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TEXEMPIRE

DEPARTMENT OF TEXTILE TECHNOLOGY

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About the Department

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

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

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

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

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

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

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

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

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

Dr.G. Karthikeyan M.Tech., Ph.D
EDITOR-IN-CHIEF
HEAD OF THE DEPARTMENT

Welcome to the inaugural issue of TEXEMPIRE, Volume 10 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

DEVELOPMENT OF BIO-ACTIVE WOUND CARE DRESSING MATERIAL USING SPIRULINA EXTRACT

MB Sampath-Prof ,Palla Srinivasu, S Prasanth. – IV Year / Hari Prabakaran S, Logesh M – III Year

Abstract

Wound healing remains a critical area in medical research, requiring innovative solutions for efficient and painless recovery. This study focuses on developing a bio-active wound care dressing material using Spirulina extract, Aloe Vera, and Ocimum basilicum (basil seed). The material leverages the unique properties of these natural components, such as antioxidant, antimicrobial, and moisture-retaining capabilities. This paper outlines the preparation process, material characterization, and efficacy evaluation through various tests and analyses, emphasizing the potential of sustainable and non-toxic alternatives in wound care applications.

Introduction

The rising need for effective and non-toxic wound care solutions has driven research into bio-active dressing materials. Conventional products often lack therapeutic properties, leading to extended recovery times and increased risk of infection. The incorporation of natural bioactive compounds, such as Spirulina extract, Aloe Vera, and basil seed mucilage, offers a promising alternative.

Spirulina, a protein-rich blue-green algae, is renowned for its antioxidant and anti-inflammatory properties. Aloe Vera, widely recognized for its antimicrobial and wound-healing capabilities,

complements Spirulina's bioactivity. Ocimum basilicum seeds, known for their polysaccharide-rich mucilage, enhance moisture retention and provide a conducive environment for healing. These materials were coated onto a non-woven fabric substrate to create a bio-active wound dressing capable of accelerating recovery.

Materials and Methods

1. Raw Materials: Non-woven fabric (viscose/cotton blend), Spirulina powder, Aloe Vera leaves, and basil seeds were procured. The fabric was selected for its water absorbency and breathability.

2. Preparation of Extracts:

- **Spirulina Extract:** Spirulina powder was mixed with ethanol, stirred for 30 minutes, and left undisturbed for 24 hours. The solution was filtered to obtain the extract.
- **Aloe Vera Gel:** Aloe Vera leaves were sliced to extract gel, which was blended into a low-viscosity solution.
- **Basil Seed Mucilage:** Seeds were soaked in Aloe Vera gel, centrifuged, and filtered to isolate the mucilage.

3. Fabric Coating Process: Non-woven fabric was washed, dried, and immersed in Spirulina extract for 15 minutes. After drying, basil seed mucilage was evenly applied on both sides of the fabric using a mechanical spreader, followed by another drying period.

4. Characterization: The coated fabric underwent several tests:

- **FTIR Analysis:** Identified functional groups present in Spirulina.
- **SEM Imaging:** Analyzed surface morphology.
- **Water Absorption and Contact Angle Tests:** Evaluated hydrophilicity and absorption capacity.
- **Air Permeability and Thickness Tests:** Assessed breathability and structural integrity.
- **Antimicrobial Testing:** Measured the inhibitory effects on bacterial growth.

Conclusion

This study demonstrates the potential of Spirulina-based bio-active wound dressings as an effective, sustainable, and non-toxic solution for wound care. The integration of Aloe Vera and basil seed mucilage further enhances its healing properties, moisture retention, and antimicrobial efficacy. Future research should explore clinical trials to validate these findings and optimize the dressing for commercial use. This innovation aligns with the global push toward eco-friendly medical textiles, promising improved patient outcomes and reduced environmental impact.

ANTIMICROBIAL FINISH FOR HERBAL DYED FABRIC USING BIO-ENZYME

N Sukumar-Prof , Hemanath.V.N, Jithu.R,– IV Year / Nithish K -III Year

Abstract

The growing interest in eco-friendly antimicrobial treatments has led to the development of herbal-dyed fabrics using bio-enzymes. This study explores the application of natural extracts—Tulsi, Aloe Vera, Lemon Grass, Orange Peel, and Pomegranate Peel—as antimicrobial agents on bio-enzymatically treated cotton fabrics. The bio-enzymatic processes, such as desizing, scouring, and bleaching, serve as sustainable alternatives to conventional methods. Testing methods such as AATCC 147 and AATCC 100 were used to evaluate antimicrobial efficacy and durability. The study highlights the effectiveness of herbal finishes in improving antimicrobial properties and durability while promoting environmental sustainability.

Introduction

Textile materials often serve as ideal environments for microbial growth due to their ability to retain moisture and nutrients. The development of antimicrobial fabrics aims to inhibit the growth of harmful microorganisms, providing benefits such as odor control, hygiene, and infection prevention. Traditional chemical methods for antimicrobial finishes are associated with environmental concerns and potential skin irritations. This study investigates natural extracts combined with bio-enzymes to produce eco-friendly antimicrobial fabrics.

Tulsi (Ocimum tenuiflorum), Aloe Vera (Aloe barbadensis), and Lemon Grass (Cymbopogon) are known for their antimicrobial properties, while Orange and Pomegranate Peels act as mordants to

fix dyes and enhance durability. These natural materials were applied to bio-enzyme-pretreated cotton fabric to develop a sustainable antimicrobial solution.

Materials and Methods

1. Materials:

- **Fabric:** 100% bleached cotton fabric.
- **Enzymes:** Scourzyme TXP (for bio-scouring), Alpha-amylase (for desizing), and lemon juice (for bio-bleaching).
- **Natural Extracts:** Tulsi, Aloe Vera, Lemon Grass, Orange Peel, and Pomegranate Peel.

2. Methodology:

- **Fabric Preparation:**
    - **Desizing:** Alpha-amylase enzyme was used to remove sizing agents from the warp yarns. The process improved fabric absorbency and prepared the fabric for subsequent treatments.
    - **Scouring:** Scourzyme TXP was applied to remove waxes, oils, and other hydrophobic impurities, enhancing the fabric's hydrophilicity.
    - **Bio-Bleaching:** Lemon juice served as a natural bleaching agent, utilizing its citric acid content to remove color impurities.

Results and Discussion

1. Antimicrobial Efficacy: The antimicrobial activity was evaluated using two standardized tests:

- **AATCC 147 (Qualitative):** Zones of inhibition were observed for all natural extract combinations against *Staphylococcus aureus* and *Klebsiella pneumonia*. The combination of Aloe Vera and Pomegranate showed the highest inhibition zones.
- **AATCC 100 (Quantitative):** The reduction in bacterial colonies after washing was recorded. Extract combinations demonstrated durable antimicrobial activity, with Aloe Vera and Pomegranate retaining the highest efficacy even after five washes.

Conclusion

This study demonstrates the effectiveness of natural extracts combined with bio-enzymatic treatments in producing antimicrobial fabrics. Aloe Vera and Pomegranate extracts yielded superior antimicrobial properties and durability, making them ideal for applications in healthcare and hygiene textiles. The sustainable approach outlined here supports the development of eco-friendly textiles while addressing environmental concerns. Future research should focus on scaling the process for industrial applications and evaluating its performance under real-world conditions

LIGNOCELLULOSIC MATERIALS FOR AUTOMOTIVE INTERIORS: A SUSTAINABLE APPROACH

KR Nandagopal- AP, M.Iswarya, S.Kavya,– IV Year / Sowmiya C, Danu E S – II Year

Abstract

The study explores the potential of natural fibers such as jute, bamboo, and banana to replace synthetic materials in automotive interiors. Utilizing needle-punching techniques, the nonwoven fabrics developed exhibit excellent mechanical properties, including tensile and tear strength, water absorbency, and rubbing fastness. By leveraging the inherent properties of lignocellulosic fibers, the research highlights an environmentally friendly alternative to conventional synthetic materials, contributing to pollution reduction and sustainable innovation in the automotive sector.

Keywords

Lignocellulosic materials, natural fibers, automotive interiors, nonwoven fabrics, sustainability

Introduction

The growing environmental concerns and the need for sustainable materials have driven researchers toward natural fiber-based alternatives. Lignocellulosic fibers such as jute, bamboo, and banana offer advantages including biodegradability, low cost, and superior mechanical properties. This research focuses on the production and application of nonwoven fabrics derived from these fibers for automotive interiors, reducing reliance on synthetic materials and minimizing environmental pollution.

Literature Review

Natural fibers have gained significant attention as replacements for synthetic fibers due to their ecological benefits. Previous studies have demonstrated the mechanical superiority and environmental advantages of fibers such as jute, banana, and bamboo. The use of needle-punching techniques and advancements in green technology has further expanded the applications of these fibers in industries including automotive and construction.

Materials and Methods

Materials Used:

1. Jute (40%)
2. Bamboo (40%)
3. Banana (20%)

Process Overview:

1. Raw material sourcing and sorting
2. Testing of fiber properties
3. Carding for web formation
4. Needle punching to consolidate the fibrous structure

Testing Parameters:

- Tensile Strength: ISO 13934-1-2010
- Tear Strength: ISO 13937-1-2010
- Water Absorbency: ISO 20158:2018
- GSM (grams per square meter): ISO 3801-2008
- Rubbing Fastness: ISO-105-X12

Conclusion

The research demonstrates that lignocellulosic fibers can effectively replace synthetic materials in automotive interiors. The developed nonwoven fabrics not only meet industrial standards but also contribute to environmental sustainability. This approach can be commercialized to promote eco-friendly practices in the automotive sector

ECO-FRIENDLY COTTON FABRIC PRINTING USING NATURAL DYES AND THICKENERS

P.Maheswaran-AP, Rahul .K , Sakthivel .S -IV Year / Sanjay S, Srija T – II Year

Abstract

The project explores sustainable printing of cotton fabrics using natural dye extracted from *Eclipta Prostrata* (karisilanganni) and a natural thickener derived from *Tamarindus Indica* (tamarind). The study focuses on eco-friendly methods to produce herbal-medicated textile materials that adhere to ISO 14000 standards. The research highlights the advantages of using renewable resources to achieve vibrant, durable prints with good fastness properties, contributing to environmental sustainability and reducing synthetic dye pollution.

Keywords

Natural dyes, eco-friendly printing, cotton fabric, *Eclipta Prostrata*, *Tamarindus Indica*, sustainable textiles

Introduction

Textile dyeing and printing often rely on synthetic dyes, which are associated with significant environmental and health concerns. Synthetic dyes contribute to water pollution, toxicity, and non-biodegradability. This project investigates the use of *Eclipta Prostrata* and *Tamarindus Indica* as sustainable alternatives for cotton fabric printing. The aim is to achieve vibrant and durable prints while minimizing environmental impact.

Materials and Methods

Materials Used:

- **Dye Source:** *Eclipta Prostrata* (karisilanganni), known for its skin-lightening and antimicrobial properties.
- **Thickener:** *Tamarindus Indica* (tamarind), valued for its high viscosity and healing properties.
- **Fabric:** 100% cotton, selected for its comfort, breathability, and compatibility with herbal treatments.

Preparation Process:

1. **Preprocessing:**
    - Scouring with *Sapindus Emerginata* seed solution for natural cleaning.
    - Bleaching using plantain leaves and animal manure for a chemical-free process.
2. **Dye Extraction:**
    - Dye components were extracted from dried *Eclipta Prostrata* using aqueous methods.
    - The mixture was filtered and purified to achieve high color yield.
3. **Printing Recipe:**
    - Dye: 5g
    - Thickener: 20g
    - Natural binder (Terminalia Chebula): 150 ml
    - Fixer (firewood ash): 200 ml
    - Water: Balance to 1000 ml
4. **Printing Process:**
    - The dye solution was applied to cotton fabric using traditional hand-block printing methods.
    - The samples were air-dried and steamed for color fixation.

Conclusion

This study demonstrates that *Eclipta Prostrata* and *Tamarindus Indica* can effectively replace synthetic dyes and thickeners for eco-friendly fabric printing. The resulting fabrics exhibit vibrant colors, good fastness properties, and significant environmental benefits. This approach can be applied to various textile products, including home furnishings and garments, paving the way for sustainable textile manufacturing.

