Biodegradation of Bisphenol A, an Endocrine-Disrupting Chemical, by Trametes versicolor and Pleurotus ostreatus

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Endocrine-disrupting chemicals (EDCs), such as bisphenol A (BPA), are a wide group of natural and synthetic compounds that influence or inhibit the natural functions of the endocrine system. Because of their structural resemblance to natural hormones, EDCs can act as hormone mimics and negatively disrupt, even at very low concentrations, secretion, transport, metabolism, and binding processes. BPA is used in the synthesis of plastics and it is found in many everyday products, such as food and drinking packaging. BPA tends to bioaccumulate in the environment and its exposure has been related to the development of cancer, type II diabetes, and obesity. Therefore, it is crucial to develop new methods to eliminate BPA presence in the environment. In this study, Trametes versicolor and Pleurotus ostreatus, two white-rot fungi, were used to evaluate their ability to degrade BPA in water samples via HPLC in Erlenmeyer flasks. Both fungi eliminated 100% of the concentration of 5.65 mg/L of BPA within six days. Moreover, the enzymatic activity of two extracellular enzymes, laccase and manganese peroxidase, was evaluated through enzymatic assays. Furthermore, the ability of T. versicolor to degrade BPA in a fluidized bed reactor was evaluated, resulting in a 100% elimination of BPA (10.2 mg/L) within 48 hours. Finally, the ability of laccase purified from T. versicolor to degrade BPA was assessed. Laccase could remove 55.06 % of BPA (10.5 mg/L) within 24 hours. The results of this study show that T. versicolor and P. ostreatus are promising fungi for the bioremediation of wastewaters contaminated with BPA and that both the intracellular and extracellular enzymatic system of these fungi are involved in BPA degradation.

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