

CREATE A SUITABLE GROWTH MEDIUM FOR HARDWOOD SURVIVAL AND GROWTH¹

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Abstract: Surface mining in the Appalachian Region of the USA removes the eastern deciduous forest and reclaiming the mined land to a productive forest must consider soil depth, soil physical and chemical properties, soil compaction, ground cover competition, and tree species selection and planting. The Appalachian Regional Reforestation Initiative has adopted the Forestry Reclamation Approach which addresses these factors. The first step is to “create a suitable rooting medium for good tree growth that is no less than 4 feet deep and comprised of topsoil, weathered sandstone and/or the best available material.” Studies have been ongoing in several Appalachian states to evaluate tree survival and growth in weathered brown sandstone and in unweathered gray sandstone. Brown and gray sandstone are often substituted when insufficient native topsoil is available for replacement. In West Virginia, plots were constructed with 1.5 m of brown sandstone and 1.5 m of gray sandstone at the surface. Percent fines (<2 mm) in the upper 20 cm was 61% for brown sandstone and 34% in gray. Brown sandstone’s pH was 5.1, while gray sandstone’s pH was around 8.0. Two-yr-old seedlings of 11 hardwood species were planted. After 3 yr, tree survival was 86% on gray sandstone, 78% on brown sandstone. Average volume of all trees (height × diameter²) was significantly greater on brown sandstone (218 cm³) than gray sandstone (45 cm³) after 3 yr. Black locust (*Robinia pseudoacacia* L.) had the highest survival (100%) and significantly greater volume (792 cm³) than all other tree species. Survival of the other 10 species varied between 65% for tulip poplar (*Liriodendron tulipifera* L.) and 92% for redbud (*Cercis canadensis* L.), and volume varied between 36 cm³ for white pine (*Pinus strobes* L.) and 175 cm³ for tulip poplar. After 3 yr, brown sandstone appears to be a better topsoil substitute material due to the much greater growth of trees, but tree growth over time as these substitute materials weather will determine whether these trends continue.

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