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Biodegradation of Direct Red 23 by Bacterial Consortium Isolated from Dye Contaminated Soil Using Sequential Air-lift Bioreactor

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Abstract : The effluent coming from various industries such as textile, carpet, food, pharmaceutical and many other industries is big challenge due to its recalcitrant and xenobiotiocs in nature. Recently, biodegradation of dye wastewater through biological means was widely used due to eco-friendly and cost effective with the higher percentage of removal of dye from wastewater. The present study deals with the biodegradation and decolourization of Direct Red 23 dye using indigenously isolated bacterial consortium. The bacterial consortium was isolated from soil sample from dye contaminated site near a cluster of Carpet industries of Bhadohi, Uttar Pradesh, India. The bacterial strain formed consortia were identified and characterized by morphological, biochemical and 16S rRNA gene sequence analysis. The bacterial strain mainly Staphylococcus saprophyticus strain BHUSS X3 (KJ439576), Microbacterium sp. BHUMSp X4 (KJ740222) and Staphylococcus saprophyticus strain BHUSS X5 (KJ439576) were used as consortia for further studies of dye decolorization. Experimental investigations were made in a Sequencing Air- lift bioreactor using the synthetic solution of Direct Red 23 dye by optimizing various parameters for efficient degradation of dye. The effect of several operating parameters such as flow rate, pH, temperature, initial dye concentration and inoculums size on removal of dye was investigated. The efficiency of isolated bacterial consortia from dye contaminated area in Sequencing Air- lift Bioreactor with different concentration of dye between 100-1200 mg/l at different hydraulic rate (HRTs) 26h and 10h. The maximum percentage of dye decolourization 98% was achieved when operated at HRT of 26h. The percentage of decolourization of dye was confirmed by using UV-Vis spectrophotometer and HPLC.

Keywords : carpet industry, bacterial consortia, sequencing air-lift bioreactor
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