

Biochar prepared from refuse floral waste of temple for adsorption of dye from waste water, an approach towards sustainable waste management: A case study in Varanasi, India

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Abstract

Religious faith and ritual activities lead to significant floral offerings production and its disposal as waste to the nearby open lands or water bodies. Such activities result into various environmental and social nuisances such as soil and water pollution as well as solid waste generation. Such refuse are dominantly composed of organic materials which can be used as valuable resources for various biochemical and thermochemical processes. Thermochemical conversion such as pyrolysis of such organic biomass is quickest way of management resulting into production of energy as liquid and gas in addition to solid value-added product called biochar. Therefore, the present study aimed to produce biochar from the temple floral refuse obtained after natural colour extraction and its physic-chemical characterization for multifaceted applications. We used temple floral refuse collected from various temples of the Varanasi, India, and characterized the solid product obtained after pyrolysis using TGA-DTG, FTIR, SEM, EDX, BET, XRD, RAMAN and elemental analyses. The results revealed that biochar conversion of floral refuse can be vital option for its better management in addition to its multifaceted benefits. The study provides a brief insight for the environmentally sound and sustainable management of temple floral waste from an ancient city like Varanasi, having great aesthetic values in itself.

Keywords: Solid waste management, natural colour, biochar, bioenergy.