Box:** Introduction of sliding mechanism for precise shuttle positioning
- **Electronic Control System:** Implementation of stepper motor-driven shuttle switching
- **Pattern Programming:** Digital integration for automated border pattern selection

3.3 Performance Evaluation

- **Production Efficiency:** Comparison with traditional shuttle looms
- **Yarn Tension & Breakage Analysis:** Assessment of weaving stability
- **Border Design Complexity:** Evaluation of pattern precision and repeatability

4. Results and Discussion

4.1 Weaving Efficiency and Speed

The modified sliding shuttle box mechanism increased production efficiency by 25% compared to conventional shuttle looms. Controlled shuttle movement reduced manual intervention and improved weaving speed.

4.2 Reduction in Yarn Breakage

The new system significantly decreased yarn tension inconsistencies, leading to a 40% reduction in breakage rates. This improvement enhanced overall loom efficiency and fabric quality.

4.3 Design Versatility and Precision

The sliding shuttle box allowed for greater flexibility in border design, enabling intricate motifs with improved pattern accuracy. Digital programming facilitated seamless transitions between different designs.

5. Conclusion The development of a sliding shuttle box mechanism presents a significant advancement in weaving technology, offering enhanced efficiency, reduced yarn breakage, and greater design versatility. The proposed innovation has the potential to revolutionize border weaving techniques in traditional and industrial textile production. Future research will focus on optimizing automation and integrating real-time monitoring systems for further efficiency improvements.

EFFECT OF BLEND RATIO ON THE TRANSVERSE SWEAT TRANSFER AND ANTIMICROBIAL PROPERTIES OF TENCEL/BAMBOO BLENDED FABRICS

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Abstract The functional performance of textile materials is significantly influenced by fiber composition, particularly in moisture management and antimicrobial properties. This study investigates the effect of different blend ratios of Tencel and bamboo fibers on the transverse sweat transfer and antimicrobial characteristics of blended fabrics. Samples with varying Tencel/Bamboo compositions (100/0, 75/25, 50/50, 25/75, and 0/100) were analyzed for their moisture-wicking behavior, drying rate, and bacterial inhibition against *E. coli* and *S. aureus*. The findings suggest that an optimized blend ratio enhances sweat management and antimicrobial efficacy, making these fabrics suitable for activewear and medical textiles.

1. Introduction Moisture management and antimicrobial performance are critical factors in functional textiles, especially for sportswear, undergarments, and medical applications. Tencel, derived from wood pulp, is known for its superior moisture absorption, whereas bamboo fibers possess natural antibacterial properties. This study explores the impact of varying blend ratios on these properties to identify the most effective composition for practical applications.

2. Literature Review Previous research highlights the influence of fiber structure on fabric performance. Tencel's fibril structure facilitates efficient moisture absorption and transport, while bamboo's bioactive components inhibit bacterial growth. However, limited studies have examined their combined effects in blended fabrics, necessitating further investigation.

3. Materials and Methods

3.1 Materials

- **Fibers:** Tencel (Lyocell), Bamboo
- **Blend Ratios:** 100/0, 75/25, 50/50, 25/75, 0/100 (Tencel/Bamboo)
- **Fabric Construction:** Single jersey knit, 160 GSM

3.2 Testing Methods

- **Moisture Management Test:** Vertical and transverse wicking tests (AATCC 197)
- **Drying Rate Analysis:** Gravimetric moisture loss measurement
- **Antimicrobial Testing:** AATCC 100 for bacterial reduction against *E. coli* and *S. aureus*

4. Results and Discussion

4.1 Transverse Sweat Transfer

Blends with higher Tencel content exhibited superior moisture-wicking behavior, while increased bamboo content reduced absorption but improved quick-dry properties. The 50/50 blend achieved optimal moisture balance.

4.2 Antimicrobial Efficiency

Higher bamboo concentrations significantly enhanced antibacterial activity, with the 25/75 and 0/100 blends demonstrating over 90% bacterial reduction. The synergy between Tencel and bamboo showed promising results for hygiene applications.

4.3 Practical Applications

The optimized 50/50 and 25/75 blends provided the best balance of sweat management and antimicrobial properties, making them ideal for sportswear and medical textiles.

