

Age and Site-Related Patterns of Carbon Allocation to Wood, Foliage and Roots on Reclaimed Kaolin Mines in Georgia.

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Abstract: We quantified merchantable stand volume, leaf area indices (LAI), and root densities in twelve *Pinus taeda* L. forests growing on reclaimed kaolin mines in Georgia. Stands were 11 to 36 yrs old, and formed two productivity classes. Projected wood volume on the poor sites ranged from 104 to 142 m³/ha and from 164 to 298 on the better sites. LAI was not related to age on either the good or poor sites. LAIs reach their maximal values early in stand development (<12 yrs). Fine roots (0-1 mm) within the upper 1 m were most abundant on the poorer sites. Roots were nearly absent at depths >50 cm in stands aged 14 or less, but nearly equal in density to surface roots in the older stands. Stand age was strongly and negatively related to fine root density on both site types. Densities of larger, more perennial roots (1-2 mm) decreased with stand age on poor sites and increased on good sites. Stand productivity is closely related to LAI, and root densities show that trees allocate more energy into fine, absorbing roots on the poorer sites. Deep fine root densities indicate that trees must explore progressively greater volumes of soil to meet water and nutritional needs in reclaimed soils.

Mycorrhizal Fungi + Trees -- Practical Beneficial Tools for Mineland Reclamation.

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Abstract: Successful consistent revegetation of drastically disturbed sites (ie., acid coal spoils and mineral waste dumps) throughout the U.S. and several foreign countries has been achieved by using the biological "tools" -- Mycor Tree™ seedlings and native shrub and grass species. These unique plants are custom-grown in bareroot and container nurseries with selected mycorrhizal fungi. On disturbed sites, specific mycorrhizal fungi such as *Pisolithus tinctorius* (PT) or VAM provide significant benefits to the plant symbionts through increased water and nutrient absorption, decreased toxic materials absorption, and overall plant stress reduction. During the past 15 years, the Ohio Division of Reclamation--Abandoned Minelands Project (AML) has utilized the combination of the PT fungus and reforestation to significantly improve the effectiveness and reduce the cost of AML projects. Since 1981, over 3.5 million PT-inoculated pine and oak seedlings have been planted on approximately 2,500 acres of unreclaimed AML sites. Tree survival has averaged over 85 percent in the PT-inoculated tree plantings with few failures as compared with less than 50% survival and over 75% failures in previous plantings with the same noninoculated tree species. From 1981 to 1995, the 2,348 acres reclaimed in Ohio have cost approximately \$832,000.00. Traditional reclamation would have cost approximately \$14 million and represents a 94% cost reduction. The total PT reforestation cost in 1995 was \$354.00 per acre and the added cost of the PT-inoculated seedlings is approximately 13% (\$45.00/acre) or \$.03 per seedling. This is a minute expense when compared to conventional AML reclamation costs (\$6,000/acre). Interest in the application of this natural environmentally-friendly technology to mineland reclamation programs throughout the U.S. and abroad is expanding.