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Evaluation of Paper Effluent with Two Bacterial Strain and Their Consortia

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Abstract : As industrialization is inevitable and progress with rapid acceleration, the need for innovative ways to get rid of waste has increased. Recent advancement in bioresource technology paves novel ideas for recycling of factory waste that has been polluting the agro-industry, soil and water bodies. Paper industries in India are in a considerable number, where molasses and impure alcohol are still being used as raw materials for manufacturing of paper. Paper mills based on nonconventional agro residues are being encouraged due to increased demand of paper and acute shortage of forest-based raw materials. The colouring body present in the wastewater from pulp and paper mill is organic in nature and is comprised of wood extractives, tannin, resins, synthetic dyes, lignin and its degradation products formed by the action of chlorine on lignin which imparts an offensive colour to the water. These mills use different chemical process for paper manufacturing due to which lignified chemicals are released into the environment. Therefore, the chemical oxygen demand (COD) of the emanating stream is quite high. This paper presents some new techniques that were developed for the efficiency of bioremediation on paper industry. A short introduction to paper industry and a variety of presently available methods of bioremediation on paper industry and different strategies are also discussed here. For solving the above problem, two bacterial strains (Pseudomonas aeruginosa and Bacillus subtilis) and their consortia (Pseudomonas aeruginosa and Bacillus subtilis) were utilized for the pulp and paper mill effluent. Pseudomonas aeruginosa and Bacillus subtilis named as T–1, T–2, T–3, T–4, T–5, T–6, for the decolourisation of paper industry effluent. The results indicated that a maximum colour reduction is (60.5%) achieved by Pseudomonas aeruginosa and COD reduction is (88.8%) achieved by Bacillus subtilis, maximum pH changes is (4.23) achieved by Pseudomonas aeruginosa, TSS reduction is (2.09 %) achieved by Bacillus subtilis, and TDS reduction is (0.95 %) achieved by Bacillus subtilis. When the wastewater was supplemented with carbon (glucose) and nitrogen (yeast extract) source and data revealed the efficiency of Bacillus subtilis, having more with glucose than Pseudomonas aeruginosa.

Keywords : bioremediation, paper and pulp mill effluent, treated effluent, lignin
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