

DYEING OF BAMBOO FABRIC USING HENNA

ABSTRACT:

Bamboo fabric's distinct qualities and sustainability have drawn a lot of interest from the textile industry. The purpose of this review is to examine the benefits and possible uses of bamboo fabrics. Wearing the T-shirt is made possible by the natural qualities of bamboo fibres. Bamboo fabric is well known for being supple, breathable, and capable of wicking away moisture. Bamboo fibres' inherent antibacterial and hypoallergenic qualities help to preserve cleanliness and lessen smell. Additionally, bamboo fabric regulates temperature exceptionally well, keeping the wearer warm in the winter and cool in the summer. This versatility makes bamboo T-shirts more comfortable and useful all year round.

1. INTRODUCTION:

Henna dyeing bamboo fabric provides a natural and sustainable substitute that combines cultural tradition and environmental awareness. To improve the fabric's ability to absorb dye, it is first pre-treated. The *Lawsonia inermis* plant's henna is then combined with water or other natural ingredients to form a paste. To enable the dye to seep into the fibres, the bamboo fabric is dipped into the henna mixture and allowed to soak. The fabric is rinsed to get rid of extra colour after a sufficient amount of time, usually overnight, and allowed to dry naturally. This technique gives the fabric earthy tones that range from warm browns to reddish hues, giving it personality and colour.

2. METHODOLOGY

2.1 MATERIAL SELECTION:

Begin by selecting high-quality bamboo fabric free from any finishes or treatments that may hinder dye absorption. Ensure the fabric is pre-washed to remove any impurities.

2.2 HENNA PASTE PREPERATION:

Mix henna powder with water to create a thick paste. Allow the paste to rest for several hours, ideally overnight, to release the dye molecules fully. Some artisans may choose to enhance the dye release by adding natural acidic substances like lemon juice or vinegar to the mixture.

2.3 FABRIC PREPERATION:

Dampen the bamboo fabric with water to enhance dye penetration and even application. Ensure the fabric is evenly moistened but not dripping wet.

2.4 APPLICATION OF HENNA PASTE:

Use a brush, sponge, or even your hands to apply the henna paste evenly onto the dampened bamboo fabric. Ensure thorough coverage, working in sections if necessary to achieve uniform coloration.

2.5 DRYING PROCESS:

Allow the henna-dyed fabric to dry completely in a well-ventilated area away from direct sunlight. Depending on humidity and temperature, this may take several hours to overnight. Ensure the fabric is fully dry before moving on to the next step.

2.6 FIXATION:

Once the fabric is dry, heat-set the henna dye to improve colour fastness. This can be done by ironing the fabric on a high heat setting or placing it in a dryer at a high temperature. Be cautious not to scorch or damage the fabric during this process.

2.7 RINSING AND WASHING:

After fixation, rinse the fabric thoroughly with cold water to remove any excess henna paste and unbound dye molecules. Follow up with a gentle hand wash using mild detergent to remove any remaining residue.

2.8 DRYING AND FINISHING:

Finally, air dry the dyed bamboo fabric away from direct sunlight to prevent fading. Once dry, iron the fabric on a low heat setting to smooth out any wrinkles and enhance the vibrancy of the henna dye.

3. PROPERTIES OF BAMBOO FABRIC:

Bamboo fabric exhibits several advantageous properties, including breathability, moisture-wicking capabilities, antibacterial properties, and softness. These properties make it an attractive choice for various textile applications, particularly in clothing and home textiles.

3.2 PROCESSING METHODS:

The production of bamboo fabric involves several processing methods, including mechanical and chemical processes. Mechanical processes include crushing the bamboo to extract fibers, while chemical processes involve treatments such as alkalization and bleaching to produce yarns suitable for textile manufacturing.

Environmental Considerations: One of the key advantages of bamboo fabric is its sustainability. Bamboo is a fast-growing renewable resource that requires minimal water and pesticides for cultivation. Additionally, bamboo fabric production typically involves fewer chemicals compared to conventional textile manufacturing processes, making it more environmentally friendly.

