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# Trapping Lignin Degrading Microbes In Tropical Forest Soil

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Lignin in feedstock plant material represents a barrier to more efficient plant-to-biomass conversion and can also hinder enzymatic access to cellulose. For this reason, it is critical to develop a way to degrade recovered lignin for next generation feedstock-derived biofuels. While the best-known ligninases are fungal, bacteria are more amenable to emerging cellulosic biofuels technologies. Tropical rain forest soils in Puerto Rico are likely dominated by bacterial decomposers because of the frequent anoxic conditions and fluctuating redox characteristic of these soils, so we focused here to search for novel bacterial lignase producers. To do this, we buried bug traps containing lignin-amended and unamended biosep beads in the soil and incubated them for 1, 4, 13 and 30 weeks. At each time point, phenol oxidase and peroxidase enzyme activity was found to be elevated in the lignin-amended versus the unamended beads, while cellulolytic enzyme activities were significantly depressed in lignin-amended beads. Quantitative PCR of bacterial communities showed more colonization in the lignin-amended compared to the unamended beads after one and four weeks, which attenuated over the course of the incubation. The microbial community was analyzed by microarray (PhyloChip) and by pyrotag sequencing of the community16S ribosomal RNA genes. Community trends were strongly driven by time but also lignin-amendment to the beads. These techniques also allow us to identify which taxa were increased in lignin-amended compared to unamended beads, which included representatives from the phyla Actinobacteria, Firmicutes, Acidobacterial and Proteobacteria.

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