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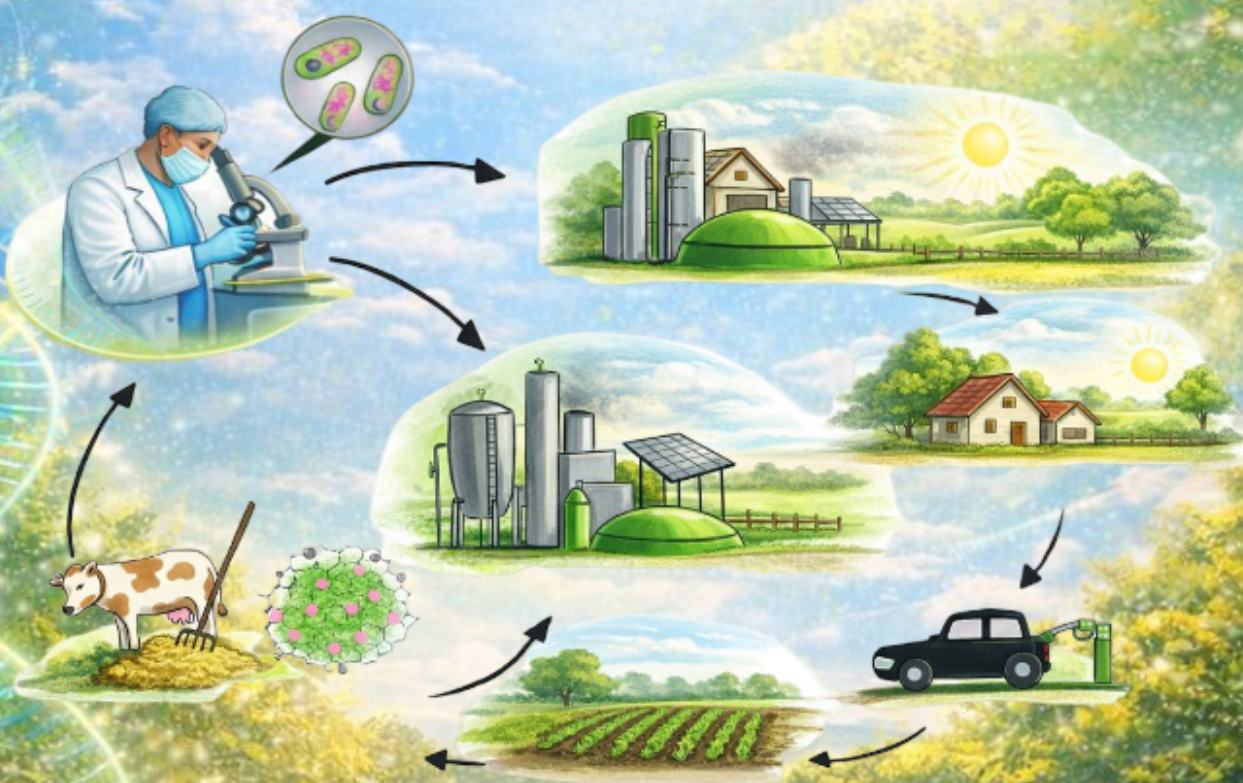
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Agricultural waste–derived bioash for synthetic dye removal: A preliminary treatment method.

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Abstract

The synthetic dyes, Crystal Violet (CV) and Methyl Violet (MV), are commonly used industrial dyes that are major environmental pollutants due to their toxic, persistent, and potential carcinogenic nature. The usual treatment processes for removing these dyes are expensive and not-efficient, which calls for the development of green adsorbents from farm wastes. In the present study, waste bioash from the sugarcane bagasse industry was obtained by thermal treatment of dry sugarcane bagasse at 500 °C and used for the removal of CV and MV dyes from aqueous solutions. Batch adsorption tests were designed to investigate the influence of various environmental factors such as temperature (15, 30, and 45°C), pH (5, 7, and 9), and contact time (30, 45, and 90 min) on dye removal. Crystal Violet recorded moderate adsorption, with optimal removal of 40.74% observed at 45°C and 42.59% at 15°C, pH 7, 90 min, which indicated that the compound has effective adsorptive properties at low temperatures. However, compound Methyl Violet has higher adsorptive properties, with 72.92% removal at 30°C under alkaline conditions, 50.00% removal at 45°C, and 60.42% removal at 15°C after 90 min. The bioash sugarcane bagasse bioash appears to be an eco-friendly and cost-effective adsorbent for the adsorption of Crystal Violet and Methyl Violet dyes from water bodies as part of its preliminary adsorption. Enhancement of its adsorption surface and scaling-up are advisable to optimize its application.

Keywords: Crystal Violet; Methyl Violet; Sugarcane bagasse bioash; Wastewater treatment; Agricultural Waste; Dye removal.
