



OSM TECHNOLOGY TRANSFER

APP

FINAL REPORT FACT SHEET

USDOJ Office of Surface Mining Reclamation and Enforcement

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REFORESTATION OF STEEP RECLAIMED SLOPES IN APPALACHIA: FOREST ESTABLISHMENT AND FUNCTION

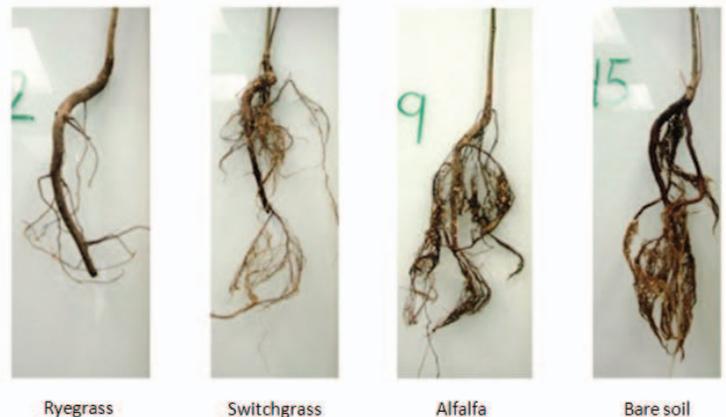
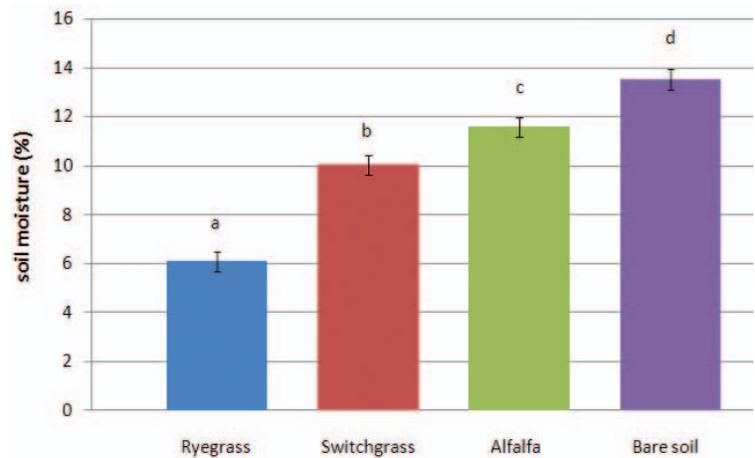
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Department of Forestry, Wildlife and Fisheries, and the University of Tennessee

Project Description and Objectives:

The goal of this technology transfer project was to improve our understanding of tree-compatible ground covers through field and greenhouse tests, and to promote the use of tree-compatible ground covers for reforestation. On the steep slopes of the Appalachian region, herbaceous ground covers are seeded during reclamation of coal mines, but these can hinder establishment of planted tree seedlings. This project identified two tree-compatible ground cover species, and documented the effect of ground covers on soil moisture and on tree seedling establishment. The results presented will help reclamation experts to select appropriate ground covers for sites with a land-use goal of forestry.

Applicability to Mining and Reclamation:

The short-term goal of reclamation to a land use of forestry is to establish vegetation that will control erosion, and jump-start succession toward a productive forest ecosystem capable of supporting multiple land uses. The selection of ground cover species may be important for ecosystem development, but prior to this project there was little information available on the influence of ground cover species on tree establishment. Recommended ground cover mixtures have been based on experience and observation.



ABOVE FIGURE: A comparison of soil moisture (top) and the growth of oak roots (bottom) in three herbaceous covers and in bare ground.

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Applicability to Mining and Reclamation (continued):

The need for less aggressive ground covers for reforestation has been expressed by researchers and regulatory agencies, along with a desire to base recommendations on scientific evidence. This study is among the first to clearly demonstrate that the choice of ground cover species has significant effects on tree establishment, soil moisture profiles, and the speed of natural succession on reclaimed mine sites. This knowledge, and the potential of alfalfa and switchgrass for reforestation, can be applied across the region and should be tested in other areas of the country in which these species grow. Information on species establishment can be applied regionally. This will allow reclamationists to better match tree species to site and slope position, improving reforestation success.

Methodology:

Northern red oak, black cherry, shagbark hickory and American chestnut were planted on plots without seeded ground cover, or seeded with switchgrass or alfalfa, on 3 reclaimed mine sites. In the greenhouse, northern red oak seedlings were grown with switchgrass, alfalfa, or annual ryegrass. Tree growth, root growth, soil moisture, and the density of planted and volunteer species were measured.

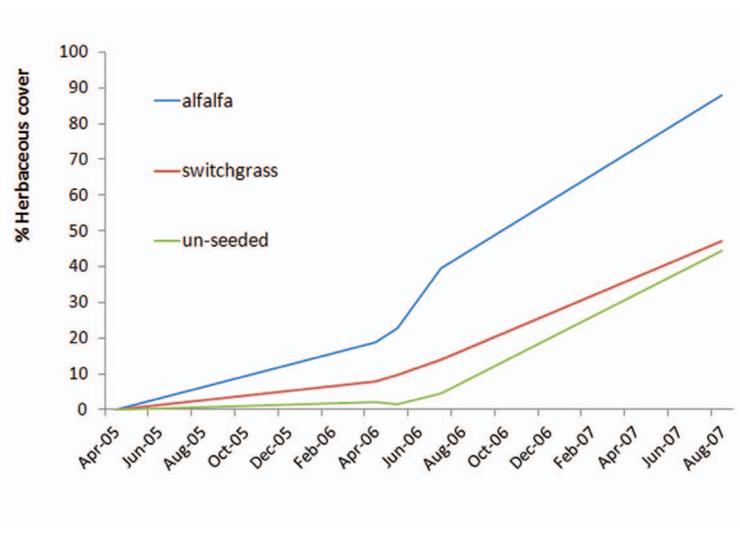
Results/Findings:

Ryegrass had the most negative influence on the growth of oak roots, and on soil moisture, while alfalfa had the

least influence. In the field, survival of the two shade-intolerant tree species was reduced by ground cover, while the survival of seedlings of intermediate tolerance was improved by the presence of ground cover. The development of herbaceous ground cover was more rapid in plots seeded with alfalfa.

University of Tennessee Tree Physiology Lab Website:

<http://fwf.ag.utk.edu/physlab/index.html>



ABOVE FIGURE: Development of ground cover on field plots, which includes both seeded and volunteer species.

Website Information:

The final project report can be found at <http://www.techtransfer.osmre.gov/NTTMainSite/appliedscience/2008/Projects/TNReforestEstandFunct08FR.pdf>

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