Applications in Textiles: Bamboo fabric finds applications in a wide range of textile products, including clothing, bedding, towels, and upholstery. Its softness, breathability, and moisture-wicking properties make it particularly well-suited for activewear and undergarments. Furthermore, its antibacterial properties make it ideal for use in items such as towels and bed linens.

Challenges and Future Directions: Despite its numerous benefits, bamboo fabric also faces certain challenges, including concerns about the environmental impact of chemical processing and the lack of standardized certification for bamboo textiles. Future research efforts could focus on developing more sustainable processing methods and addressing these certification issues to further enhance the appeal of bamboo fabric in the textile industry.

4. RESULT AND DISCUSSION

4.1 Evaluation of Colourfastness properties

The wash fastness properties of merino wool yarns treated with mango ginger, cloves, and henna are illustrated in Table 3.

A fair light fastness was gained on merino wool yarns cured with cloves and henna. The wash fastness rating to colour change and staining was very good and excellent for cloves followed by henna and mango ginger subsequently. The herbs and the treated merino wool yarns were condensed in functional phytochemicals that could be applied for disposable facial masks, band-aids, and healing fabrics designed for a specific purpose. The herbal-coloured fabrics are categorized as luxury fabrics of today and with its own story to tell it occupies a must-have in every wardrobe.

4.2. DIMENSIONAL STABILITY TO WASHING:

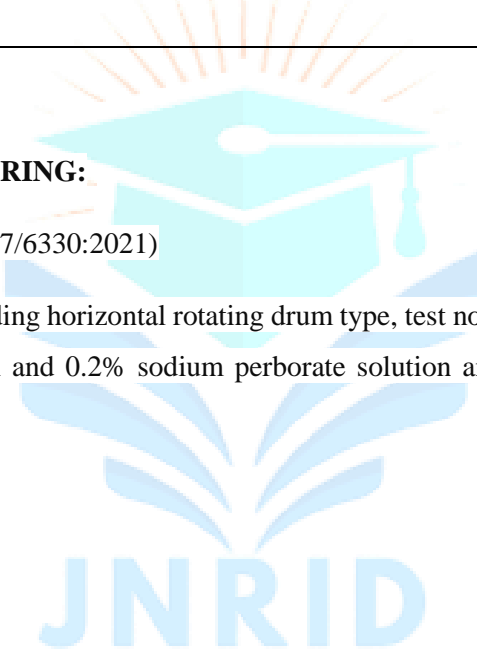
Fabric (BS EN ISO 3759/5077/6330:2021) Wascator washing machine front loading horizontal rotating drum type, test no. 4N at 40°C, with 2 Kg load in 0.77% ECE(A) reference detergent solution and 0.2% sodium perborate solution and 0.3% TAED solution followed by tumble dry low

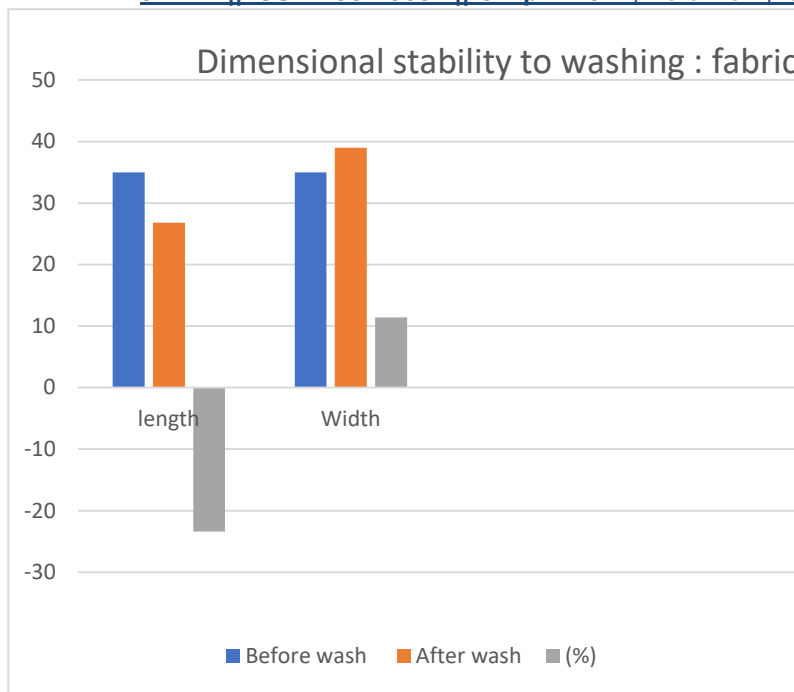
	Sample B - result			Requirement
	Before wash	After wash	(%)	
Length	35.0	26.8	-23.4	-
Width	35.0	39.0	+11.4	-
Conclusion	Data			-

