

Enhancement of Lignin Bio-Degradation through Homogenization with Dimethyl Sulfoxide

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Abstract : Bio-decomposition of lignin by Basidiomycetes in the presence of dimethyl sulfoxide (DMSO) was investigated. The addition of 3-5 vol% DMSO to lignin aqueous media significantly increased the lignin solubility based on UV absorbance. After being dissolved in DMSO, the thermal evolution profile also changed significantly, yielding more high-MW organic carbon at the expense of recalcitrant elemental carbon. Medical fungi *C. versicolor*, *G. lucidum* and *P. pulmonarius*, were observed to grow on the lignin in media containing up to 15 vol. % DMSO. Further detailed product characterization by chromatographic methods corroborated these observations, as more low-MW phenolic products were observed with DMSO as a co-solvent. These results may be explained by the high solubility of lignin in DMSO; thus, the addition of DMSO to the medium increases the lignin availability for microorganisms. Some of these low-MW phenolic products host a big potential to be used in medicine. No significant inhibition of enzymatic activity (laccase, MnP, LiP) was observed by the addition of up to 3 vol% DMSO.

Keywords : basidiomycetes, bio-degradation, dimethyl sulfoxide, lignin

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