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APPLICATION OF WASTE-DERIVED NATURAL DYES FOR COTTON COLORATION UTILIZING CONTEMPORARY PRACTICE

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Natural dyes have gained importance as a non-toxic alternative of synthetic dyes. This research explores the potential of utilizing sawdust waste from the timber industry as a natural dye for cotton fabrics coloration. To enhance its durability, metal mordants were employed. The exhaust method was utilized for pre-treatment and dyeing processes. Standard techniques were employed to assess various properties including color fastness to wash, water, perspiration, saliva, rubbing, light and color strength (K/S). The results indicate that sawdust waste can be used as a natural dye for eco-friendly fabric dyeing.

Researchers are constantly searching for new plant sources that can produce natural dyes and pigments, aiming to address the environmental concerns associated with synthetic/organic dyes. By utilizing waste materials, the textile industry not only reduces waste but also promotes sustainability in everyday textile production. While there have been some studies on using mahogany sawdust and seeds to color cotton, silk, polyester, and non-woven fabrics [1-3], there is a lack of research on cotton coloration using bio-waste from timber industry and improving color fastness properties with metallic mordants. This study examined the interaction between dye and fiber by assessing color fastness to various factors such as wash, water, perspiration, saliva, rubbing, and light.

Table 1 – Various color fastness properties of dyed fabric

Color fastness to wash							
Sample types	Change in Color	Staining in color					
		Acetate	Cotton	Nylon	Polyester	Acrylic	Wool
Dyed fabric	3	4	4-5	4-5	4-5	4-5	4
Alum treated dyed fabric	3-4	4	4-5	4-5	4-5	4-5	4
Copper treated dyed fabric	3-4	4	4-5	4-5	4-5	4-5	4
Color fastness to perspiration (acid)							
Dyed fabric	4	4	4-5	4-5	4-5	4-5	4
Alum treated dyed fabric	4	4	4-5	4-5	4-5	4-5	4
Copper treated dyed fabric	4	4	4-5	4-5	4-5	4-5	4
Color fastness to perspiration (alkali)							
Dyed fabric	4	4	4-5	4-5	4-5	4-5	4
Alum treated dyed fabric	4-5	4	4-5	4-5	4-5	4-5	4-5
Copper treated dyed fabric	4	4	4-5	4-5	4-5	4-5	4
Color fastness to water							

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Dyed fabric	4-5	4	4-5	4-5	4-5	4-5	3
Alum treated dyed fabric	4-5	4	4-5	4-5	4-5	4-5	4
Copper treated dyed fabric	4-5	4	4-5	4-5	4-5	4-5	4
Color fastness to saliva							
Dyed fabric	4	4	4-5	4-5	4-5	4-5	4
Alum treated dyed fabric	4	4	4-5	4-5	4-5	4-5	4
Copper treated dyed fabric	3	4	4-5	4-5	4-5	4-5	4
Color fastness rubbing							Light fastness
	Dry rubbing			Wet rubbing			
Dyed fabric	4			3-4			2-3
Alum treated dyed fabric	5			4-5			3
Copper treated dyed fabric	5			4			3

Table 1 presents the color fastness properties of dyed fabric using bio-waste extracts. The findings demonstrate that the color fastness properties of the majority of the dyed samples were excellent in terms of color staining and color change. However, the sample dyed without metal treatment had a poor rating for light fastness, whereas the other samples showed a rating of 3, indicating a slight enhancement in light fastness due to the interaction between dye, mordant, and fiber [4].

References

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