4.3 SPIRALITY AFTER LAUNDERING:

knitted fabrics (BS EN ISO 3759/5077/6330:2021)

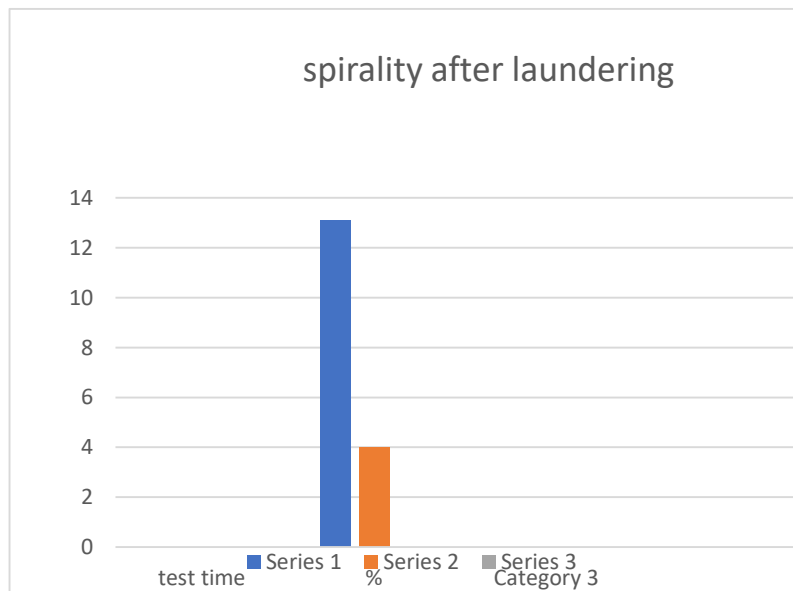
Wascator washing machine front loading horizontal rotating drum type, test no. 4N at 40°C, with 2 Kg load in 0.77% ECE(A) reference detergent solution and 0.2% sodium perborate solution and 0.3% TAED solution followed by tumble dry low.