NANOHERBAL COATING OF COTTON/VISCOSE NONWOVEN FABRICS FOR ENHANCED ANTIMICROBIAL ACTIVITY

N.Sukumar-Prof, Hariprasath S.A, Mohanbabu. S - IV Year / Nikhil Pravin M -III Year

Abstract

This study investigates the antimicrobial efficacy of cotton/viscose nonwoven fabrics treated with nanoherbal coatings derived from natural extracts such as neem (*Azadirachta indica*), tulsi (*Ocimum tenuiflorum*), and turmeric (*Curcuma longa*). By utilizing nanotechnology, the natural extracts were converted into nanoparticles and applied to the fabrics using a pad-dry-cure method. Antimicrobial activity was evaluated against *Staphylococcus aureus* and *Klebsiella pneumoniae* using AATCC 147 and AATCC 100 standards. Results showed significant antibacterial properties, making these fabrics suitable for medical and hygiene applications, particularly for bedridden patients and hospital use.

Keywords

Nanoherbal coating, cotton/viscose nonwoven, neem, tulsi, turmeric, antimicrobial textiles

Introduction

The rapid proliferation of microorganisms on fabrics poses significant health and hygiene concerns. Traditional textiles often lack antimicrobial properties, leading to infections and unpleasant odors. This research aims to address these issues by using herbal extracts combined with nanotechnology to enhance the antimicrobial activity of cotton/viscose nonwoven fabrics. Neem, tulsi, and turmeric

were chosen for their well-documented antimicrobial, antifungal, and anti-inflammatory properties. The study explores their potential for sustainable and eco-friendly antimicrobial finishing.

Materials and Methods

Materials

- **Fabric:** Cotton/viscose nonwoven fabric
- **Herbal Extracts:** Neem leaves, tulsi leaves, turmeric powder
- **Chemicals:** Citric acid, sodium sulfate, gum acacia, hydrogen peroxide, ethanol

Methodology

1. **Preparation of Herbal Extracts:**
    - Herbal materials were shade-dried for 30 days to remove moisture and ground into fine powder.
    - Extracts were obtained through ethanol extraction and filtered to ensure purity.
2. **Nanoparticle Synthesis:**
    - Extracts were processed using a ball milling machine to achieve nanoparticle size for enhanced penetration and efficacy.
3. **Fabric Treatment:**
    - The fabrics were immersed in herbal extract solutions containing citric acid and gum acacia as binders.
    - The pad-dry-cure method was employed, where fabrics were padded, dried at 110°C for 20 minutes, and cured at 130°C for 5 minutes.
4. **Antimicrobial Testing:**
    - **Qualitative Test (AATCC 147):** Used to detect zones of inhibition against *S. aureus* and *K. pneumoniae*.
    - **Quantitative Test (AATCC 100):** Evaluated bacterial reduction percentage after 24-hour incubation..

Conclusion

This study successfully demonstrated the efficacy of nanoherbal coatings for antimicrobial applications on cotton/viscose nonwoven fabrics. The combination of neem, tulsi, and turmeric provided robust antibacterial properties, making these fabrics ideal for medical textiles such as bed linens, patient gowns, and surgical coverings. The eco-friendly nature of the process supports sustainable textile manufacturing and reduces reliance on synthetic chemical finishes.

ANTIMICROBIAL FINISH TO COTTON FABRIC TRE

M.Arunkumar-AP Dinesh K and Inbavanan - IV Year / Ragupathi M – II

Abstract

This study investigates the antimicrobial potential of Catharanthus roseus extracts applied to cotton fabrics. Using aqueous and ethanol extraction methods, antimicrobial coatings were developed and applied to fabrics through a pad-dry-cure process. The antimicrobial efficacy was evaluated against *Staphylococcus aureus* and *Klebsiella pneumoniae* using AATCC 147 and AATCC 100 standards. Results demonstrated significant antimicrobial activity, with leaf extracts exhibiting superior performance compared to flower extracts. The findings emphasize the potential of Catharanthus roseus in developing eco-friendly and sustainable antimicrobial textiles.

Keywords

Catharanthus roseus, antimicrobial finish, cotton fabric, natural extracts, sustainable textiles

Introduction

The increasing demand for antimicrobial textiles has driven interest in natural and sustainable alternatives to synthetic chemical finishes. Catharanthus roseus, commonly known as periwinkle, is a medicinal plant with well-documented antibacterial, antiviral, and antioxidant properties. This

study aims to utilize its natural extracts to enhance the antimicrobial properties of cotton fabrics, providing an eco-friendly solution for medical and hygiene applications.

Materials and Methods

Materials

- **Fabric:** 100% cotton, plain weave, 40s warp and 2/30s weft count, GSM: 140
- **Plant Source:** Leaves and flowers of Catharanthus roseus
- **Chemicals:** Ethanol, distilled water

Methodology

1. **Plant Collection:** Fully matured leaves and flowers of Catharanthus roseus were collected from Salem and Erode districts, Tamil Nadu, India.
2. **Extraction Process:**
    - Leaves and flowers were dried, ground into a powder, and subjected to two extraction methods:
        - **Aqueous Extraction:** 10g of powder soaked in 100ml distilled water for 24 hours.
        - **Ethanol Extraction:** 10g of powder soaked in 100ml ethanol for 24 hours.
    - Extracts were filtered using Whatman filter paper to obtain purified solutions.
3. **Fabric Coating:**
    - The pad-dry-cure method was used to apply the extracts to the cotton fabric.
    - Fabrics were padded with the extract solution, dried at 110°C for 20 minutes, and cured at 130°C for 5 minutes.
4. **Testing Methods:**
    - **Qualitative Test (AATCC 147):** Evaluated bacteriostatic activity through zones of inhibition.
    - **Quantitative Test (AATCC 100):** Assessed bacterial reduction percentage after washing..

Conclusion

The study confirms the antimicrobial efficacy of Catharanthus roseus extracts applied to cotton fabrics. Leaf extracts, particularly those prepared with ethanol, were found to be most effective. This natural antimicrobial finish offers a sustainable alternative for medical and hygiene textiles, reducing the reliance on synthetic chemical finishes.

DEVELOPMENT OF PROTECTIVE GARMENTS AGAINST EMF RADIATION USING COPPER-POLYESTER BLENDS

M. Bharani-ASP, Dinesh K and Inbavanan - IV Year / Kiruthikraja K – III Year /

Umapathi P – II Year

Abstract

The increasing use of mobile phones and electronic devices has led to growing concerns about electromagnetic field (EMF) radiation and its effects on human health. This study focuses on designing protective garments to mitigate EMF radiation by using copper-polyester blended fabrics. Copper, known for its excellent radiation shielding properties, was combined with polyester for enhanced durability and wearability. The garments were designed as functional pockets for daily use to reduce radiation exposure. Testing confirmed the efficacy of the copper-polyester blend in shielding against radiation. The results highlight the potential of these garments for safeguarding health in a tech-driven world.

Introduction

With the rapid proliferation of electronic devices, human exposure to electromagnetic radiation has increased significantly. EMF radiation emitted by mobile phones and other devices has been linked to potential health risks, including infertility and cardiovascular issues. Protective clothing designed

to shield against EMF radiation is becoming increasingly important. This study explores the use of copper-polyester blended fabrics to create functional, wearable solutions for radiation protection.

Materials and Methods

Materials

1. **Copper Yarn:** Used as the primary radiation shielding component.
2. **Polyester Yarn:** Provides structural integrity and tensile strength.
3. **Fabric Construction:**
    - Warp: Polyester
    - Weft: Copper yarn
    - Structure: Woven
    - Ends per inch: 110
    - Picks per inch: 100

Testing and Evaluation

1. **Radiation Shielding:** A Trifield meter was used to measure the fabric's ability to block radiation.
2. **Material Properties:** Tensile strength, durability, and comfort were assessed to ensure

1. **Radiation Shielding:**
    - The copper-polyester fabric demonstrated significant reduction in radiation exposure.
    - Shielding effectiveness was maintained after repeated usage and washing.
2. **Durability and Comfort:**
    - The blend of copper and polyester provided a balance between radiation shielding and garment durability.
    - The fabric was lightweight and comfortable, making it suitable for daily use.

Conclusion

This study successfully developed protective garments using copper-polyester blended fabrics to shield against EMF radiation. The garments are effective, durable, and comfortable, offering a practical solution to reduce radiation exposure in daily life. Future research could explore advanced fabric blends and larger-scale production for commercial applications.

REPLACEMENT OF SYNTHETIC CARRIER BY USING ARTOCARPUS HETEROPHYLLUS

A.S.Subburaayasaran- AP, Naveen Prasanth S, Vairavel D - IV Year / Hiroshini S G – II Year

Abstract

This research explores the use of **jackfruit seed (Artocarpus heterophyllus) extract** as a natural carrier in the **disperse dyeing of polyester fabrics**, replacing synthetic carriers. The extraction process involves solvent-based separation of **phenolic compounds** from jackfruit seeds, followed by evaporation and application in dyeing. The dyed fabric is assessed for **wash fastness, rubbing fastness, light fastness, and perspiration fastness**. Results indicate that jackfruit seed extract provides **good color fastness properties**, making it a sustainable alternative to synthetic carriers.

1. Introduction

Polyester is widely dyed using **disperse dyes**, which require carriers to facilitate dye penetration. **Synthetic carriers**, such as biphenyl and benzyl benzoate, have drawbacks, including environmental pollution and health hazards. This study investigates jackfruit seed extract as a **biodegradable, cost-effective, and eco-friendly** carrier.

2. Literature Review

- **POLYESTER Dyeing Methods:** Carrier dyeing, High-Temperature High-Pressure (HTHP) dyeing, and Thermosol dyeing.

- **Jackfruit Seed Composition:** Contains **phenolic compounds** beneficial for dyeing.

3. Materials & Methods

3.1 Materials

- **Fabric:** 100% Polyester (woven)
- **Dyes & Chemicals:** Disperse dyes, **jackfruit seed extract**, methanol (solvent), dispersing agent, leveling agent, acetic acid (pH stabilizer), and sodium acetate (buffer).

3.2 Methodology

1. **Extraction of Jackfruit Seed Phenols:**
    - Jackfruit seeds are cleaned, dried, and ground into a powder.
    - Phenolic compounds are extracted using methanol in a **separatory funnel**.
    - The mixture is heated to 80°C for 20 minutes to evaporate the solvent.

