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Optimization of Isolated Textile Dye (CI Direct Blue 201) Decolorizing Bacteria

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Abstract

Textile industry is the largely employed sector of synthetic dyes which creates various environmental problems through their untreated or partially treated effluents. Most of those synthetic textile dyes are highly recalcitrant to natural degradation processes. The general approach of the study was to determine bioremediation potential of native bacteria for textile dye CI Direct Blue 201. The effect of physiochemical parameters were optimized for five bacterial isolates (*Pseudomonas* sp.1, *Pseudomonas* sp.2, *Bacillus* sp.1, *Bacillus* sp.2, *Micrococcus* sp.) on decolorization of CI Direct Blue 201. Decolorization potential was studied by introducing overnight starved equalized bacteria suspensions into filter sterilized dye solutions at different concentrations of dye, temperature and pH. 3 ml sample aliquots were removed at 2 days interval for a period of 14 days and decolorization percentage was determined by spectrophotometric analysis. After 14 days of incubation at 50 ppm concentration, decolorization percentage by *Pseudomonas* sp.2, *Pseudomonas* sp.1, *Bacillus* sp.1, *Micrococcus* sp., *Bacillus* sp.2 were recorded as 67.93±1.23% , 65.20±2.94%, 58.81±0.81%, 53.60±2.51%, 50.30±1.24% respectively. The decolorization of dye by each bacterium was studied at 24⁰C, 28⁰C and 32⁰C temperatures respectively for 14 days of incubation. The highest decolorization was detected when the samples were incubated at 32⁰C than at the other two temperatures. At 14 days of incubation at pH 7.0, *Pseudomonas* sp.1 and *Micrococcus* sp. were showed the highest decolorization percentages as 55.91±1.45% and 55.54±1.17% respectively. None of bacteria isolates showed remarkable decolorization when the medium was acidic pH. *In-vitro* photolysis experiment revealed that decolorization of CI Direct Blue 201 dye was not occurred by natural sunlight. Hence, optimized bacterial isolates can be used as a green solution for textile dye pollution.

Keywords: Decolorization, CI Direct Blue 201, Textile dye, *Pseudomonas*, *Bacillus*, *Micrococcus*