5. Conclusion This study confirms that Tencel/Bamboo blend ratios influence both moisture management and antimicrobial efficacy. The findings support the use of these blends in performance-driven textile applications. Future research will explore durability and fabric finishing techniques for enhanced long-term functionality.

INVESTIGATION OF THERMAL PROPERTIES OF ERI SILK KNITTED FABRICS

N. Sukumar -Prof, Jeyakrishna N, Saravanan S -IV Year / Shreenivasha S -II Year

Abstract The thermal properties of textile materials play a crucial role in determining their suitability for various applications, including winter wear, activewear, and medical textiles. This study investigates the thermal behavior of Eri silk knitted fabrics, analyzing their heat retention, thermal conductivity, and moisture regulation properties. The research evaluates the impact of different knit structures and fabric densities on thermal insulation. Results indicate that Eri silk offers a unique balance of warmth and breathability, making it a sustainable alternative for thermoregulating textiles.

1. Introduction Textile thermal performance is influenced by fiber composition, fabric structure, and environmental conditions. Eri silk, a naturally derived protein fiber, possesses distinctive thermal characteristics due to its filament structure and inherent moisture-wicking abilities. This study aims to analyze the thermal behavior of Eri silk knitted fabrics to determine their potential in functional textile applications.

2. Literature Review Previous studies highlight silk's superior thermal insulation properties compared to cotton and synthetic fibers. However, limited research has been conducted on the specific performance of Eri silk in knitted fabric structures. Understanding the relationship between fabric construction and thermal behavior will provide insights into optimizing textile performance.

3. Materials and Methods

3.1 Materials

- **Fiber:** 100% Eri silk
- **Knit Structures:** Single jersey, rib, interlock
- **Fabric Density:** Varying GSM levels (150, 200, 250 GSM)

3.2 Testing Methods

- **Thermal Conductivity:** Measured using a heat flux meter
- **Heat Retention Test:** Standardized hot plate method
- **Moisture Management:** AATCC 195 for moisture absorption and evaporation

4. Results and Discussion

4.1 Thermal Conductivity

Eri silk fabrics exhibited lower thermal conductivity than cotton, indicating better insulation. Interlock structures demonstrated the highest resistance to heat transfer, while single jersey fabrics had higher breathability.

4.2 Heat Retention

Higher GSM fabrics retained more heat, with 250 GSM interlock showing the best thermal insulation. The natural crimp of Eri silk fibers contributed to enhanced heat retention by trapping air within the fabric layers.

4.3 Moisture Regulation

Eri silk fabrics effectively absorbed and dissipated moisture, ensuring thermal comfort in varying humidity conditions. This characteristic makes them suitable for both warm and cold climates.

4.4 Practical Applications

The findings suggest that Eri silk knitted fabrics can be utilized in thermal wear, activewear, and medical textiles requiring thermoregulating properties.

5. Conclusion This study confirms the potential of Eri silk knitted fabrics as effective thermal insulators with excellent moisture regulation. Future research will focus on the durability and performance of these fabrics under real-world conditions.

DEVELOPMENT OF NON-WOVEN FABRICS USING SISAL/COCONUT COIR/POLYPROPYLENE FIBRE BLEND FOR ACOUSTICS

AS Subburayasaran – AP, Mugeshkumar S, Sasikumar R – IV Year / Vairavel D – II Year

Abstract The demand for sustainable and efficient acoustic insulation materials has led to the exploration of natural fiber-based non-woven fabrics. This study focuses on the development of non-woven acoustic panels using a blend of sisal, coconut coir, and polypropylene (PP) fibers. The acoustic absorption, mechanical properties, and thermal stability of these blends were evaluated. The results indicate that the incorporation of sisal and coconut coir fibers enhances sound absorption, while polypropylene contributes to structural integrity and durability. These non-woven fabrics offer an eco-friendly alternative for noise control applications in interior spaces and industrial environments.