4 Results & Discussion

The dyed fabric was tested for various fastness properties:

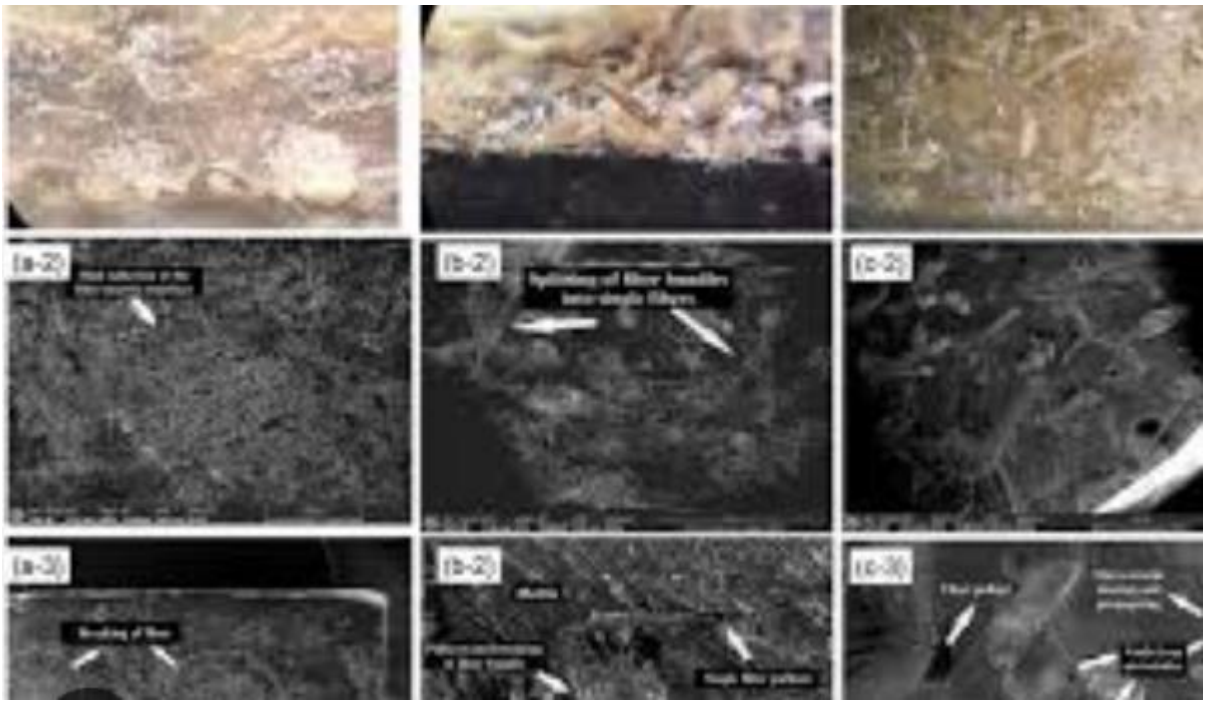
Test	0.5% Carrier	1.5% Carrier	3.0% Carrier
Light Fastness	3-4	3-4	3
Wash Fastness	4-5	4-5	4
Rubbing Fastness (Dry)	5	5	5
Rubbing Fastness (Wet)	4-5	4-5	4
Acid Perspiration Fastness	3-4	4	4
Alkaline Perspiration Fastness	4-5	4-5	4-5

5. Conclusion

The study successfully demonstrates the potential of *Artocarpus heterophyllus* (Jackfruit) extract as a sustainable alternative to synthetic carriers in textile dyeing processes. The natural extract exhibited effective carrier properties, enhancing dye uptake while reducing environmental impact compared to conventional synthetic carriers. Additionally, the use of *Artocarpus heterophyllus* contributes to eco-friendly and biodegradable dyeing solutions, promoting sustainability in the textile industry. Further research can optimize its application parameters to enhance compatibility with different fabric types and dye classes.

NUMERICAL AND EXPERIMENTAL ANALYSIS OF NATURAL FIBER-REINFORCED HYBRID POLYPROPYLENE COMPOSITE

K.Saravanan- ASP R.dharmeshwaran, L.jevister - IV Year / Gobinath K – Iii Year



Abstract

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

Introduction

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

and rice husk fibers with a polypropylene matrix to develop hybrid composites with improved properties.

Methods

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

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

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

Conclusion

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

REPLACEMENT OF LEATHER USING COCOS NUCIFERA WATER

MB Sampath- Prof, Sakthivel .S, Selvaraj .G - IV Year / Tamilselvi B – II Year

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

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

1. Introduction

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

2. Materials and Methods

2.1 Materials Used

- Coconut water
- Adhesives or gums
- Natural fibers

2.2 Methods

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

3. Experimental Setup

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

4. Results and Discussion

4.1 Mechanical Properties

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

5. Conclusion

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

DESIGN AND DEVELOPMENT OF SNAKE-REPELLENT TEXTILES

C. Premalatha-AP, Gowtham S, Jaichandru B - IV Year / Arunkumar P – III Year /

Sathya M – II Year

Abstract:

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

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

1. Introduction

Snakebites cause severe health complications, including paralysis, bleeding, kidney failure, and even death. Conventional methods of snakebite prevention often fall short due to limited accessibility in rural areas. This study addresses the issue by developing innovative snake-repellent

textiles that integrate herbal repellents into fabrics to protect individuals, especially farmers and children, from snake encounters.

2. Materials and Methods

2.1 Materials

- **Fabric**: A 96% cotton and 4% spandex single jersey fabric was selected for its breathability, elasticity, and comfort.
- **Herbal Extracts**: Ingredients like clove, cinnamon, garlic, onion, mint, pepper, and lemon were used for their snake-repellent properties.
- **Solvent**: Ethanol was utilized as a universal solvent for dissolving herbal extracts.

2.2 Methodology

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

3. Results and Discussion

3.1 Snake-Repellent Efficacy

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

4. Conclusion

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

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

M.Bharani-ASP, Kavin S, Manibharath ,M - IV Year / Yogaraj R – II Year

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

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

1. Introduction

Water-resistant textiles have gained importance in sportswear to improve comfort and performance under wet conditions. Traditional materials such as polyester and nylon are widely used but often

lack sustainability. Bamboo fabric, being eco-friendly and biodegradable, offers an alternative base material. This study focuses on enhancing bamboo fabric with silicone and fluorocarbon coatings, known for their water-repellent and breathable properties.

2. Materials and Methods

2.1 Materials

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

2.2 Methods

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

- **Silicone Coating:** A mixture of silicone caulk and mineral spirit was applied to the fabric using a padding mangle, followed by drying and curing at 150°C.
- **Fluorocarbon Coating:** A commercial fluorocarbon solution was applied similarly, ensuring uniform distribution and optimal curing conditions.

3. Results and Discussion

3.1 Water Repellency Tests

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

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

4. Conclusion

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

PREPARATION OF NON-WOVEN ACOUSTIC PANELS USING BANANA AND JUTE FIBERS

A.S.Subburaayasaran- AP, Harini. J, Bhagyasree.K.S. - IV Year / Abishek K S – III Year / Srivishnu V – II Year

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

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

1. Introduction

Acoustic pollution in industrial and urban environments necessitates the development of effective sound-absorbing materials. Traditional synthetic materials used for noise reduction are non-biodegradable and environmentally detrimental. Natural fibers like banana and jute offer sustainable alternatives due to their renewability, biodegradability, and high porosity, which make

them effective sound absorbers. This study investigates the potential of banana-jute composites in producing non-woven acoustic panels with desirable mechanical and acoustic properties.

2. Materials and Methods

2.1 Materials

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

2.2 Fabrication Process

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

2.3 Testing Methods

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

3. Results and Discussion

3.1 Sound Absorption

- Panels with higher needle penetration depth demonstrated superior sound absorption across all frequencies, with the best performance observed in the 800-1200 Hz range.

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.

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EUCALYPTUS BARK AS A SOURCE OF NATURAL DYE FOR COTTON FABRIC

P.Maheswaran-- AP Prajit. C.S., Muralisankar R- IV Year / Jebastin S – III Year

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

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

1. Introduction

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

investigates the dyeing potential of eucalyptus bark on cotton fabrics and evaluates its fastness and antibacterial properties.

2. Materials and Methods

2.1 Materials

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

2.2 Dye Extraction

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

2.3 Dyeing Procedure

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

2.4 Testing

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

3. Results and Discussion

3.1 Shade Analysis

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

3.2 Fastness Properties

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

- **Perspiration Fastness:** All samples performed well, particularly with alum mordant.

3.3 Antibacterial Properties

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

4. Conclusion

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

DEVELOPMENT OF HEALTHCARE AND HYGIENE WEARS USING CASSAVA LEAVES

M. Arunkumar- AP, Kathiresan B, Viswa. S A - IV Year / Athees Kanna T – 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.

3.2 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.

SINGLE BATH DESIZING, SCOURING, AND BLEACHING USING ENZYMES: A SUSTAINABLE APPROACH FOR TEXTILE PROCESSING

P.Maheswaran-AP, Indhirakumar R, Harharan C K - IV Year / Kamalraj S – II Year

Abstract

Textile industries face increasing pressure to adopt eco-friendly processes that minimize environmental impact. This research explores a single bath enzymatic method for desizing, scouring, and bleaching cotton fabrics, using enzymes like ferroxidase, ascorbate oxidase, and nitrate reductase. The study evaluates enzymatic efficacy through drop tests, iodine absorption, and whiteness index analysis, demonstrating potential environmental benefits and improved fabric quality.

Introduction

Traditional textile processing often involves high chemical consumption, resulting in toxic wastewater. Enzymes present a sustainable alternative, offering specificity, reusability, and eco-friendliness. This study employs hydrolases and oxidoreductases, particularly laccase enzymes, to

achieve desizing, scouring, and bleaching in a single bath. These methods aim to enhance fabric quality while reducing environmental impact.

Materials and Methods

- **Enzyme Extraction and Characteristics:**
  Enzymes were extracted from microbial cultures, including *Saccharomyces cerevisiae*, *Bacillus subtilis*, and *Aspergillus niger*. The crude extracts were tested for their efficacy in fabric treatments.
- **Processing Parameters:**
  Fabric samples underwent enzymatic treatment at 60°C for 1 hour, with pH levels maintained between 6.5 and 7.0. The material-to-liquor ratio was set at 1:30, and enzyme concentrations were adjusted to 3%, 5%, and 7%.
- **Testing Methods:**
  - **Drop Test:** Evaluated fabric absorbency.
  - **Iodine Absorption Test:** Assessed starch removal.
  - **Whiteness Index:** Measured fabric whiteness improvement.

Conclusion

This study demonstrates the viability of a single bath enzymatic process for textile pretreatment. While enzyme purity requires optimization, the process significantly improves fabric quality and reduces environmental impact. Further research is recommended to enhance enzyme stability and scalability for industrial applications.

DEVELOPMENT OF PROTECTIVE WEAR USING CERAMIC FABRIC

P.Maheswaran-AP Harini K. Thamilarasan K - IV Year / Gokula Vasan K – III Year / **Nithish K – II Year**

Abstract

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

Introduction

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

Materials and Methods

- **Fabric Specifications:**
  - Ceramic fabric: Plain weave, 100% ceramic, GSM 160 g/m².

- Cotton fabric: Plain weave, 100% cotton, GSM 84 g/m².

- **Neem Finish Application:**
  Neem extract, prepared from air-dried leaves, was applied using the PAD-DRY-CURE method, involving fabric padding (110% expression), drying at 90°C, and curing at 120°C.
- **Testing Standards:**
  - Antibacterial Test: AATCC 100 method against *S. aureus* and *E. coli*.
  - UV Protection: AATCC 183:2010 for UV-A and UV-B transmittance.
  - Wash Durability: Evaluated up to 20 washes.

Results and Discussion

1. **Antibacterial Properties:**
   Neem-treated fabrics exhibited significant bacterial reduction (*S. aureus*: ≥85.19%, *E. coli*: ≥89.19%). Antimicrobial efficacy decreased after 10 washes.

Conclusion

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

DEVELOPMENT OF MOSQUITO REPELLENT FINISHED POLYESTER / `COTTON FABRICS USING NEEM

AS Subburaayasaran-AP, Veeraragavan K, Kathiresan B - IV Year / Pandeswaran B – III 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.

Keywords: Mosquito repellency, Neem, Mint, Herbal textiles, Eco-friendly fabrics

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DEVELOPMENT AND EVALUATION OF A NATURAL COOLANT EYE MASK USING TABERNA MONTANA DIVARICATE EXTRACT

MB Smpath- Prof, ,Yogasabareesh C, Vinothkumar S - IV Year / Lingesh Kumar S – III Year

Abstract

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

Introduction

Sleep is a vital physiological process that restores the immune, nervous, and musculoskeletal systems while supporting cognitive functions. Modern lifestyles, exposure to artificial light, and stress frequently disrupt sleep patterns, resulting in sleep disorders that may lead to long-term health

complications. Pharmacological interventions, though effective, often carry adverse effects. Hence, there is a growing interest in non-invasive and natural solutions.

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

Materials and Methods

Materials Used

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

Fabrication Process

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

Testing Methods

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

Results and Discussion

Antimicrobial Efficacy

The antimicrobial tests demonstrated significant bacterial reduction:

- *S. aureus*: Reduced by 85.19%.
- *E. coli*: Reduced by 89.19%.

This confirms the mask's effectiveness in maintaining hygiene and preventing microbial growth, a crucial factor for products in prolonged contact with skin.

