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Bioremediation of adsorbed dyestuffon agricultural wastes under the solid state fermentation conditions

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Solid state fermentation (SSF) is defined as the growth of microorganism on a moist solid support and the spaces between particles mainly contains minimum visible water and continuous gas phase. Dyes adsorbed after the adsorption treatment were decolorized under SSF, this approach combines, physical method-adsorption and biological method-SSF to ensure safe, economical and ecofriendly removal of textile dyes completely from the environment. Use of rhizospheric plant growth promoting microorganisms under SSFfor bioremediation of textile dyes adsorbed on agricultural solid wastes gaves an ecofriendly promising treatment approach. The purpose of this study was to adsorb azo dye Disperse Red 73 (DR73) on sugarcane bagasse (SCB) and its further bioremediation using consortium-RARB under SSF. SCB showed maximum adsorption (65%) for DR73. Kinetics of adsorption of DR73 on milled SCB follows pseudo-second order kinetics. The individual cultures of *Rhodobacter erythropholis* MTCC 4688, *Azotobacter vinelandii* MTCC 1241, *Rhizobium meliloti* NCIM 2757 and *Bacillus megaterium* NCIM 2054 showed 44, 28, 50 and 61% decolorization of DR73 in 48 hours respectively while the consortium-RARB showed complete decolorization in 48 hours. Optimum moisture content, temperature and pH for decolorization of DR73 was found to be 90%, 30°C and 6 respectively. DR73 biodegradation analysis was carried out using HPTLC, FTIR and HPLC. Phytotoxicity and genotoxicity studies revealed detoxification of DR73. Tray bioreactor study for decolorization of adsorbed DR73 on SCB suggests its implementations at large scale. Use of plant growth promoting bacteria's consortium under SSF for bioremediation of adsorbed dyes gives ecologically sustainable approach.

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