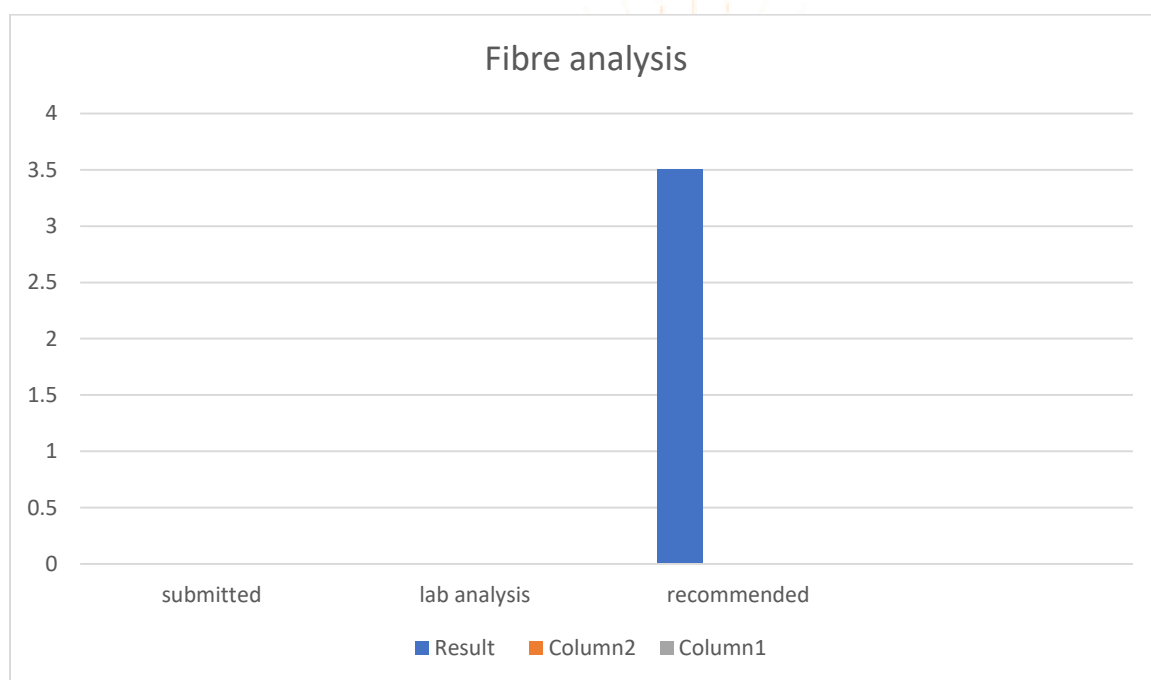


4.4 FIBRE ANALYSIS (ISO/TR 11827:2012/ISO1833)

Test item	Result	Requirements
	Sample A	
Submitted	Rayon	-



Lab analysis	100% rayon	-
Recommended	100% rayon	-
Conclusion	Data	-

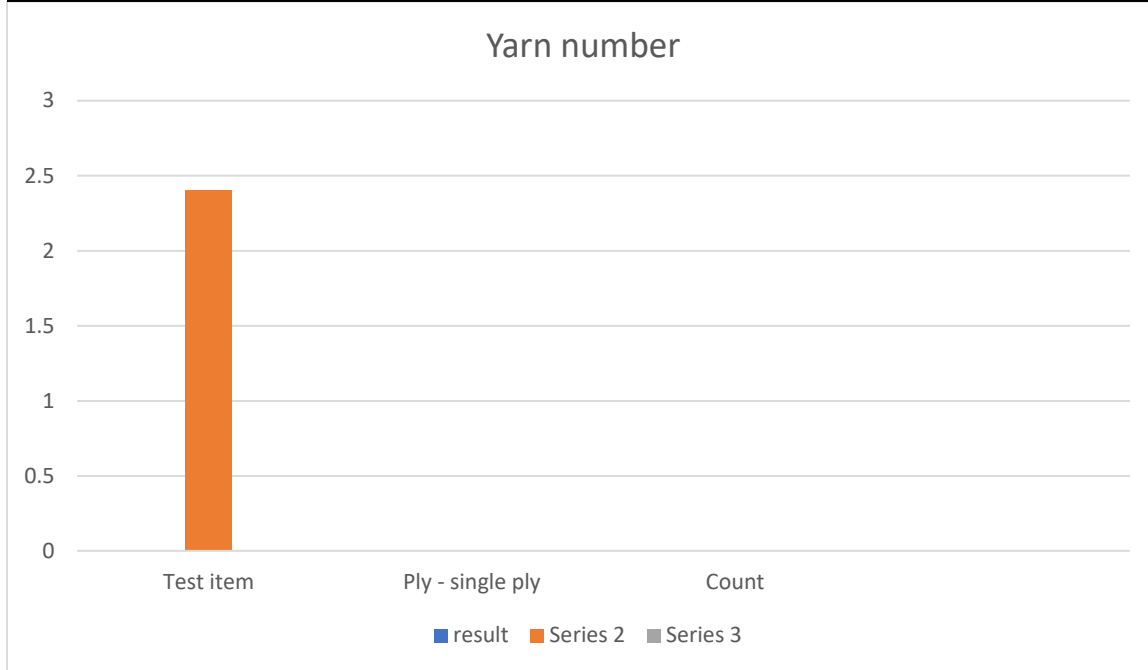


4.5 YARN NUMBER (ASTM D1059-17)

item	Test	Result	Requirements
		Sample A	

Ply – single ply