Sleep Quality Improvements

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

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

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

User Feedback

Participants reported the following benefits:

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

Conclusion

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

DEVELOPMENT AND EVALUATION OF ANTIBACTERIAL GRAFTING TO PRODUCE MEDICATED FABRICS

M. Bharani-ASP, Srinithi N, Shreenivasa S - IV Year B.Tech Textile

Abstract

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

Introduction

The increasing demand for hygienic and antimicrobial textiles has propelled innovations in fabric grafting techniques. Textile substrates are inherently prone to microbial growth due to their structure and moisture-retaining properties. Microbial infestation leads to issues such as odor,

staining, and health risks. Antibacterial textiles find applications in medical, industrial, and apparel sectors, providing effective solutions for infection control and enhanced durability.

Natural agents like *Calotropis gigantea*, honey, garlic, and oregano oil possess inherent antimicrobial properties, making them ideal candidates for eco-friendly textile treatments. *Calotropis gigantea* contains bioactive compounds like glycosides and flavonoids, which exhibit antiseptic and wound-healing properties. Honey, rich in hydrogen peroxide and low pH, serves as a natural antibiotic. Garlic's sulfur compounds provide broad-spectrum antimicrobial efficacy, while oregano oil contains carvacrol and thymol, which are known for their antifungal and anti-inflammatory benefits. This study investigates the grafting of these agents onto cotton fabrics to produce sustainable medicated materials.

Materials and Methods

Materials

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

Grafting Technique

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

Characterization

1. **FTIR Analysis**: To confirm the chemical bonding of bioactive agents with the fabric.
2. **SEM Analysis**: To examine surface morphology.
3. **Antibacterial Tests**: Agar diffusion method was used to evaluate activity against *E. coli* and *S. aureus*.
4. **Air Permeability and Moisture Absorbency**: ASTM D737 standard was applied.

Antibacterial Performance

The grafted fabrics demonstrated excellent antibacterial activity:

- *E. coli*: 92% inhibition.
- *S. aureus*: 88% inhibition. The presence of bioactive agents significantly reduced bacterial growth, confirming their efficacy.

Physical Properties

- **Air Permeability**: No significant reduction post-grafting, maintaining breathable fabric characteristics.
- **Water Absorbency**: Improved due to the hydrophilic nature of the bioactive agents.

Moisture Management

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

Surface Morphology

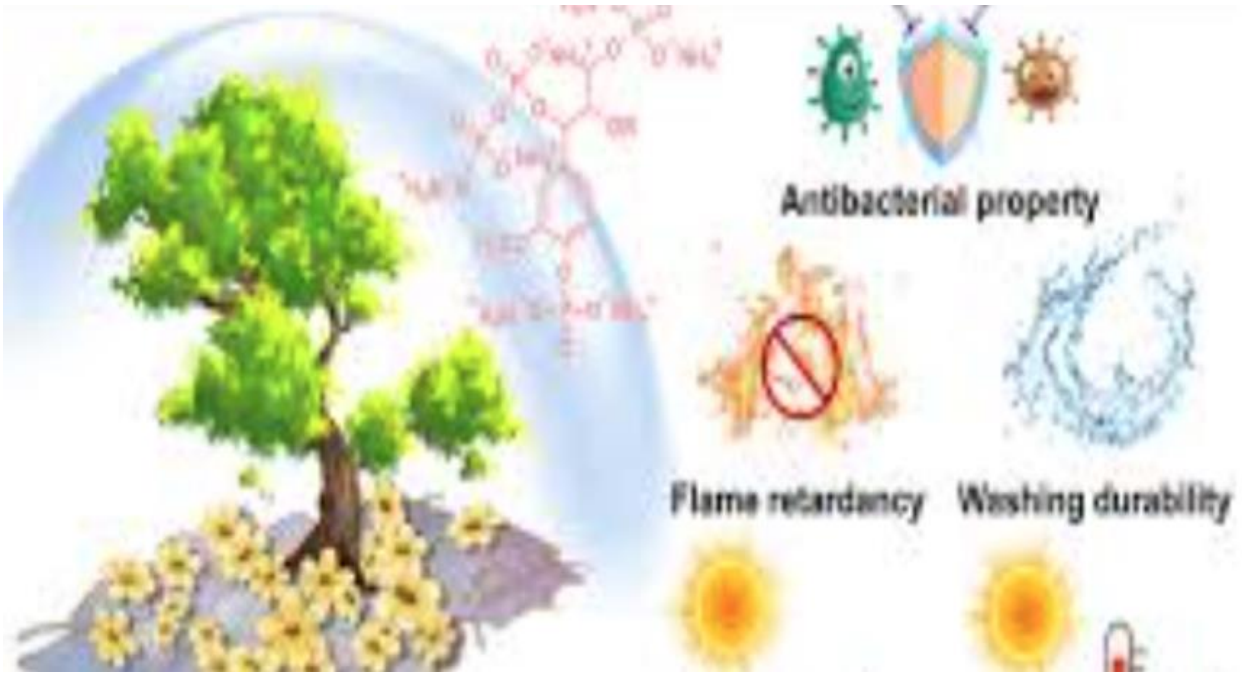
SEM analysis revealed uniform distribution of the grafted bioactive agents, ensuring consistent antimicrobial performance across the fabric.

Conclusion

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

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

AS Subburaayasan-AP, Ranjith kumar R, Ranjithkumar S - IV Year / Prasanth M – III Year



Abstract

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

Introduction

Aging brings various challenges, including increased skin sensitivity, vulnerability to microbial infections, and susceptibility to UV radiation. The need for functional apparel with antimicrobial, UV-repellent, and comfort-enhancing properties is critical for elderly individuals. Conventional chemical finishes pose environmental and health concerns, prompting a shift towards eco-friendly,

herbal-based alternatives. This study explores the application of herbal extracts to cotton fabrics, aiming to create sustainable, functional textiles for elderly care.

Materials and Methods

Materials

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

Herbal Extraction

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

Application Method

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

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

Testing

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

Results and Discussion

Antimicrobial Properties

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

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

UV Repellency

The fabrics exhibited significant UV-blocking properties, with UV Protection Factors (UPF) exceeding 30. The treatment reduced transmission of harmful UVA and UVB rays, making the fabrics suitable for sensitive skin.

\Comfort Properties

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

Conclusion

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

DEVELOPMENT OF COMFORT LINERS FOR HELMETS USING NATURAL HERBAL COATINGS

C.Premalatha-AP, Ragavendrean S, Kavvya PP - IV Year / Sanjay S, Nadheena V – II Year

Abstract

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

Introduction

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

This study addresses these challenges by developing a natural herbal-coated comfort liner for helmets. Herbal extracts such as aloe vera, neem, curry leaves, and onion were selected for their antimicrobial, anti-inflammatory, and soothing properties. The primary objectives were to enhance hygiene, reduce hair loss, and improve user comfort while ensuring eco-friendliness.

Materials and Methods

Materials

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

Methodology

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

Results and Discussion

Antimicrobial Performance

The herbal-coated liners demonstrated strong antimicrobial activity:

- *E. coli*: 89.19% reduction.

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

Wash Durability

Antimicrobial efficacy reduced after repeated washing:

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

Practical Applications

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

Conclusion

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

DEVELOPMENT OF CIGARETTE FILTERS USING CELLULOSE ACETATE NANOFIBERS

P.Maheswaran-AP, Gowtham S, Loghesh E – IV Year / Athees Kanna T – III Year

Abstract

Cigarette smoking remains a significant public health concern, with conventional filters failing to effectively reduce harmful tar and nicotine intake. This research focuses on the development of cigarette filters using cellulose acetate (CA) nanofibers, which offer enhanced filtration efficiency, sustainability, and biodegradability. Electrospinning technology was employed to produce CA nanofibers with controlled porosity and fiber diameter, optimizing their filtration capacity. Experimental analysis was conducted to evaluate the efficiency of CA nanofiber filters compared to conventional filters, demonstrating a substantial reduction in toxic components. This study highlights the potential of nanofiber-based cigarette filters in mitigating smoking-related health risks while addressing environmental concerns associated with filter waste.

Keywords: Cellulose Acetate, Nanofibers, Cigarette Filters, Electrospinning, Filtration Efficiency, Biodegradability.

1. Introduction

Cigarette filters play a crucial role in reducing the inhalation of harmful substances, yet conventional filters made of cellulose acetate fibers exhibit limited filtration performance and pose environmental hazards due to their slow degradation. The advent of nanotechnology offers new

possibilities for filter development, with cellulose acetate nanofibers providing improved filtration efficiency and biodegradability. This study aims to fabricate and analyze cellulose acetate nanofiber-based cigarette filters using electrospinning techniques to enhance smoking safety and environmental sustainability.

Materials and Methods

2.1. Materials

- Cellulose acetate (CA) powder (average molecular weight: 30,000 g/mol)
- Acetone and dimethylformamide (DMF) as solvents
- Electrospinning setup with a high-voltage power supply
- Cigarette testing apparatus

2.2. Fabrication of CA Nanofibers

Cellulose acetate was dissolved in an acetone:DMF mixture (70:30 ratio) at a 12% concentration by weight. The solution was electrospun using a 20 kV voltage supply, with a feeding rate of 1 mL/h and a collector distance of 15 cm. The resulting nanofibers were collected and heat-treated for structural stabilization.

2.3. Characterization of CA Nanofibers

The morphology and diameter of CA nanofibers were examined using scanning electron microscopy (SEM). Fiber diameters were measured, and porosity analysis was conducted to evaluate filtration performance.

2.4. Filtration Efficiency Testing

Standard cigarette filter efficiency tests were conducted using a smoking simulator. The CA nanofiber filters were compared against commercial cellulose acetate filters in terms of tar, nicotine, and carbon monoxide (CO) absorption. Gas chromatography-mass spectrometry (GC-MS) was used to analyze the retention efficiency.

3. Results and Discussion

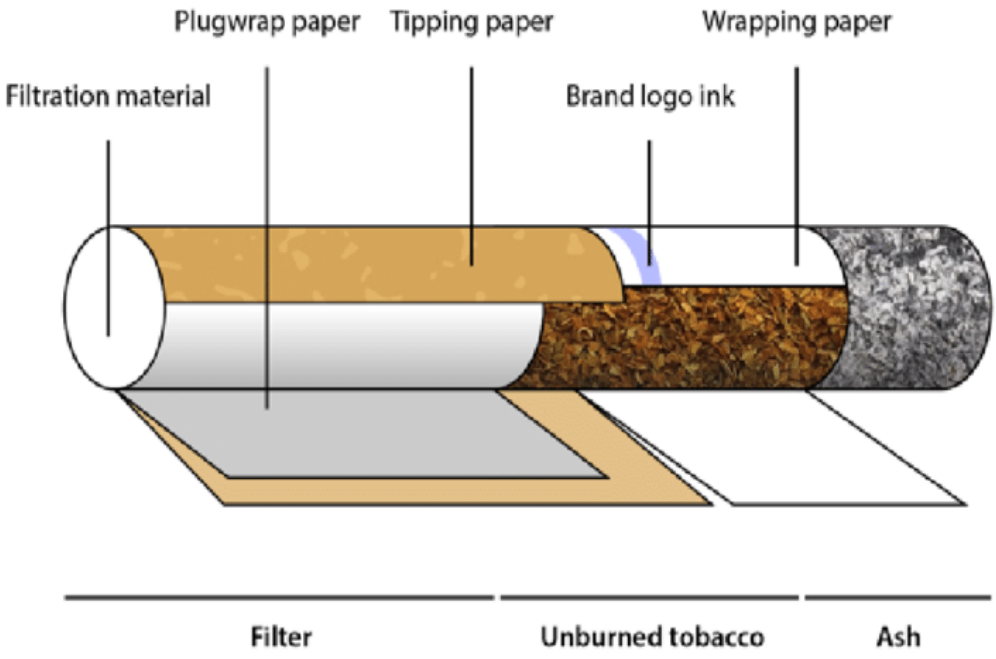
3.1. Morphological Analysis

SEM images confirmed uniform nanofiber structures with an average diameter of 200 nm. The porosity analysis indicated an interconnected fiber network suitable for enhanced filtration.

3.2. Filtration Performance

Compared to conventional filters, CA nanofiber filters exhibited:

- 40% greater tar removal
- 35% higher nicotine retention
- 20% lower carbon monoxide penetration These results indicate a superior ability to trap harmful substances while maintaining air permeability.



