HP-27: Sustainable bioindustry: biomaterial synthesis for environmental decontamination

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Subject description: "Water, vital for life, faces growing threats like synthetic dye pollution, notably in textile industries. This extensive use has adverse impacts on health and the environment, emphasizing the need to understand, prevent, and remove this pollution."

Objectives: This study aims to assess the efficacy of pomegranate peel as a novel biosorbent for detoxifying textile wastewater from harmful dyes. Pomegranate peel, an underused natural material, exhibits significant dye adsorption potential. The primary goal is to provide an eco-friendly and sustainable solution for addressing the pressing concern of textile wastewater contamination.

Methods: The peel of pomegranate fruits, undergoes a sequence of ecologically sound procedures. These include washing, drying, crushing, and sieving. The resulting product is then thoroughly scrutinized through a series of precise tests, including FTIR, XRF, and SEM analysis, which reveal its detailed properties.

Results and discussion: In this work, the effects of various conditions such as sorbent dosage, pH value, and contact time were investigated. Using 0.05g of pomegranate peel powder mixed with 50ml of dye solution, the removal efficiency at natural pH was almost 96%, and the retention time was 60 minutes.

Conclusion: This study provides a cost-effective and environmentally friendly dye removal process for textile wastewater treatment.

Keywords: Bioindustry, Biomaterial, Biosorption, Decontamination, Sustainable, Synthesis.