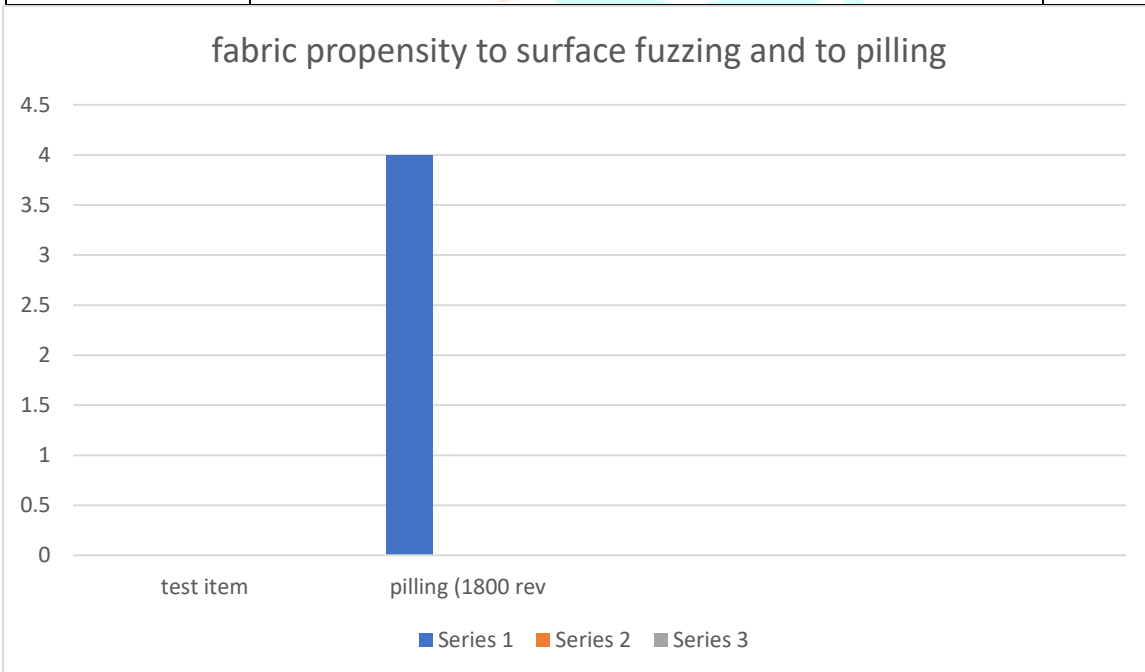
Count	1/40.4 Ne	-
Conclusion	Data	-



Determination of mass per unit area using small samples (GSM) (BS EN 12127:1998)		
Test item	Result	Requirement
	Sample B	
Mass per unit area (GSM) average	221.0 g/m ²	-
Conclusion	Data	-

Fabric propensity to surface fuzzing and to pilling: pilling box method (ISO 1294-1:2020 / BS EN ISO 12945-1:2020)

