



A Synergism of Eco-Friendly Dyeing of Cotton Fabric and Therapeutic Benefits of *Bixa Orellana* Seed

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Abstract: Background and objectives: The present research is aimed to study the eco-friendly nature and therapeutic application of the natural dye from the seed extract of *Bixa orellana* for maximizing the benefits of cotton fabric. Materials and methods: A natural dye was extracted from *Bixa orellana* seeds by hot water and ethanolic extraction method. This dye was examined for its ability with pre-mordanting and post-mordanting of cotton fabrics with ferrous sulphate, hydrated double sulphate and tamarind seed powder in order to improve the aesthetics and natural color shades on cotton fabrics. Furthermore, the dyed cotton fabric was used to analyze the antibacterial efficacy of cotton fabric against bacterial culture such as *Bacillus cereus*, *Escherichia coli*, *Proteus mirabilis*, *Salmonella typhi* and *Klebsiella pneumoniae*. Results: Our results suggest that pre-mordanting of cotton fabric with ferrous sulphate, alum and tamarind seed shows good dye fixation rate and stronger color than post-mordanting. Dyeing of cotton fabric with the ethanol extract of *Bixa orellana* seeds gave excellent and beautiful shades than the ones extracted with hot water. Furthermore, cotton fabric dyed with ethanol extracted was found significantly active against human pathogens compared to cloth dyed with hot water extract. The results evidenced that cotton knitted fabrics showed an increase in dye uptake with natural mordant and strength with a considerable reduction in antimicrobial activity. Conclusion: This research adumbrated developing a greener technology to cabalistic use of *Bixa orellana* seed extract applied on cotton cloths for coloring and in future find commercial use as a functional finishing agent (for newborns, clothing for burns, injured soldiers and hospitals) for health protection with semi-durable therapeutic properties.

Keywords: *Bixa orellana*; Antimicrobial activity; Natural dye; Cotton fabrics; Health protection.

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