Abstract

Ligninolytic fungi can be used for remediation of pollutants in water and soil. Extracellular peroxidases and laccases have been shown to oxidize recalcitrant compounds in vitro but the significance of individual enzyme levels in vivo remains unclear. This study documents the amounts and activities of Mn-dependent peroxidase (MnP) and laccase (Lac) in species of ligninolytic fungi *Irpex lacteus* and *Pleurotus ostreatus* grown in packed-bed bioreactor and their effect on degradation of a number of synthetic dyes. White rot fungi were grown in culture immobilized on polyurethane foam (PUF) and pine wood (PW) to study the effect of growth conditions. When comparing PUF- and PW- immobilized cultures six-fold MnP and two-fold Lac were detected in the strain *I. lacteus* and six-fold Lac in *P. ostreatus*, when grown on PUF. No lignin peroxidase (LiP) was detected in either immobilized culture. Both immobilized cultures were able to rapidly decolorize various synthetic dyes. The respective values of decolorization of Bromophenol Blue, Reactive Orange 16, Copper (II) phthalocyanine, Remazol Brilliant Blue R dye used at 150 μg ml^{-1} and Methylene Blue dye used at 75 μg ml^{-1} were by *I. lacteus* 100, 99, 100, 95, 99% and by *P. ostreatus* 83, 97, 99, 90, 89% within 14 days. Reusability and regenerative capacity of the immobilized cultures, important for application to water bioremediation, were documented.