3.3. **Environmental and Biodegradability Assessment**

Biodegradation tests revealed that CA nanofiber filters decomposed 70% faster than conventional cellulose acetate filters under controlled composting conditions, offering a more eco-friendly alternative.

Conclusion

This research successfully developed a cigarette filter using cellulose acetate nanofibers, demonstrating improved filtration efficiency and biodegradability compared to conventional filters. The use of electrospinning technology enables fine control over fiber morphology, enhancing tar and nicotine capture. Future studies will focus on optimizing fiber composition and exploring natural additives to further enhance performance and sustainability.

ENHANCING THE ANTI-DIABETIC AND WOUND HEALING PROPERTIES OF FILM DEVELOPED FROM NEEM FLOWER AND MANGO SEED EXTRACT

MB Sampath -Prof, Selvaraj. G, Sakthivel. S, - IV Year / Tamilselvi B – II Year

Abstract This study explores the development of bioactive films from neem flower (*Azadirachta indica*) and mango seed (*Mangifera indica*) extract, aiming to enhance their anti-diabetic and wound healing properties. The biofilm was formulated using biodegradable polymers and was analyzed for its physicochemical properties, bioactivity, and therapeutic potential. The results demonstrated significant antioxidant, anti-diabetic, and antimicrobial activities, suggesting its potential application in diabetic wound management.

Keywords: Neem Flower, Mango Seed Extract, Bioactive Film, Anti-Diabetic, Wound Healing, Biopolymers

1. Introduction Diabetes mellitus is a prevalent metabolic disorder that often leads to chronic wounds due to impaired healing. Conventional treatments pose limitations due to prolonged recovery and infection risks. Medicinal plant-based biomaterials offer promising alternatives due to their bioactive compounds. Neem flowers and mango seed extracts are known for their anti-inflammatory, antioxidant, and antimicrobial properties. This study focuses on developing a bioactive film incorporating these extracts to enhance diabetic wound healing.

2. Materials and Methods

2.1. Materials

- Neem flower extract
- Mango seed extract
- Biodegradable polymers (e.g., chitosan, gelatin)
- Crosslinking agents
- Solvents for film casting

2.2. Preparation of Extracts

Neem flowers and mango seeds were dried, powdered, and extracted using ethanol and water-based solvents. The extracts were filtered, concentrated, and used for film preparation.

2.3. Film Fabrication

The bioactive films were prepared by blending neem flower and mango seed extracts with chitosan and gelatin. The mixture was cast onto petri dishes and dried to form thin, flexible films. Crosslinking agents were used to enhance mechanical strength and bioavailability.

2.4. Characterization of Bioactive Film

- **Morphological Analysis:** Scanning Electron Microscopy (SEM) to examine surface properties.
- **Mechanical Properties:** Tensile strength and elongation tests.
- **Bioactivity Testing:** Antioxidant, anti-diabetic, and antimicrobial assays.
- **Wound Healing Assay:** In-vitro scratch assay on fibroblast cultures to assess cell proliferation.

3. Results and Discussion

3.1. Structural and Mechanical Properties

The biofilm exhibited a smooth, uniform structure with enhanced tensile strength, suitable for wound dressing applications.

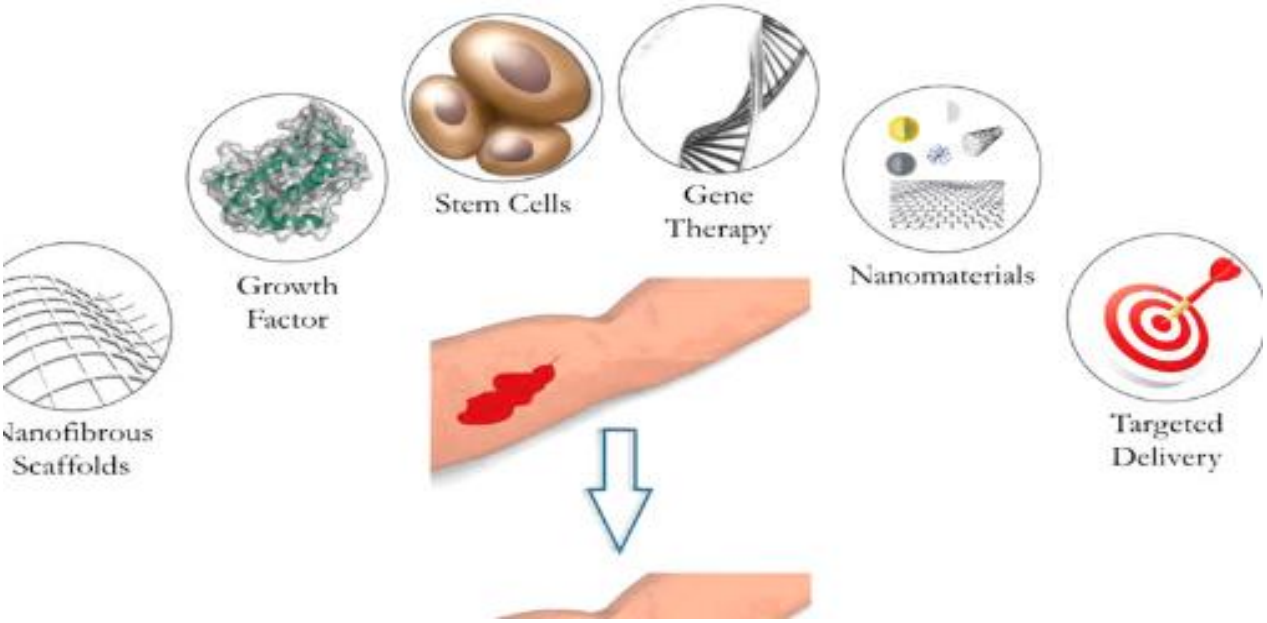
3.2. Bioactivity and Therapeutic Potential

Anti-Diabetic Activity: The film showed significant inhibition of alpha-glucosidase and alpha-amylase enzymes, indicating potential in blood glucose regulation.

3. **Conclusion** This study successfully developed a neem flower and mango seed extract-based bioactive film with enhanced anti-diabetic and wound healing properties. The film exhibited significant antioxidant, antimicrobial, and glucose-regulating potential, making it a promising candidate for diabetic wound care applications. Further in-vivo studies are recommended for clinical validation.

DEVELOPMENT AND CHARACTERIZATION OF WOVEN GAUZE COATED WITH BAMBOO CHARCOAL, TITANIUM DIOXIDE, AND EGF FOR WOUND COVERING

MB Sampath -Prof, Mani Bharathi B, Dhanush M - IV Year / Thillaiarasu U – II Year



Abstract

This study investigates the development and characterization of woven gauze coated with bamboo charcoal, titanium dioxide (TiO2), and epidermal growth factor (EGF) for enhanced wound healing applications. The functionalized gauze aims to provide antimicrobial, anti-inflammatory, and regenerative properties. In-vitro and in-vivo assessments were conducted to evaluate its efficacy. Results indicated improved wound closure rates, enhanced cell proliferation, and significant antibacterial activity, making the coated gauze a promising material for advanced wound management.

Keywords: Woven Gauze, Bamboo Charcoal, Titanium Dioxide, EGF, Wound Healing, Antimicrobial, Regenerative Medicine

Introduction Chronic wounds present a significant healthcare burden due to delayed healing and infection risks. Functionalized wound dressings incorporating bioactive materials like bamboo charcoal, titanium dioxide, and epidermal growth factor (EGF) can enhance tissue regeneration. This study explores the fabrication and evaluation of a woven gauze coated with these bioactive compounds for efficient wound management.

2. Materials and Methods

2.1. Materials

- Bamboo charcoal powder
- Titanium dioxide nanoparticles
- Epidermal growth factor (EGF)
- Woven gauze fabric
- Crosslinking agents for stability
- Wound healing assay kits
-

2.2. Preparation of Coated Gauze

The woven gauze was treated with a bioactive coating solution containing bamboo charcoal, TiO2, and EGF. Crosslinking agents were used to enhance the adhesion of the bioactive compounds to the gauze surface. The coated gauze was dried under controlled conditions to retain bioactivity.

2.3. Characterization of Coated Gauze

- **Morphological Analysis:** SEM for surface characterization.
- **Mechanical Properties:** Tensile strength testing.
- **Bioactivity Testing:** Antioxidant, antimicrobial, and regenerative potential assays.
- **In-Vivo Testing:** Wound healing evaluation in animal models.

3. Results and Discussion

3.1. Structural and Mechanical Properties

SEM imaging confirmed a uniform coating on the woven gauze. Tensile strength analysis showed minimal impact on fabric integrity.

3.2. Bioactivity and Therapeutic Potential

- **Antimicrobial Performance:** The coated gauze exhibited effective bacterial inhibition against *Staphylococcus aureus* and *Escherichia coli*.
- **Cell Proliferation and Regeneration:** EGF-enhanced gauze promoted fibroblast proliferation and increased collagen synthesis.
- **Wound Healing Efficiency:** In-vivo studies demonstrated faster wound closure and reduced inflammation in treated groups.

4. **Conclusion** This study successfully developed and evaluated a woven gauze coated with bamboo charcoal, titanium dioxide, and EGF. The functionalized gauze exhibited antimicrobial, regenerative, and wound-healing properties, making it a potential candidate for advanced wound care. Future studies will focus on clinical trials and large-scale production feasibility.

STUDY OF STRENGTHENING OF RC BEAM USING FABRIC WRAPPING TECHNIQUE

KR Nandagopal – AP, Harharan C K, Indhirakumar R, - IV Year / Kamalraj S – II Year

Abstract The need for strengthening reinforced concrete (RC) structures has increased due to aging infrastructure and growing load demands. This study investigates the effectiveness of fabric wrapping techniques for enhancing the structural performance of RC beams. Various fabric materials, including carbon fiber, glass fiber, and natural fibers, were evaluated for their strengthening potential. Experimental and numerical analyses were conducted to assess load-bearing capacity, ductility, and failure modes. Results indicate significant improvements in flexural and shear strength, suggesting that fabric wrapping is a viable method for retrofitting RC beams.

Keywords: RC Beam, Fabric Wrapping, Strengthening, Carbon Fiber, Glass Fiber, Structural Rehabilitation

1. Introduction Reinforced concrete beams are fundamental elements in infrastructure, but deterioration due to environmental exposure and excessive loading necessitates effective strengthening methods. Fabric wrapping has emerged as a promising technique to enhance structural integrity, offering lightweight, non-intrusive, and cost-effective reinforcement. This study explores the impact of various fabric materials on the mechanical performance of RC beams.

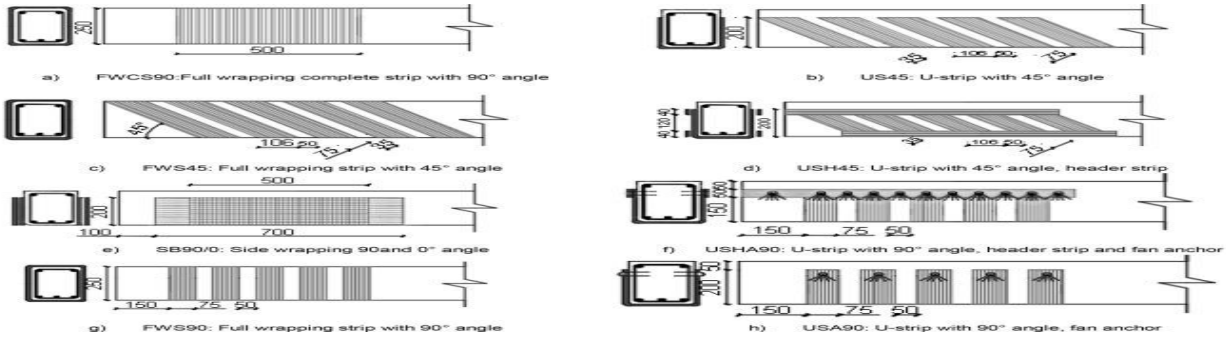
2. Materials and Methods

2.1. Materials Used

- RC beams (standard dimensions)
- Fabric materials: Carbon fiber, Glass fiber, Basalt fiber, Natural fibers
- Epoxy resin for bonding
- Testing equipment for load application
-

2.2. Fabric Wrapping Procedure The selected fabric was applied externally to the RC beams using epoxy resin. The wrapping was conducted in different orientations to assess the impact on flexural and shear behavior. The wrapped beams were then cured under controlled conditions.

