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RESEARCH ARTICLE

Decolourization of congo red and crystal violet by bacterial consortium

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SUMMARY: Dye polluted soil samples were used for the isolation of bacterial species. Among the isolates, *Bacillus subtilis, Clostridium butyricum, Enterobacter aerogens* and *Pseudomonas fluorescens* were the dominant bacterial species present and they are designated as the indicator bacterial isolates. These isolates are able to utilize the dye as nitrogen source and hence they are able to decolorize the congo red and crystal violet dyes. Decolourization was assayed colorimetrically at 495 nm 540 nm for congo red and crystal violet, respectively and percentage of decolourization was calculated. The optimum concentration for both the dyes was 100 ppm. The maximum decolourization of congo red and crystal violet dyes at the end of 96 hours of decolourization experiments were 85 per cent and 70 per cent, respectively for consortium of indicator bacterial isolates. The individual bacterial isolates were less effective for decolourization. UV spectroscopy analysis revealed the changes in the peaks before and after decolourization by bacterial consortium. These bacterial consortium can be exploited as bioremediation agents to reduce dye pollutants.

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Key Words :
Bacterial consortium, Congo red, Crystal violet dyes, Decolourization, Enzymatic degradation

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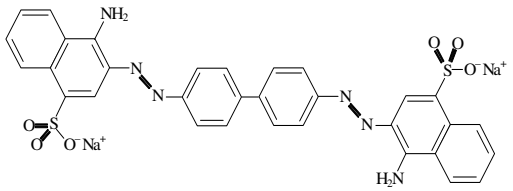
Water pollution control is at present one of the major thrust areas of scientific research. Colour removal in particular, has recently become an area of major scientific interest (Moosvi *et al*., 2005). Dyes are released into the environment through industrial effluents from three major sources such as textile, dye stuff manufacturing and paper industries. One of the most pressing environmental problems related to dye effluents is the improper disposal of waste water from dyeing industry (Rajeswari *et al*., 2011).

Dyes are chemical substances, which are used to colour textile fabrics. Dyes are synthetic, aromatic and dispersible organic colorants, having potential application in various industries. Dyes include acidic, basic, azoic, chromic, diazoic dispersive, reactive sulphur and vat dyes. Approximately 1,00,000 commercial dyes are manufactured with an annual production of over $7'10^5$ metric tons (Campos *et al*., 2001; Mohan *et al*., 2002).

In the azo dyes the aromatic moieties are linked together by azo (– N = N –) chromophores, and they are the largest class of dyes employed in dyeing and printing processes. The downstream processes, *i.e.*, after printing, washing and finishing, generate large quantities of coloured waste water (Othman *et al*., 2011).

Congo red (sodium salt of benzidinediazo-bis-1-naphthylamine-4-sulfonic acid) with molecular formula $C_{32}H_{22}N_6Na_2O_6S_2$ has been reported to be a carcinogenic direct diazo dye, used for colourization of paper products (Jaladoni-Buan *et al*., 2010).



Crystal violet or gentian violet tris (4-dimethylamino) (phenyl) methylium chloride with