

# **Mycorrhizal Fungi-Beneficial Tools for Mineland Reclamation and Christmas Trees**

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Abstract-Two forestry-related areas where the mycorrhizal fungi have provided consistent benefits have been mineland reclamation and the Christmas tree industry. Selected ectomycorrhizal and endomycorrhizal fungal species have been successfully utilized in the production of tailored higher quality bareroot and container seedlings for these specific applications. A major factor affecting the successful application of this unique biological tool is the selection of the most favorable and compatible mycorrhizal fungus-host tree seedling species combination for the intended application.

## **MINELAND RECLAMATION**

Both ectomycorrhizal and endomycorrhizal fungi have been successfully utilized during the past several years in the production of high-quality tailored Mycor Tree™ seedlings, shrubs and grasses for mineland reclamation projects in the eastern and western United States. Consistent benefits include increased tree and shrub survival and growth along with increased and better quality native grass establishment. One of the best mineland reclamation success stories involves the Ohio abandoned mineland reforestation project using selective pine and hardwood bareroot seedling species in combination with the ectomycorrhizal fungus, *Pisolithus tinctorius* (PT). During the past 15 years, the Ohio Division of Reclamation has successfully used 3.5 million PT-Inoculated pine and oak seedlings to reclaim over 2,000 acres of previously abandoned mineland (AML) sites. Consistent benefits continue to be increased tree survival and early growth on these very harsh stressful planting sites. Typical site characteristics include highly acidic (pH 3 or less), low fertility and soil water storage, high surface soil temperatures, and low rainfall (droughty) conditions. Since 1981, pine and oak tree seedling survival has averaged over 85% on the PT-tree plantings with less than 5% planting failures. An important consideration is that none of these trees have received any fertilization, amendments, (i.e., sewage sludge) or irrigation. In previous reclamation plantings on these same type sites with nursery-run seedlings of the same tree species but with only natural ectomycorrhizae, tree survival averaged less than 50 % and more than 75% of the plantings were failures and required replanting. The Ohio reforestation AML reclamation program with PT-inoculated seedlings has also significantly reduced reclamation costs. The reforestation cost in 1995 was \$354.00/acre with the added PT inoculation costs being \$45.00/acre or approximately \$.03/seedling. The total cost of the PT reforestation AML reclamation program between 1981 and 1995 has been approximately \$800,000. In comparison, using traditional AML reclamation procedures, this program would have cost approximately \$14 million. Consequently, the use of PT-inoculated seedlings has represented a 94% savings to the Ohio AML reclamation program.

## **CHRISTMAS TREE PRODUCTION**

Several selected ectomycorrhizal and endomycorrhizal fungi have been successfully utilized

in the production of higher-quality bareroot and container Mycor Tree™ seedlings for Christmas tree production. Specific mycorrhizal fungi-Christmas tree species combinations have been determined to be most compatible and favorable in providing positive tree host responses. These include PT with the pines, a *Hebeloma* sp. with the true firs, a *Laccaria* sp. with Douglas-fir and the spruces and several endomycorrhizal (vesicular-arbuscular mycorrhiza) fungi with exotic tree species such as Leyland cypress. Several fungal inoculum types and inoculation techniques are also available including the vegetative and spore inoculants of ectomycorrhizal fungi and endomycorrhizal spore inocula for bareroot and container nursery inoculations. Also, there are root dips containing selected Mycor Tree ectomycorrhizal (PT, Hebeloma, Laccaria) and endomycorrhizal fungi for treating seedling transplants for field planting sites. Christmas tree benefits include increased survival on droughty and substandard planting sites, increased growth for shorter rotations, increased nutrient availability and efficiency for decreased fertilizer requirements, improved tree quality including needle length, density, color, and retention, and increased root disease (i.e., Phytophthora root rot) resistance. Mycorrhizal fungal inoculation costs range from less than \$.01 seedling to \$.02- \$.03 /seedling depending on the inoculum type, inoculation procedure, nursery seedling density, and seedling size.

### **COMMERCIAL SOURCES**

The above along with a variety of additional mycorrhizal, biostimulant, and water management gel products are commercially available from Plant Health Care, Inc., 440 William Pitt Way, Pittsburgh, PA 15238. Requests for a product catalog, price listing, additional information and product orders can be made by calling our toll free number 800-421-9051 or by fax at 412-826-5445.

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