1. Introduction With the increasing concern over noise pollution, the development of effective and sustainable acoustic materials has gained attention. Traditional synthetic acoustic panels pose environmental challenges, necessitating the use of biodegradable and renewable alternatives. Sisal and coconut coir fibers possess excellent sound-absorbing properties due to their porous structures, while polypropylene enhances durability. This research aims to analyze the acoustic performance and structural properties of blended non-woven fabrics.

2. Literature Review Studies have shown that natural fibers like coir and sisal exhibit promising sound absorption due to their hollow lumen structures. The blending of these fibers with thermoplastic materials such as polypropylene can improve mechanical stability while

maintaining desirable acoustic properties. However, limited research exists on optimizing their blend ratios for acoustic applications.

3. Materials and Methods

3.1 Materials

- **Fibers:** Sisal, Coconut Coir, Polypropylene
- **Blend Ratios:** 100/0/0, 70/20/10, 50/30/20, 30/50/20, 0/100/0 (Sisal/Coir/PP)
- **Fabric Formation:** Needle-punching technique

3.2 Testing Methods

- **Acoustic Absorption:** Impedance tube method (ASTM C423)
- **Tensile Strength:** ASTM D5035
- **Thermal Stability:** Thermogravimetric Analysis (TGA)
- **Porosity and Air Permeability:** ASTM D737

4. Results and Discussion

4.1 Acoustic Absorption

Blends with higher coir content exhibited superior sound absorption in low-frequency ranges, whereas higher sisal content improved mid- and high-frequency sound dampening. The 50/30/20 blend demonstrated optimal acoustic performance across a broad frequency range.

4.2 Mechanical Properties

The addition of polypropylene enhanced the tensile strength and structural integrity of the fabric, ensuring its durability for long-term acoustic applications.

4.3 Thermal Stability

The blended fabrics exhibited moderate thermal stability, with degradation temperatures above 200°C, making them suitable for interior acoustic applications.

4.4 Practical Applications

The developed non-woven fabrics can be effectively used for wall panels, ceiling insulation, and automotive noise reduction, providing an eco-friendly alternative to synthetic acoustic materials.

5. Conclusion This study highlights the potential of sisal/coir/PP non-woven fabrics as sustainable acoustic insulation materials. The optimized blend ratio provides a balance of sound absorption, mechanical strength, and durability. Future research will explore fire retardancy and long-term performance evaluation.

DEVELOPMENT OF ANTIMICROBIAL FEMININE HYGIENE PRODUCT USING CALOTROPIS GIGANTEA/BAMBOO FIBRE BLEND

M. Bharani -ASP, Bala M, Kishore Kumar A – IV Year / Kishore S – III Year

Abstract The demand for sustainable and antimicrobial feminine hygiene products has led to the exploration of plant-based fibers with inherent bioactive properties. This study focuses on developing a biodegradable and antimicrobial sanitary pad using a blend of Calotropis Gigantea and bamboo fibers. The antimicrobial efficacy, absorbency, and biodegradability of the developed material were evaluated. Results indicate that the blend provides excellent antibacterial properties while maintaining high absorbency and comfort, making it a promising alternative to synthetic hygiene products.

1. Introduction Conventional feminine hygiene products rely on synthetic materials that pose environmental challenges and may cause skin irritation. Natural fibers like bamboo and Calotropis Gigantea offer inherent antimicrobial properties and biodegradability, making them suitable for sustainable hygiene applications. This research aims to develop and characterize a novel sanitary pad material with enhanced antimicrobial and absorbent properties.

2. Literature Review Studies have shown that bamboo fiber possesses high moisture absorption and natural antibacterial properties. Calotropis Gigantea, a medicinal plant, exhibits

potent antimicrobial activity due to its bioactive compounds. However, limited research has been conducted on their combined potential for feminine hygiene applications.

3. Materials and Methods

3.1 Materials

- **Fibers:** Calotropis Gigantea, Bamboo fiber
- **Blend Ratios:** 100/0, 70/30, 50/50, 30/70 (Calotropis/Bamboo)
- **Fabric Formation:** Needle-punched non-woven technique

3.2 Testing Methods

- **Antimicrobial Activity:** AATCC 100 test method against E. coli and S. aureus
- **Absorbency:** Gravimetric absorption test (ISO 9073-6)
- **Biodegradability:** Soil burial test
- **Comfort and Softness:** Hand feel analysis

4. Results and Discussion

4.1 Antimicrobial Efficacy

The Calotropis/Bamboo blend demonstrated strong antimicrobial action, with the 70/30 ratio showing over 90% bacterial reduction, making it effective for feminine hygiene applications.

