463d Detailed Analysis of Modifications in Lignin after Treatment with Cultures Screened for Lignin Depolymerizing Agents

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Lignin due to its intimate association with cellulose and hemicellulose forms a barrier to enzymatic attack. Termites, beetles and other arthropods can digest decaying wood and other lignocellulosic plant litter. Lignin-degrading filamentous bacteria have been isolated from the termite gut. Bacterial lignin degradation has also been reported to be more specific than with fungal systems, an advantage, leading to many industrial applications like vanillin, adhesives, binder for laminated or composite wood products, etc.

Screening of different inoculum sources for lignin depolymerization was conducted. Sources selected were cultures obtained after dissection of guts of various insects like termites, beetles etc. that are known to digest wood. Other sources included cow rumen/dung, deer dung, extremophiles from Yellowstone National Park, and soils high in lignin content. Simultaneous fermentations with Geotrichum Klebahnii (Slavikova, 2001), a yeast-like strain, Trametes cingulata and Phanerochaete chrysosporium from ATCC were used as references for their documented ability to depolymerize lignin.

Detailed analysis with Near Infrared Spectroscopy (NIR) and Atomic Force Microscopy (AFM) along with HPLC (UV detector) were conducted for the sources showing potential for lignin degradation. Spread plate techniques, gram staining and Biolog were used for isolation and identification of the cultures showing potential. Depolymerization was confirmed on the HPLC, AFM and NIR. The molecular size range reduced from 250-650 nm to 135-220 nm.