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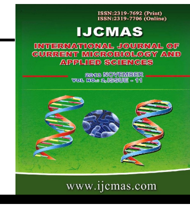

Original Research Article

Microbial decolorization of azo dye reactive blue 19

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A B S T R A C T

Keywords

Reactive dye-19;
Biodegradation;
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concentration of
inoculam;

The aim of present research work is investigate the different chemical and physical parameters for decolorization of the textile dyes using Bacillus cereus and *Pseudomonas aeruginosa*. In this study the dyes Concentration(50mg/ L,100mg/L,150mg/L,200mg/L), Inoculam Size(25,50,75,100mg/L) were used for investigate the efficiency of the microbes in decolorization of textile dye. The bacterial concentration at 150mg/L and Inoculam size 100mg/L showed the lessor colour of the industrial effluent which denotes the decolorization of the dye.

Introduction

Reactive dyes are water soluble and anionic in nature, which are extensively used in textile industries due to their favorable characteristics of water-fast, bright color, simple and low energy consumption and their ability to bind with cellulosic fiber by covalent bonding (Siddique et al., 2011). Most of them are synthetic in nature, made up of two key components: the chromophore, responsible for the color, and the auxochrome (Gupta, Suhas, 2009) which renders the solubility of molecule in water, affinity to attach the fiber (Lee and Pavlostathis, 2004).They are toxic, mutagenic and carcinogenic. Once they enter into the aquatic system their biodegradation is very difficult due to their complex aromatic molecular structure, which makes them more stable. For example, Reactive Blue-19 (RB-19) also known as Remazol brilliant blue is an anthraquinone based vinylsulphone dye, which is very resistant to chemical oxidation due to its anthraquinone structure being stabilized by resonance (Alinsafi et al., 2005). RB-19 has relatively low fixation ability (75-80 %) due to the competition between the formation of vinylsulphone and the hydrolysis.

Pollution is a major problem facing humankind, and not restricted to highly industrialized nations. The alarming increase in world population coupled with urbanization, industrialization and other developmental activities has brought tremendous pressure on water resource. Textile and dyestuff industries consume substantial volumes of water and chemicals for wet processing of textiles and manufacturing of dyes. Many chemicals are used for desizing, bleaching, dyeing, printing and finishing ranging from inorganic compounds to polymers and organic products.

Synthetic dyes are widely used in a number of industrial processes, such as textile dyeing, paper printing and colour photography. At present over 1,00,000 dyes are commercially available and 7 x 105 tons of dyestuff are produced annually. Inefficiency in the dyeing process results in the 10 - 15% of all dyestuff being directly lost to wastewater, which ultimately finds its way into the environment.

Prohibition of use of certain dyes containing banned amines and other toxic substances has necessitated the replacement of these chemicals by ecofriendly compounds. About 140 azodyes are suspected to release harmful amines and are carcinogenic, allergenic and toxic. Textile and dyestuff industries generate colossal amounts of effluent containing hazardous dyes and dyestuff chemicals which are discharged into water bodies. Unfortunately many synthetic dyes and dye intermediates are resistant to conventional waste water treatment systems. The significant leads have been obtained in biodegradation of dyes and dye intermediates employing phytoremediation and use of microbial consortia.

Materials and Methods

The effluent from various chemical dye industries are collected at Chennai, India. The dye reactive blue -19 was collected in this effluent. Bacillus cereus and *Pseudomonas aeruginosa* are selected as the best organisms among 15 microbes tested in laboratory. These two bacteria are cultured in Luria Bertani medium (LB),Nutrient Broth media(NB) and Mineral Basal medium.

The isolation techniques such as Serial dilution, streak plat techniques and pour plat techniques were used for bacteria isolation. Identification of the bacterial strain was performed based on the methods of in Bergey's Manual of Systematic Bacteriology, using standard microbiological procedures.

Identification of Selected Decolorizing Bacteria: A pure colony of the isolates was identified presumptively on the basis of the following features: colony morphology, colonial pigmentation, cell morphology, Gram-staining reaction, oxidase positivity, O/F tests (Gerhardt *et al.*, 1981). Isolates were further characterized biochemical methods.

Results and Discussion

Effect of concentration on decolorization of dye-Reactive Blue 19 by *Bacillus cereus* and *Pseudomonas aeruginosa* were represented in table.1 and Effect of inoculum size on decolorization of dye-Reactive Blue 19 by *Bacillus cereus* and *Pseudomonas aeruginosa* were represented in table.2. The biodegradation of RB-19 dye from the textile industrial waste was done with the help of Bacillus cereus *and Pseudomonas aeruginosa* in concentration and inoculum size. Biotechnology can offer novel, eco friendly and cost-effective alternative for pollution control. Bio remediation refers to bio transformation of toxic hazardous can substantially reduce toxic substances resulting in a cleaner environment. hazards.

Table.1 Effect of concentration on decolorization of dye-Reactive Blue 19 by *Bacillus cereus* and *Pseudomonas aeruginosa*

Sl.No	**Initial concentration (mg/l)**	**% Decolorization**	
		Bacillus cereus	*Pseudomonas aeruginosa*
1	50	65.59	60.23
2	100	77.45	84.55
3	**150**	**92.28**	89.45
4	200	67.24	65.54

Table.2 Effect of inoculum size on decolorization of dye-Reactive Blue 19 by *Bacillus cereus* and *Pseudomonas aeruginosa.*

Sl.No	**Inoculum size(mg/l)**	**% Decolorization**	
		Bacillus cereus	***Pseudomonas aeruginosa***
1	25	52.25	51.26
2	50	69.55	63.24
3	75	82.45	82.65
4	100	95.59	96.24

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