



Development of Bacterial Cellulose Sheets from Agricultural Waste Materials Using *Acetobacter xylinum*.

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Abstract

This study investigated the production of bacterial cellulose sheets from watermelon peel waste using *Acetobacter xylinum* as a sustainable alternative to synthetic leather. The research aimed to convert agricultural waste into a value-added biomaterial with environmentally friendly properties. Watermelon peel waste was used as the cultivation substrate, and the resulting bacterial cellulose sheets were evaluated for their physical and mechanical properties. The findings showed that the sheets exhibited good flexibility, elasticity, and mechanical strength comparable to synthetic leather, demonstrating their potential for practical applications. Although the addition of L-arginine did not significantly enhance bacterial cellulose production under the experimental conditions, surface treatment with beeswax effectively improved water resistance. Furthermore, dyeing with sappanwood extract resulted in good color absorption and satisfactory color durability. Overall, the results suggest that bacterial cellulose derived from watermelon peel waste is a promising, eco-friendly alternative to synthetic leather and highlights the potential of agricultural waste as a sustainable resource for developing high-performance biomaterials.

Keywords: *Acetobacter xylinum*, bacterial cellulose, agricultural waste, synthetic leather, sustainable biomaterials.