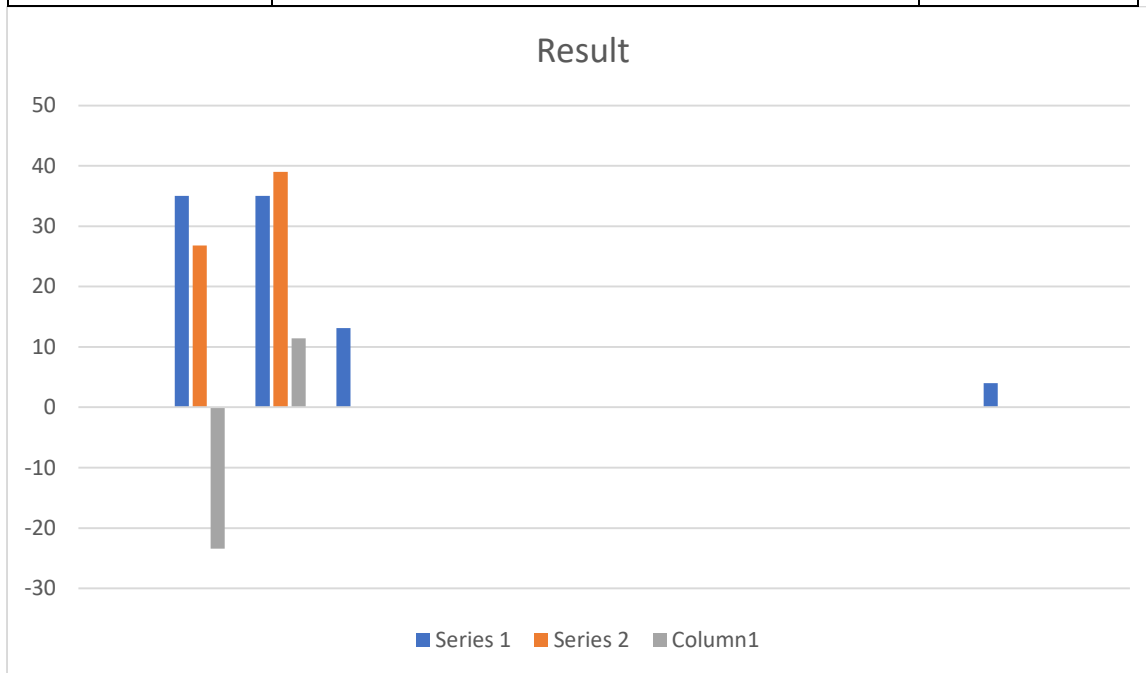
Test item	Result	Requirements
	Sample B	
Pilling (18000 Rev)	4	-
Conclusion	Data	-



Whiteness index (cie) and tint (Spectro photometer method) observe:10deg, illuminant: D65

Test item	Result	Requirement
	Sample B	

	CIE whiteness index:130.8 Tint (-)0.554	-
Conclusion	Data	-



5. CONCLUSION:

In conclusion, employing henna as a dye in the production of bamboo T-shirts combines environmental friendliness, fashionable appeal, and cultural importance. The method creates clothing that is both fashionable and ecologically conscious by fusing the natural dyeing powers of henna with the sustainable qualities of bamboo fabric. Henna is an artistic and distinctive dye that can be used to create elaborate designs on bamboo cloth, giving each T-shirt a touch of originality and craftsmanship. The inherent colour and texture of bamboo fabric are complemented by the earthy tones created by henna, giving clothing a handcrafted, rustic appeal. Additionally, the usage of henna is in line with the textile industry's rising need for non-toxic and ecological substitutes. Henna is a biodegradable plant-based dye.

REFERENCE:

1. Abitbol, T., Rivkin, A., & Cao, Y. (2017). The quest for sustainable materials: Bamboo-based fibers for multifunctional textile applications. *Advanced Materials*, 29(39), 1702498.
2. Choudhury, A. K. R., & Rusli, R. (2020). Bamboo fiber and its composites: Fabrication, properties, and applications. *Materials Today: Proceedings*, 27, 2285-2290.
3. Li, Y., Zeng, X., Hou, J., Wang, S., & Ma, J. (2020). Bamboo fiber-based materials and applications. In *Bamboo: Current and Future Prospects* (pp. 233-262). Springer, Singapore.
4. Rathore, V., & Gandhi, M. (2019). Sustainable textile production: A review on bamboo fibre. *International Journal of Fashion Design, Technology and Education*, 12(1), 46-53.
5. Yadav, M., & Gahlot, D. (2018). Bamboo: A sustainable and eco-friendly alternative in textile industry. *International Journal of Textile Science*, 7(5), 151-157.
6. Abolghasemi, M., Montazer, M., & Harifi, T. (2015). Moisture management properties of bamboo fabric. *Fibers and Polymers*, 16(6), 1314-1322.

- Cai, L., Xin, J. H., & Zeng, X. (2017). Bamboo fabric with UV-blocking property by TiO₂ nanoparticles deposition. *Textile Research Journal*, 87(15), 1844-1852.

