



TECHNOLOGY SOLUTION

Environment



Soil Remediation With Plant-Fungal Combinations

Ectomycorrhizal mediated remediation of phenolic-based contamination

This process applies to remediation and restoration of soils contaminated by fuel, polychlorinated biphenyl wastes, etc. While there can be a general beneficial effect of microbial communities, individual plant-fungus combinations can vary in their efficacy in removal of pollutants from the environment. Selection of the most effective combination of plants and fungi is very important for achieving the desired benefits. Not all fungi are created equal as some die off in contaminated soils. Having a set of enzymes from fungi specifically adapted to conditions in contaminated soils and use of native plant/fungal combinations is a huge advantage. Ectomycorrhizal (EM) mediated remediation of phenolic-based contamination through use of specifically adapted Soil and enzyme utilizes plant/fungal combinations that are specifically adapted to conditions created by phenolic application to soils and abilities of ectomycorrhizal fungi to oxidize these compounds. This platform can be adapted to other ecosystems through field assessments of the EM community in each new site.

BENEFITS

- Increased resistance to environmental extremes
- Fast response, high selectivity
- Enhances naturally occurring species ability to decontaminate soil
- Cost effective and low maintenance
- Use of native plant/fungal combinations
- Flexible platform



THE TECHNOLOGY

The technology builds on the existing notion that establishment of trees in contaminated soils can be enhanced through the use of ectomycorrhizal (EM) fungi. EM fungi impart resistance to soil extremes such as high temperature, high acidity and heavy metal contamination. This process for soil remediation utilizes specific plant/fungal combinations that are specifically adapted to conditions created by phenolic application to soils, and abilities of ectomycorrhizal fungi to oxidize these compounds. This is done by taking advantage of the ability of native fungi to upregulate enzyme genes in response to changes in host physiological condition and hence enhance natural phenolic oxidation in soils by up to 5-fold. Ectomycorrhizal mediated remediation of phenolic- based contamination through use of specifically adapted ectomycorrhizal fungi and enzymes utilizes the findings that EM fungi in the genera *Russula* and *Piloderma* react with positive growth responses to phenolic-based soil contamination. The activities of enzymes that oxidize these compounds increase in activity by 5 fold when the host tree is partially defoliated, which in turn imparts an increase in phenolic oxidation in soils by a similar amount. Defoliation is done by pine needle removal, where 50% of the needles are removed. This process is performed each year on new growth to maintain defoliation.



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APPLICATIONS

The technology has several potential applications:

- Oil and gas industry
- Environmental remediation
- Phytoremediation
- Enzymatic bioremediation
- Clean up of soil contamination by spills of solvents, including diesel fuels
- Habitat restoration
- Land Remediation

PUBLICATIONS

Patent No: 8,759,057