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Review

A Recent and Systemic Approach Towards Microbial Biodegradation of Dyes from Textile Industries

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Abstract: The textile industry generated a series of synthetic dyestuffs that threatened environmental protection. Azo dyes, widely utilized in textile, paper, fruit, leathers, cosmeceuticals and pharmaceutical fields, account for most of the dyestuffs made. Since they have colour fastness properties, stability, and susceptibility to oxidation, existing effluent treatment methods cannot entirely strip different dyes from effluents. Under certain environmental factors, bacteria decolourize and degrade dyes. The treatment process is cheap, environmentally safe, and can be used on various dyes. However, textile plant wastewater can produce many polluting chemicals and dyes. Environmental legislation is increasingly being enacted to regulate mainly azo-based dyes in the environment. The potential of the microbes for the decolourization of dyes and metabolizing them is long-known knowledge. The toxic components of dyes challenge a potential threat to all the living forms of life. Though both natural and synthetic dyes are used for the colourization of textiles, only synthetic ones are challenging to decolourize. Microbial-based bioremediation of dyes has been studied and reviewed primarily to accelerate dye degradation. The various piece of the literature revealed that the majority of these dye removal microbes belong to mainly white-rot fungi, a consortium of anaerobic bacteria. In addition to this, there are several (genetically engineered microorganisms) GEMs that remediate dyes efficiently. Here in the current review, the authors have tried to bridge the existing gap in the bioremediation of dyestuff. Moreover, the authors have also tried to provide the latest trend in this field. This study will surely benefit the industries and researchers related to dyestuffs by maintaining eco-friendly approaches.

Keywords: bioremediation; bacteria; fungi; microalgae; consortium; laccase; white-rot fungi

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1. Introduction

Over the last few decades, the utilization of dyes has increased drastically due to the rapid industrialization of dye-based industries and the increase in demand for textiles and