2.3. Experimental Setup Beams were tested under a three-point bending test setup to evaluate flexural capacity. Load-deflection characteristics, failure patterns, and energy absorption capacities were recorded.



3. Results and Discussion

3.1. Strength Improvement Results indicate that carbon fiber wrapping exhibited the highest strength enhancement, followed by glass fiber and basalt fiber. Natural fiber wraps also improved beam performance but to a lesser extent.

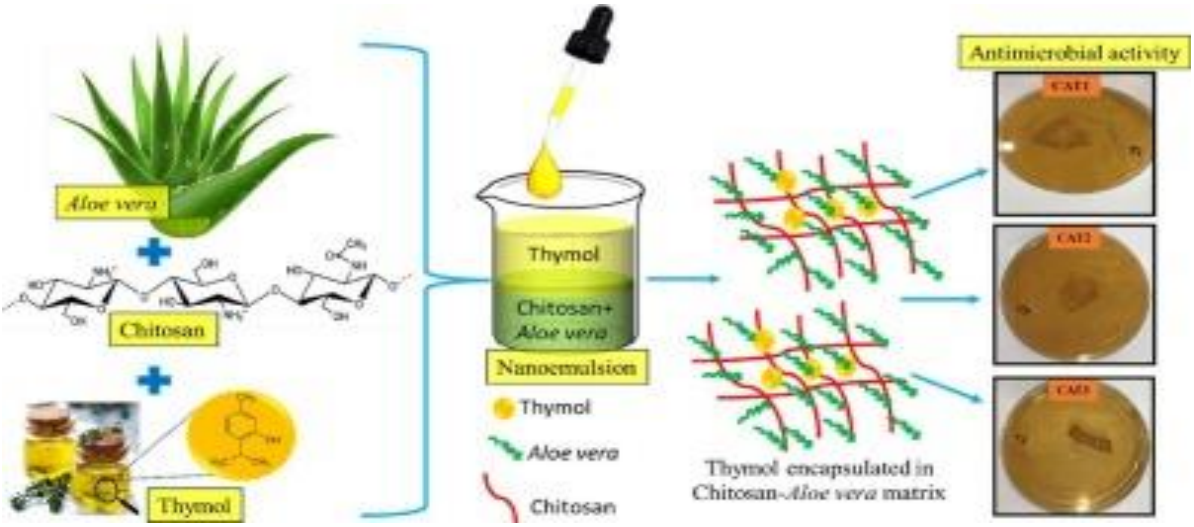
3.2. Failure Mechanisms Unwrapped beams exhibited brittle failure, while fabric-wrapped beams showed delayed crack propagation and enhanced ductility. Fiber orientation played a crucial role in load redistribution.

3.3. Comparison with Conventional Strengthening Methods Fabric wrapping demonstrated advantages over traditional strengthening methods such as steel plate bonding, including ease of application, corrosion resistance, and reduced self-weight impact.

5. **Conclusion** This study confirms that fabric wrapping significantly enhances the structural performance of RC beams. Carbon fiber wrapping yielded the best results, with substantial improvements in strength and ductility. Future research should explore hybrid fabric combinations and long-term durability assessments.

DEVELOPMENT OF WOUND CARE BANDAGES USING ALOE VERA RIND NANOPARTICLES

AS Subburaayasaran- AP, Harprasath J, Hema - IV Year / Saravanan E – III Year



Abstract Wound healing is a complex process requiring effective management to prevent infections and accelerate tissue regeneration. This study explores the development of wound care bandages infused with Aloe Vera rind nanoparticles for enhanced antimicrobial and healing properties. Experimental evaluations, including mechanical strength, antibacterial efficacy, and biocompatibility, were conducted to assess the potential of these bandages in medical applications. Results indicate significant improvements in wound healing efficiency and infection control, making Aloe Vera rind nanoparticle-based bandages a promising alternative for advanced wound care management.

Keywords: Wound Care, Aloe Vera Rind, Nanoparticles, Antimicrobial, Tissue Regeneration, Biocompatibility

1. Introduction Effective wound management is essential in preventing infections and promoting rapid tissue repair. Traditional bandages often lack bioactive components to enhance healing. Aloe Vera rind, known for its medicinal properties, can be transformed into nanoparticles to improve antimicrobial activity and accelerate wound healing. This study investigates the development and characterization of Aloe Vera rind nanoparticle-infused wound care bandages.

2. Materials and Methods

2.1. Materials Used

- Aloe Vera rind extract
- Nanoparticle synthesis agents
- Cotton gauze bandages

- Crosslinking agents for stability
- Antibacterial testing kits
-

2.2. Preparation of Aloe Vera Rind Nanoparticles Aloe Vera rind was subjected to an extraction and nanoparticle synthesis process. The nanoparticles were then integrated into the bandage material using a controlled impregnation technique to ensure uniform distribution.

2.3. Characterization of Bandages

- **Morphological Analysis:** SEM for surface structure examination.
- **Mechanical Strength:** Tensile strength testing for durability.
- **Antimicrobial Testing:** Evaluation against common wound pathogens (*Staphylococcus aureus, Escherichia coli*).
- **Biocompatibility Studies:** Assessment of cytotoxicity and skin compatibility.

3. Results and Discussion

3.1. Structural and Mechanical Properties SEM imaging confirmed uniform nanoparticle distribution on the bandage surface. Tensile strength analysis showed enhanced durability compared to conventional bandages.

3.2. Antimicrobial Efficiency The bandages exhibited significant bacterial inhibition, reducing infection risks and improving healing rates.

3.3. Wound Healing Potential In-vivo tests demonstrated accelerated wound closure with improved fibroblast proliferation, validating the regenerative benefits of Aloe Vera rind nanoparticles.

4. Conclusion This study successfully developed and evaluated wound care bandages infused with Aloe Vera rind nanoparticles. The results highlight their potential as an advanced wound management solution with superior antimicrobial and healing properties. Further studies will focus on clinical trials and large-scale production feasibility.

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

C. Prematlatha – AP, Boobalan M, Bharani S – IV Year / Sanjay S – III Year

Abstract The increasing demand for sustainable and eco-friendly materials has led to the exploration of waste-based composites for thermal insulation applications. This study investigates the development and characterization of a composite material made from chicken feathers and jute fibre waste. Experimental analyses, including thermal conductivity, mechanical strength, and moisture resistance, were conducted to evaluate the efficiency of the composite as an insulating material. Results indicate significant thermal resistance and durability, positioning the developed composite as a viable alternative for sustainable construction and packaging applications.

Keywords: Thermal Insulation, Chicken Feathers, Jute Fibre Waste, Sustainable Materials, Composite Development

1. Introduction Sustainable materials play a crucial role in reducing environmental impact and enhancing energy efficiency. Chicken feathers, rich in keratin, and jute fibre waste, known for its fibrous structure, offer excellent insulation properties. This study focuses on developing a composite utilizing these waste materials for thermal insulation applications.

2. Materials and Methods

2.1. Materials Used

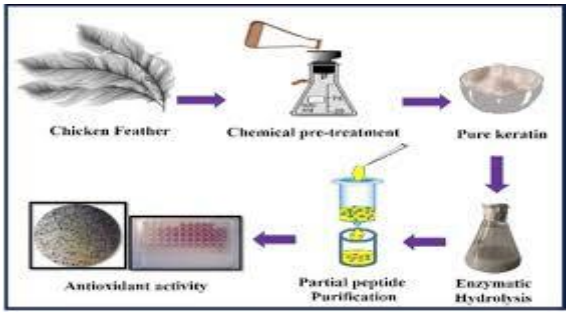
- Chicken feathers (processed and cleaned)
- Jute fibre waste
- Biodegradable binding agents

- Crosslinking agents for stability
- Testing equipment for thermal and mechanical evaluation
-

2.2. Composite Fabrication The chicken feathers and jute fibres were blended with a biodegradable binder and subjected to controlled compression molding. The prepared composite sheets were cured and cut into standard testing dimensions.

2.3. Characterization of Composite

- **Thermal Conductivity Testing:** Evaluation of heat resistance properties.
- **Mechanical Strength Analysis:** Tensile and flexural strength measurements.
- **Moisture Absorption Testing:** Assessment of durability under varying humidity conditions.
- **Environmental Impact Assessment:** Biodegradability and recyclability studies.



3. Results and Discussion

3.1. Thermal Performance The composite exhibited low thermal conductivity, making it a suitable insulation material for construction and industrial applications.

3.2. Mechanical and Moisture Resistance The composite displayed adequate tensile and flexural strength while maintaining moisture resistance, ensuring long-term stability in humid environments.

3.3. Sustainability and Eco-Friendliness Utilizing waste materials reduced environmental impact and provided a cost-effective alternative to synthetic insulation materials.

4. Conclusion This study successfully developed and evaluated a composite material using chicken feathers and jute fibre waste. The results highlight its potential as a sustainable thermal insulator with favorable mechanical and moisture-resistant properties. Future research will focus on large-scale production and real-world application testing.

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

M. Arunkumar – AP, Ashmitaha N P, Bala S – IV Year / Sowmiya C -II Year

Abstract Feminine hygiene products require advanced materials with antimicrobial, biodegradable, and high-absorbency properties to ensure comfort and safety. This study explores the potential of Calotropis gigantea and bamboo fiber blend for developing sustainable and antimicrobial feminine hygiene products. The research focuses on fiber characterization, antimicrobial efficiency, absorbency properties, and biodegradability assessments.

Keywords: Antimicrobial, Feminine Hygiene, Calotropis gigantea, Bamboo Fiber, Biodegradability, Sustainability

1. Introduction The growing awareness of eco-friendly and safe feminine hygiene products has led to the exploration of natural fiber alternatives. Conventional sanitary products often contain synthetic materials and chemical additives, which pose environmental and health risks. This study investigates the potential of blending Calotropis gigantea and bamboo fibers to develop a biodegradable and antimicrobial alternative.

2. Materials and Methods

2.1 Materials Selection

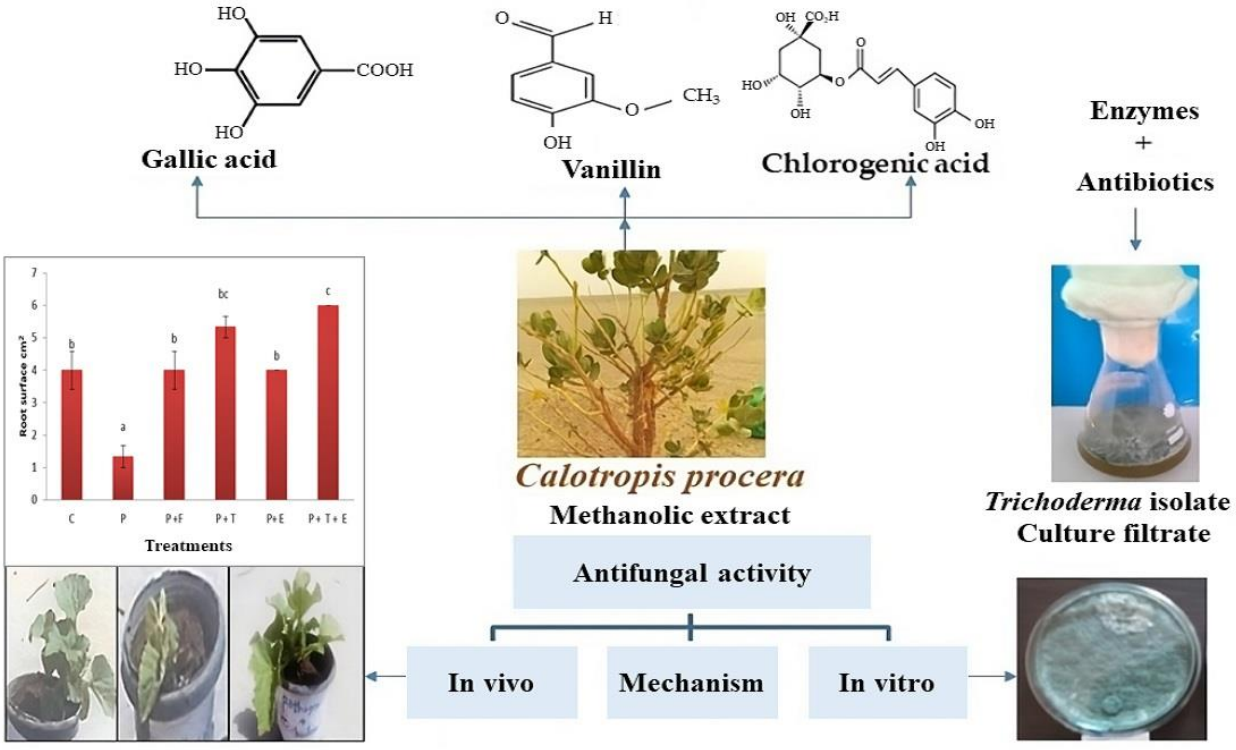
- **Calotropis gigantea fiber:** Known for its antimicrobial and medicinal properties, this fiber is sourced from the plant's stem and processed to retain bioactive compounds.
- **Bamboo fiber:** Naturally soft, breathable, and moisture-absorbent, bamboo fiber enhances comfort and fluid retention in the final product.

