Pleurotus ostreatus as a More Sustainable Alternative to the Kraft Method in Papermaking

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Pleurotus ostreatus is a common kind of white rot fungi, which possess the unique ability to degrade lignin into CO2 and H2O. The Kraft method is the most common pulping method for papermaking and poses serious issues, generating freshwater contaminants and emitting reduced sulfur compounds that contribute to global warming and increase risks of malignant diseases with long-term exposure. This project evaluates the efficiency of Pleurotus ostreatus in degrading lignin in rice straw and corn husk over a period of 14 days, as a less wasteful method compared to the Kraft method. The lignin degraded was hypothesized to increase as the time period increased. The experiment was conducted with four steps: preparation and pasteurization of substrate, inoculation of Pleurotus ostreatus, separation of mycelium and substrate via centrifugation, and quantification of lignin degraded. Lignin was quantified by measuring the absorbance at 400 nm of samples dissolved in acetyl bromide, with measurements taken every day. Lignin concentration in molarity was calculated using the Beer-Lambert Law. The average absorbance at 400 nm for three trials decreased, and the lignin concentration decreased proportionally. The data support the hypothesis, as the lignin degraded did increase with an increase in time period for both substrates tested. The 14 day period also yielded similar degradation to a control bleaching treatment, suggesting that Pleurotus ostreatus treatment is a promising alternative to Kraft method bleaching.

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