

Performance study of external blinds with atlas structure using different sustainable materials

Prof. Dr. Heba Abdel Aziz Shalaby

Professor of Design, Faculty of Applied Arts and Head of the Spinning, Weaving and Knitting Department, Benha University

Prof. Dr. Gamal Abdel Hamid Radwan

Professor of Design, Faculty of Applied Arts, Spinning, Weaving and Knitting Department, Helwan University

Marwa Atef Ali

Head of the Spinning and Weaving Engineering Department, Textile Research and Technology Institute, National Research Center - Dokki - Giza - Egypt.

Mr. Shaimaa Mohamed Mahmoud Abu El-Ela

Assistant Lecturer, Spinning, Weaving and Knitting Department, Faculty of Applied Arts, Benha University

Abstract:

Man derives all the energy sources necessary for the continuation of life from the sun, without the sun life becomes impossible. Despite the importance of the sun to human life, it is also sometimes a source of damage to human skin, so awareness of sun protection methods has increased. The sun protection products industry began in 1930, and protective textiles are one of these methods, as the type of materials used in the fabrics production and their properties play a major role in controlling the type and quality of the product according to the required functional performance. The industrial community is now turning its attention to the use of sustainable and eco-materials, which means the materials used in production processes in a way that preserves the environment and society and reduces the negative impact, in addition to achieving the balance between the human needs and the future generations needs to ensure the sustainability of materials. Accordingly, this research aims to use some recent materials with natural and mechanical properties that make them superior to their counterparts from conventional plant fibers to manufacture outdoor curtain for resistance and protection from ultraviolet rays and compare them with their counterparts produced from synthetic fibers. The research was based on producing five woven samples using the double-weave structure with satin 4 with five different weft materials (cotton, bamboo, tencel, micro-modal, and polyester), and the mechanical, performance, and UV resistance properties of the produced samples were evaluated to determine their efficiency in terms of their functional performance.

Paper History:

Paper received October 22, 2024, Accepted December 26, 2024, Published on line March 1, 2025

Keywords:

Woven fabrics- UV protection- Bamboo- Tencel- Micro- modal- Polyester- Satin 4.

References:

- 1- Mohamed, Mohamed El-Badrawy. "The relationship between the difference in structural and engineering properties of decorative textile design and the physical and mechanical properties of upholstery fabrics", PhD thesis, Faculty of Applied Arts: Helwan University, 1987. Page 23.
- 2- Jaafar, Rania Rashad Tawkal. "Improving the functional performance of bed sheet fabrics with various textile structures using bamboo fibers with some modern materials" PhD thesis. Unknown location, Faculty of Applied Arts: Damietta University, 2021. Page 11.
- 3- Mahmoud, Hossam El-Din El-Sayed Mohamed;. (2019). "The effect of mixing lyocell and viscose fibers with cotton on the mechanical and physical properties of the produced threads". Journal of Specific Education and Technology (Scientific and Applied Research), 11(3), p. (75).
- 4- Amer, Shaimaa Ismail Mohamed. 2019 "Improving the functional performance of kitchen towel fabrics using modal material". Journal of Architecture and Arts, Volume 4, Issue 15, Page 313.
- 5- Ghada Shaker Abdel Fattah - "Combination of textile printing and embroidery in the design of