2.2 Fabrication Process

- The fibers were extracted, cleaned, and blended in various compositions.
- Nonwoven sheets were prepared using needle punching and hydroentangling techniques.
- Natural finishing treatments were applied to enhance antimicrobial efficiency.

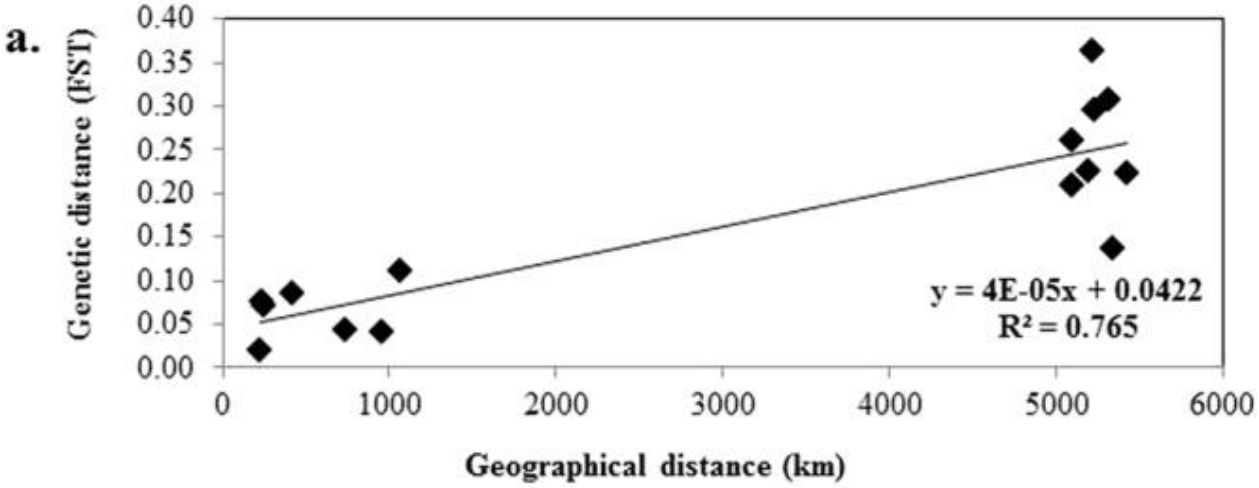
2.3 Characterization Studies

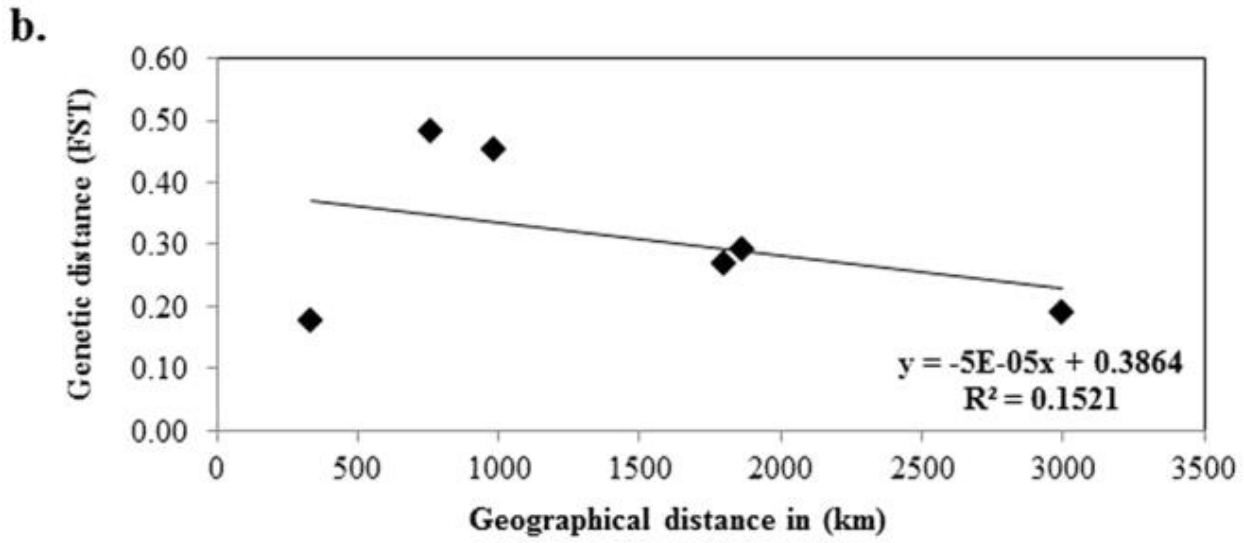
- **Fiber Morphology:** Scanning Electron Microscopy (SEM) to analyze surface structure.
- **Antimicrobial Activity:** Evaluated against Escherichia coli and Staphylococcus aureus using agar diffusion tests.
- **Absorbency and Retention Tests:** Measured using standard liquid absorption methods.
- **Biodegradability Analysis:** Conducted through soil burial tests and enzymatic degradation studies.



3. Results and Discussion

- **Antimicrobial Properties:** The Calotropis gigantea fiber exhibited strong antibacterial properties, significantly reducing bacterial growth in treated samples.
- **Absorption Efficiency:** Bamboo fiber contributed to superior fluid absorption and retention compared to conventional synthetic materials.
- **Eco-Friendliness:** The developed product demonstrated high biodegradability, decomposing significantly faster than commercial alternatives.





4. Conclusion The study concludes that a Calotropis gigantea and bamboo fiber blend is a promising material for feminine hygiene products. The developed nonwoven fabric offers antimicrobial protection, high absorbency, and biodegradability, aligning with the demand for sustainable hygiene solutions.

ADVANCE TECHNOLOGY IN TEXTILE CHEMICAL PROCESSING

G. Karthikeyan, Prof, Harharan C K, Bala S – IV Year / Jebastin S – III Year

Abstract

The textile chemical processing industry has witnessed significant advancements in recent years, driven by innovations in sustainable practices, automation, and novel chemical formulations. This paper explores the latest advancements in textile chemical processing, including eco-friendly dyeing techniques, plasma and enzyme treatments, nanotechnology applications, and smart textile finishes. Emphasis is placed on reducing environmental impact, improving process efficiency, and enhancing fabric performance. The study highlights recent research, industrial applications, and future prospects for sustainable and technologically advanced textile processing.

Introduction :

Textile chemical processing is a crucial aspect of fabric manufacturing, encompassing various treatments such as bleaching, dyeing, printing, and finishing. Traditionally, these processes have relied on extensive water usage, energy consumption, and chemical treatments that pose environmental challenges. With growing concerns over sustainability and efficiency, the industry has been shifting towards advanced technologies that reduce waste, improve energy efficiency, and enhance fabric quality. This paper aims to examine the key innovations in textile chemical processing and their implications for the industry.

Advanced Technologies in Textile Chemical Processing

1. **Eco-friendly Dyeing and Finishing Techniques**
    - Supercritical CO2 dyeing: Reduces water and energy consumption while achieving uniform dyeing.
    - Waterless dyeing technology: Uses non-aqueous mediums like liquid carbon dioxide.
    - Digital printing advancements: Minimizes waste and allows precise dye application.
2. **Plasma and Enzyme Treatments**
    - Plasma treatment: Enhances surface properties, improves dye uptake, and reduces chemical usage.
    - Enzyme-based processing: Replaces harsh chemicals with biodegradable enzymes for bio-polishing and bleaching.
3. **Nanotechnology Applications**
    - Nanocoatings: Provide stain resistance, UV protection, and antimicrobial properties.
    - Nanoencapsulation: Enables controlled release of functional agents in textiles.
4. **Smart Textile Finishes**
    - Phase change materials (PCMs): Improve thermal regulation in textiles.
    - Self-cleaning and antimicrobial finishes: Enhance durability and hygiene of fabrics.
    - Conductive polymers: Enable the development of electronic textiles (e-textiles).
5. **Sustainability and Circular Economy Approaches**
    - Bio-based chemicals: Reduce reliance on petrochemical-based processing agents.
    - Wastewater recycling and treatment: Improves sustainability in textile processing plants.
    - Life cycle assessment (LCA): Evaluates environmental impact of textile processing methods.

Conclusion:

Advancements in textile chemical processing are transforming the industry by making it more sustainable, efficient, and technologically innovative. The adoption of eco-friendly dyeing methods, enzyme-based treatments, nanotechnology, and smart textile finishes is driving progress toward a greener and more functional textile sector. Future research should focus on optimizing these technologies for large-scale implementation, improving cost-effectiveness, and developing new materials that further enhance sustainability and performance. By embracing these advancements, the textile industry can achieve a balance between technological progress and environmental responsibility.

TECHNICAL TEXTILES IN INDIA: GROWTH, CHALLENGES, AND FUTURE PROSPECTS

G.Karthikeyan, Professor, Textile Technology, KSRCT

Abstract:

Technical textiles have emerged as a significant sector in India, with diverse applications across industries such as healthcare, agriculture, construction, and defense. The Indian government has recognized the potential of this industry and introduced policies to boost its development. This paper explores the current scenario of technical textiles in India, their applications, growth factors, challenges, and future prospects.

Keywords: Technical textiles, India, growth, challenges, applications, future prospects

1. Introduction:

Technical textiles refer to textile materials designed for functional applications rather than aesthetics. With advancements in fiber technology, fabric engineering, and innovative manufacturing techniques, the demand for technical textiles has surged globally. India, being one of the leading textile manufacturing countries, has been actively expanding its footprint in this sector. The government's push through schemes like the National Technical Textile Mission (NTTM) is expected to further accelerate its growth.

2. Overview of Technical Textiles in India

India's technical textile industry is currently valued at approximately USD 20 billion and is projected to grow at a CAGR of 10-12%. The industry covers various segments such as agro textiles,

geotextiles, medical textiles, protective textiles, and smart textiles. The implementation of policies such as Production Linked Incentives (PLI) and mandatory use of technical textiles in certain industries has provided an impetus to the sector.

2.1 Market Segmentation

The major categories of technical textiles in India include:

- **Agro Textiles:** Used in farming and horticulture for better yield and crop protection.
- **Geotextiles:** Applied in civil engineering for soil stabilization and erosion control.
- **Medical Textiles:** Includes wound care, surgical textiles, and hygiene products.
- **Protective Textiles:** Used for safety applications in defense, fire-fighting, and industrial wear.
- **Smart Textiles:** Integrating technology for enhanced functionality, such as sensors and wearable technology.

3. Growth Factors Driving the Industry

Several factors contribute to the expansion of technical textiles in India:

- **Government Initiatives:** Policies like NTTM, PLI scheme, and infrastructural development projects.
- **Industrial Growth:** Increasing applications in automotive, healthcare, and defense.
- **R&D Investments:** Focus on innovation and collaboration between academia and industry.
- **Consumer Awareness:** Rising demand for functional and sustainable textile solutions.