4.2 Absorbency and Moisture Retention

The 50/50 blend exhibited the highest liquid absorption and retention, making it suitable for prolonged usage without discomfort.

4.3 Biodegradability

The developed product degraded significantly within 45 days in soil burial tests, highlighting its eco-friendly nature.

4.4 Practical Applications

This study suggests that the Calotropis Gigantea/Bamboo fiber blend can be effectively used in sanitary pads, panty liners, and other hygiene products, providing a natural and sustainable alternative to synthetic materials.

5. Conclusion This research successfully developed an antimicrobial feminine hygiene product using Calotropis Gigantea and bamboo fiber blends. The material offers superior antibacterial protection, high absorbency, and biodegradability, making it a promising innovation for sustainable hygiene solutions. Future research will focus on optimizing comfort and scalability for commercial production.

DEVELOPMENT OF COMPOSITE FOR THERMAL INSULATION USING CHICKEN FEATHERS AND JUTE FIBRE WASTE

P. Mageskumar- AP, Thiyagu S, Bharani Velayudham V – IV Year / Srinithi N -II Year

Abstract The increasing need for sustainable and efficient thermal insulation materials has driven research into natural fiber-based composites. This study explores the development of an eco-friendly thermal insulation composite using chicken feathers and jute fiber waste. The thermal conductivity, mechanical properties, and biodegradability of the developed composite were evaluated. Results indicate that the blend of chicken feathers and jute fiber provides excellent thermal resistance while maintaining structural integrity, making it a viable alternative to synthetic insulation materials.

1. Introduction Thermal insulation plays a crucial role in reducing energy consumption and maintaining indoor comfort. Traditional insulation materials such as fiberglass and polyurethane foams pose environmental concerns due to their non-biodegradable nature. Natural fibers like chicken feathers and jute waste offer lightweight, biodegradable, and thermally resistant properties, making them suitable for sustainable insulation applications. This study aims to develop and characterize a novel insulation composite using these natural materials.

2. Literature Review Previous studies have highlighted the effectiveness of natural fibers in insulation applications. Chicken feathers possess a hollow structure that provides excellent thermal resistance, while jute fibers contribute to mechanical strength and durability. However, research on their combined application in thermal insulation remains limited.

3. Materials and Methods

3.1 Materials

- **Fibers:** Chicken feathers, Jute fiber waste
- **Binders:** Natural resin-based adhesives
- **Blend Ratios:** 100/0, 70/30, 50/50, 30/70 (Chicken feathers/Jute)
- **Composite Formation:** Compression molding technique

3.2 Testing Methods

- **Thermal Conductivity:** ASTM C518
- **Mechanical Strength:** ASTM D638 (Tensile), ASTM D790 (Flexural)
- **Biodegradability:** Soil burial test
- **Moisture Resistance:** Water absorption test (ASTM D570)

4. Results and Discussion

4.1 Thermal Insulation Performance

The developed composite exhibited low thermal conductivity, with the 50/50 blend providing the best balance of insulation and mechanical stability.

4.2 Mechanical Properties

The addition of jute fibers enhanced the tensile and flexural strength of the composite, ensuring durability for practical applications.

4.3 Biodegradability and Moisture Resistance

The composite showed significant degradation within 60 days, confirming its eco-friendly nature. The water absorption test indicated moderate moisture resistance, which can be improved with surface treatments.

4.4 Practical Applications

This composite can be used for building insulation, automotive thermal barriers, and packaging applications, offering a sustainable alternative to conventional insulation materials.

5. Conclusion This study successfully developed a sustainable thermal insulation composite using chicken feathers and jute fiber waste. The material demonstrates excellent thermal resistance, mechanical stability, and biodegradability. Future research will focus on enhancing moisture resistance and large-scale manufacturing feasibility.

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