

Production, Optimization, Characterization, and Kinetics of a Partially Purified Laccase from *Pleurotus citrinopileatus* and Its Application in Swift Bioremediation of Azo Dyes

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Abstract : Background: In the present investigation the efficiency of laccase (benzenediol: oxygen oxidoreductase, EC 1.10.3.2) from *Pleurotus citrinopileatus* was assessed for the decolorization of azo dyes. Aim: Enzyme production, characterization and kinetics of a partially purified laccase from *Pleurotus citrinopileatus* were determined for its application in bioremediation of azo dyes. Methods & Results: Laccase has been partially purified by using 80% ammonium sulphate solution. Total activity, total protein, specific activity and purification fold for partially purified laccase were found to be 40.38U, 293.33mg/100ml, 0.91U/mg and 2.84, respectively. The pH and temperature optima of laccase were 5.0 and 50°C, respectively, while the enzyme was most stable at pH 4.0 and temperature 30°C when exposed for one hour. The Km of the partially purified laccase for substrates guaiacol, DMP (2,6-dimethoxyphenol) and syringaldazine (3,5-dimethoxy-4-hydroxybenzaldehyde azine) were 60, 95 and 26, respectively. This laccase has been tested for the use in the bioremediation of azo dyes in the absence of mediator molecules. Two dyes namely congo red and bromophenol blue were tested. Discussion: It was observed that laccase enzyme was very effective in the decolorization of these two dyes. More than 80% decolorization was observed within half an hour even in the absence of mediator and their lower Km value indicates that efficiency of the enzyme is very high. The results were promising due to quicker decolorization in the absence of mediators showing that it can be used as a valuable biocatalyst for quick bioremediation of azo dyes. Conclusion: The enzymatic properties of laccase from *P. citrinopileatus* should be considered for a potential environmental (biodegradation and bioremediation) or industrial applications.

Keywords : azo dyes, decolorization, laccase, *P.citrinopileatus*

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