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Marine brown macroalga *Sargassum wightii* as a novel biosorbent for removal of brilliant green dye from aqueous solution: kinetics, equilibrium isotherm modeling and phytotoxicity of treated and untreated dye

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ABSTRACT

In this study, the removal of brilliant green dye from aqueous solution using seaweed *Sargassum wightii* was carried out. The effects of different variables such as adsorbent dose, pH, initial dye concentrations and temperature were studied through batch experimental system. The adsorbent–adsorbate interaction was characterized by Fourier transform infrared spectroscopy and UV–Vis spectrophotometer and the surface structure of the sorbent was documented by scanning electron microscopy and chemical composition was determined by energy dispersive X-ray spectroscopy. The maximum biosorption of brilliant green dye was observed at the sorbent concentration of 0.1 g/L, 7 of pH at 35°C of temperature and initial dye concentration of 10 mg/L. Sorption interaction of dye on to algal biosorbents obeyed the pseudo-second-order rate (R^2 = 0.99). Experimental data showed good fit with the Langmuir adsorption isotherm (R^2 = 0.996) model with a maximum biosorption capacity of 43.48 mg/g. Furthermore, significant reduction in physicochemical parameters was obtained in the treated dye compared with the untreated dye. Phytotoxicity analyses suggested that the treated dye could be tuned as beneficial source for agricultural practices. Accordingly macroalga could be utilized as an efficient adsorbent for dye removal from aqueous solution; prompting to resulting subsequent reduction of toxic effects of the treated dye, alleviates environment damage.

Keywords: Brilliant green; Seaweed; Isotherm; Kinetics; Desorption; Phytotoxicity

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