upholstery fabrics using

- 6- Nora Hassan Ibrahim Al-Adwy - "Determining the most appropriate structural criteria for textile compositions to achieve the functional performance properties of upholstery fabrics" - PhD thesis - Faculty of Specific Education - Mansoura University - 2010 - p. 25
- 7- Ali Al-Sayed Zalat - "Textiles and their care" - Dar Al-Islam for Printing and Publishing - Mansoura - 2008 - p. 37.
- 8- Samia Lotfy Al-Samman - "Textile Science" - Dar Al-Qalam - United Arab Emirates - Dubai - p. 27.
- 9- Julian M. Menter , Kathryn L. Hatch "Clothing as Solar Radiation Protection" Textiles and the Skin. Curr Probl Dermatol. Basel, Karger, Vol.31, 2003, page 50-63.
- 10- Nayak, L., & Mishra, S. P. (2016). Prospect of bamboo as a renewable textile fiber, historical overview, labeling, controversies and regulation. Fashion and Textiles, 3(1), 2, P. 7.
- 11- T, Afrin ; T, Tsuzuki ; R, K. Kanwar ; X, Wang ;. (2012). " The origin of the antibacterial property of bamboo ". The Journal of The Textile Institute, 103(8), p.844.
- 12- Rathod , Ajay ; Kolhatkar , Avinash ;. (2014). " Analysis of physical characteristics of bamboo fabrics ". International Journal of Research in Engineering and Technology, 3(8), p.21.
- 13- Abd El- Hady , R.A.M ;. (2016). " Open warp – knitted structures for bamboo mosquito nets ". International Journal of Advance Research in Science and Engineering, 5(10), p.425.
- 14- Kala, T. F., & Kavitha, S. (2016). Bamboo fiber analysis by scanning electron microscope study. International Journal of Civil Engineering and Technology, 7(4), p.235.
- 15- Pavko-Čuden, A., & Kupljenik, A. (2012). Knitted fabrics from bamboo viscose. Textile Journal, 55(1), p.6.
- 16- Muthu , Subramanian Senthilkannan. " Sustainable fibers and textiles ". United Kingdom : Woodhead Publishing, 2017. p. 183.
- 17- Murthy , H.V. Sreenivasa . " Introduction to textile fibers ". India : Woodhead Publishing, 2016. p. 120.
- 18- Tausif , Muhammad ; Ahmad , Faheem ; Hussain , Uzair ; Basit , Abdul ; Hussain , Tanveer ;. (2015). A comparative study of mechanical and comfort properties of bamboo viscose as an eco – friendly alternative to conventional cotton fiber in polyester blended knitted fabrics. Journal of cleaner production, 89, p.111.
- 19- Basit , Abdul ; Latif , Wasif ; Baig , Sajjad Ahmed ; Afzal , Ali ;. (2018). " The mechanical and comfort properties of sustainable blended fabrics of bamboo with cotton and regenerated fibers ". Clothing and Textiles Research Journal, 36(4), p.268.
- 20- Abu-Rous, M., Ingolic, E., & Schuster, K. C. (2006). Visualisation of the nano-structure of Tencel®(Lyocell) and other cellulose as an approach to explaining functional and wellness properties in textiles. Lenzinger Berichte, 85, p.31-37.
- 21- Badr, A. A., El-Nahrawy, A., Hassanin, A., & Morsy, M. S. (2014). Comfort and protection properties of tencel/cotton blends. Beltwide Cotton Conferences. 6, p. 1010. New Orleans , LA: Beltwide Cotton Conferences.
- 22- Muthu , Subramanian Senthilkannan . " Sustainable Innovations in Textile Fibers ". Singapore : Springer Nature Ltd, 2018. p. 39 .
- 23- Rohrer, C., Retzl, P., & Firgo, H. (2001). "Lyocell LF-Profile of a fibrillation-free fibre from lenzing.". Lenzinger Berichte, 80, p.75-81.
- 24- Hussain, T. "Developments in the Processing of Lyocell Fabrics ". Pakistan : Department of Textile Chemistry, National Textile University.
- 25- Kandhavadi, P., Vigneswaran, C., Ramachandran, T., & Geethamanohari, B. (2011). " Development of polyester – based bamboo charcoal and lyocell – blended union fabrics for healthcare and hygienic textiles ". Industrial Textile journal, 41(2), p.144.
- 26- Di, Y., Li, Q., & Zhuang, X. (2012). "Antibacterial Finishing of Tencel/Cotton Nonwoven Fabric Using Ag Nanoparticles-Chitosan Composite". Journal of Engineered Fibers and Fabrics, 7(2), p.24.
- 27- Eichinger, D., & Leitner, J. (2000). "cotton blends with tencel® and lenzing modal" . Lenzing AG, Austria, , p.1-7.
- 28- Moses, J. J. (2016). " A study on modal fabric using formic acid treatment for K/S , SEM and fourier

-
- transform infrared spectroscopy ". Oriental journal of chemistry, 32(2), p.1099.
- 29- Ray, D. " Biocomposites for High-Performance Applications " . England : Woodhead Publishing , 2017 .
 - 30- Jadhav, A. C., Pingale, N., & Shukla, S. R. 2018" Modal wet processing – A novel approach "., Indian Journal of Fiber & Textile Research, Vol. 43, p. 98.
 - 31- K , Gnanapriya ; Moses , Jeyakodi . 2015 " A study on modal fiber based on the absorption characteristics ". SOJ Materials Science & Engineering journal, Vol. 3, Iss. 2
 - 32- Gun, A. D., Demircan, B., & Acikgoz, A. 2014, " Colour , abrasion and some colour fastness properties of reactive dyed plain knitted fabrics made from modal viscose fibers ". Fibers & Textiles in Eastern Europe, Vol. 22, Iss. 5 , p. 107.
 - 33- Brederbeck, K., & Hermanutz, F. 2005, " Man-made cellulose".Review of Progress in Coloration and Related Topics, Vol. 35, Iss. 1 , p. 59.
 - 34- Bhattacharya, S. S., & Ajmeri, J. R . 2013," Investigation of air permeability of cotton & modal knitted fabrics". International Journal of Engineering Research and Development, Vol. 6, Iss. 12 , p. 1.
 - 35- S.Yahia, F. A. Metwally, M. A. Saad , K. Nassar, M. H. Kasem, Marwa A. Ali, "Usage of Different Types of Polyester Yarn for Enhancing the Performance of Sportswear", Journal of Textile Association, November-December, 2018, pp.266-275.
 - 36- M. A. Saad, F. A. Metwally, Sarah.Yahia, K. Massar, Marwa A. Ali* "Effect of Using Trilobal Polyester on the Functional Performance of Fencing Suit", Journal of Textile and Apparel, Vol. 25 (1), pp. 1-18, 2021.
 - 37- Zhang, W., Okubayashi, S., & Bechtold, T. 2003 " Modification of fibrillation by textile chemical processing"., Lenzinger Berichte, Vol. 82, p. 58.
 - 38- O .A. Hakeim , M. M. El Zawahry , Nermin M. Aly , N. S. El-Hawary , H. A. Diab and Ali Marwa A., (2015); "Anti-Static and Functional Properties of Asminosilsesquioxane Oligomer Treated and Dyed Fabrics", Accepted for publication in Journal of The Textile Association.
 - 39- Julian M. Menter , Kathryn L. Hatch "Clothing as Solar Radiation Protection" Textiles and the Skin. Curr Probl Dermatol. Basel, Karger یراجع, Vol.31, 2003, page 50-63.
 - 40- Marwa A. Ali, Nermin M. Aly and A. Abou El-Kheir*, "Imparting Antibacterial Activity, UV-Protection Properties and Enhancing Performance of Casein Modified Polyester Fabrics" The Journal of the Textile Institute, Vol.112 (9), pp; 1436-1448, 2021.
-

CITATION

Heba Shalaby, et al, (2025), Performance study of external blinds with atlas structure using different sustainable materials, International Design Journal, Vol. 15 No. 2, (March 2025) pp 181-188