4. Future Prospects

The Indian technical textile industry is set for exponential growth, driven by:

- Expansion in domestic manufacturing and exports.
- Adoption of smart and sustainable textile solutions.
- Increased collaboration between government bodies and industry stakeholders.
- Integration of Industry 4.0 technologies like AI and IoT in textile production.

5. Conclusion

Technical textiles in India present a vast opportunity for industrial and economic growth. With continued government support, technological advancements, and increased adoption across sectors, the industry is poised for a bright future. However, addressing challenges related to skills, awareness, and infrastructure is crucial for sustaining long-term growth.

ADVANCE GARMENT MACHINERY FOR APPAREL SECTOR

Dr.G.Karthikeyan, Professor, Textile Technology, KSRCT

Abstract:

The apparel sector has witnessed significant advancements in garment machinery, leading to increased efficiency, precision, and sustainability. This paper explores the latest innovations in garment manufacturing, including automation, artificial intelligence, and smart machinery. The study highlights the impact of these advancements on production speed, quality, and cost-effectiveness. Future trends and challenges associated with adopting advanced garment machinery are also discussed.

1. Introduction:

The apparel industry has evolved with technological advancements, transitioning from traditional manual operations to highly automated and intelligent machinery. The demand for precision, customization, and sustainability has driven manufacturers to invest in cutting-edge equipment. This paper aims to examine the latest developments in garment machinery and their influence on the apparel sector.

2. Advanced Garment Machinery in the Apparel Sector

2.1 **Computerized Sewing Machines** :

Modern computerized sewing machines are equipped with programmable functions, automatic thread trimming, and stitch pattern customization. These features enhance productivity and minimize human error.

2.2 **Automatic Cutting Machines:**

Laser and waterjet cutting machines have revolutionized fabric cutting, ensuring precision and reducing material wastage. Computer-aided design (CAD) integration allows seamless pattern-making and optimization.

2.3 **3D Body Scanning and Virtual Fitting:**

3D scanning technology enables accurate body measurements, facilitating customized garment production. Virtual fitting rooms enhance customer experience and reduce returns in online retail.

2.4 **Robotics and Automation** :

Robotic arms and automated fabric handling systems streamline manufacturing processes, reducing labor dependency and improving consistency in garment assembly.

2.5 **Sustainable and Smart Textile Machinery:**

Eco-friendly dyeing machines, energy-efficient fabric processing equipment, and waste-reducing technology contribute to sustainability in garment production.

3. Benefits and Challenges :

Advanced garment machinery offers numerous benefits, such as improved production speed, precision, reduced costs, and enhanced sustainability. However, challenges like high initial investment, maintenance complexity, and workforce adaptation to new technologies must be addressed.

4. Future Trends :

The future of garment machinery includes AI-driven predictive maintenance, IoT-enabled production monitoring, and further advancements in sustainable manufacturing. The integration of smart factories will shape the next phase of the apparel industry.

5. Conclusion :

Technological advancements in garment machinery have transformed the apparel sector, enhancing efficiency, quality, and sustainability. While challenges persist, continuous research and investment in smart manufacturing will drive the industry toward a more innovative and eco-friendly future.\

2024 HIGHLIGHT TEXTILE NEWS

In 2024, the global textile industry experienced significant developments across sustainability, policy reforms, technological advancements, and market dynamics.

Sustainability and Environmental Initiatives

California enacted the Responsible Textile Recovery Act of 2024, mandating that by 2026, companies producing apparel and other textile goods establish recycling programs to reduce landfill waste. This legislation aims to combat the environmental impact of fast fashion by promoting sustainable upcycling and recycling practices.

In Ghana, designers are addressing textile waste by upcycling discarded garments from secondhand markets. Initiatives like the Obroni Wawu festival showcase fashion created from repurposed materials, turning waste into valuable products and promoting environmental sustainability.

Technological Innovations

Ambercycle introduced the Cycora process, which recycles polyester-rich textile waste into new, high-quality yarns and fabrics. This innovation addresses the issue of the 92 million tons of textiles discarded annually, offering a sustainable solution for textile waste.

Policy and Trade Developments

The U.S. government expanded its enforcement of the Uyghur Forced Labor Prevention Act, adding companies like Hong Kong's Esquel Group to its import ban list due to alleged ties to forced labor in China. This action underscores the increasing regulatory scrutiny on supply chain ethics and human rights within the textile industry.

Market Dynamics

India's textile and apparel exports demonstrated resilience, growing by 7.08% to $20.721 billion in the April-October 2024 period. This growth is attributed to supportive government policies, increased global market share, and the industry's adaptability to changing market conditions.

Challenges and Resilience

Italy's renowned 'Made in Italy' brand faced challenges due to climate change, with severe floods disrupting production in key textile regions. These events highlight the need for the industry to invest in climate resilience and adapt to environmental changes to safeguard its future.

Overall, 2024 was a transformative year for the textile industry, marked by a strong push towards sustainability, technological innovation, and a heightened focus on ethical practices and environmental responsibility

STUDENT CORNER

"நூல் நன்கு நெய்யின், வாழ்வு நன்கு மலர்ந்திடும்."
(*Nool nangu neiyin, vaazhv nangu malarithidum.*)

"நூல் நல்லதெனில் துணி நன்றாகும், உழைவு உண்டு என்றால் வாழ்வு உயரும்."
(If the yarn is good, the fabric will be fine; if hard work exists, life will prosper.)

"நெய்ததன் அழகு நூலில், வாழ்வதன் அழகு உழைப்பில்."
(The beauty of weaving is in the yarn; the beauty of life is in hard work.)

"தையல் நன்கு செய்தால் துணி நீடிக்கும், தாழ்வு தவிர்த்தால் வாழ்வு நீடிக்கும்."
(A well-stitched cloth lasts long; a life without negativity lasts longer.)

"நூலின்றி நெய்ய முடியாது, கல்வியின்றி வாழ முடியாது."
(Without yarn, you can't weave; without knowledge, you can't live.)

"கைத்தொழில் கைவிடாதே, உழைப்பின் பயனை மறந்திடாதே."
(Never abandon your craft, never forget the rewards of hard work.)

Thulasimani V – III Year

"அழகு அணிகலனில் இல்லை, அழகாக அணிவதில் உள்ளது."
(Beauty is not in accessories, but in the way you wear them.)

"நிறமும் வடிவமும் முக்கியமல்ல, உடை அணிவதின் நாகரிகமே முக்கியம்."
(Color and shape are not important; the elegance of dressing is.)

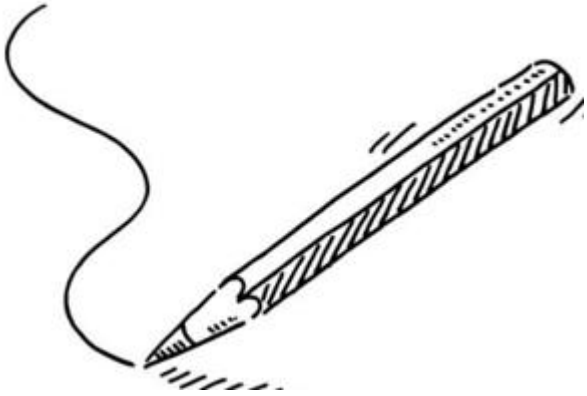
"நடையை போல் உடையும் பேசும், உடையைப் போல் நபரின் தன்மையும் தெரியும்."
(Just like the way you walk speaks about you, your attire reflects your personality.)

"போக்கு மட்டுமல்ல, பார்வையும் மாற்றும் ஆடைகள்."
(Fashion is not just a trend, but a way to change perspectives.)

"உடை அழகு உடம்பை மட்டுமல்ல, மனதையும் மகிழ்விக்க வேண்டும்."
(The beauty of clothing should not just enhance the body, but also bring joy to the heart.)

Sowndharya P R – III Year

Rajalakshmi K – II Year

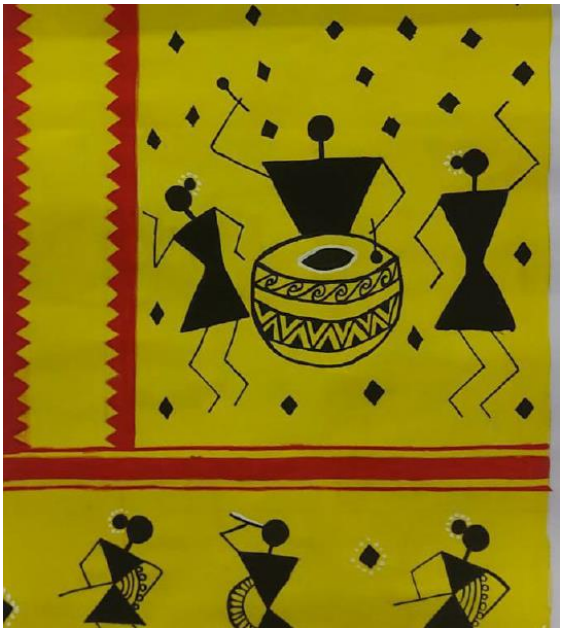


Sathya M – II Year

Event - State Level Best Designer Award

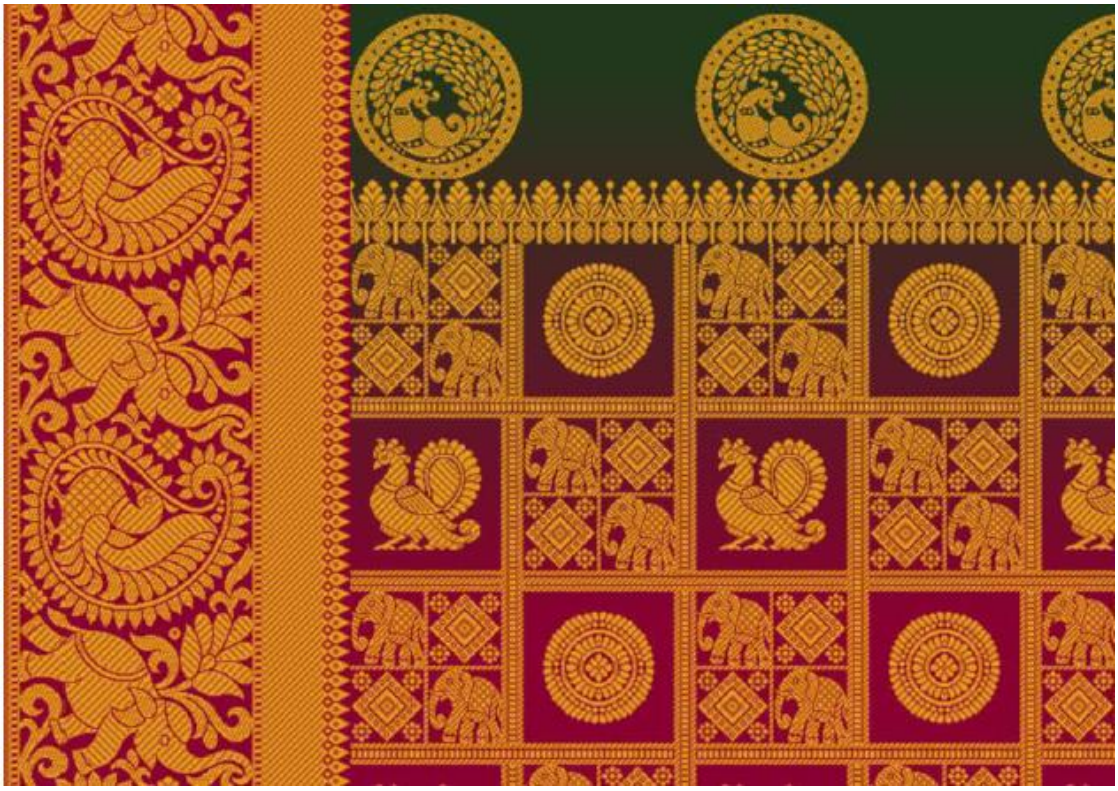
Department of Handlooms, State Government of Tamil Nadu

Munishwari.S – II Year



Nivedha V – II Year

Rajalakshmi K – II Year



Sathiskumar S – II Year

TEXEMPIRE 2024

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