

Field Inoculation Rates of Mycorrhizal Fungi in Revegetation of Abandoned Coal Mine Lands. Robert K. Noyd and F. L. Pflieger, Department of Plant Pathology, University of Minnesota, St. Paul, MN 55108

Abstract: Abandoned coal mine land (AML) sites in southern Illinois and western North Dakota contain areas that are difficult to revegetate due to low fertility (1-3 mg kg⁻¹ N and P), little organic matter, and acidic (3-4, Illinois) or alkaline (~8, North Dakota) pH. Areas such as these may benefit from inoculation with arbuscular mycorrhizal (AM) fungi to assist in the establishment of vegetative cover. Potential sources of adapted mycorrhizal inoculum were found in reclaimed overburden sites with large AM fungal spore densities (100 and 33 spores g⁻¹ Illinois and North Dakota, respectively). Soils from these locations were used to determine an infective inoculation rate by a mycorrhizal inoculum potential (MIP) bioassay. Inoculum, consisting of rhizosphere soil and dried roots, was mixed into overburden in proportions of 0, 1, 2.5, 25, 50 and 100% (w/w), placed into containers, and sown with a single 12-day-old seedling of *Andropogon gerardii* Vitm. (big bluestem), a native prairie species known to respond favorably to AM fungi. After 14 days, shoots were dried and weighed and the root system was collected, cleared, stained, and assessed for percent root length colonized by AM fungi. An inoculum proportion of 1% in Illinois and 2.5% in North Dakota overburden produced moderate (16%) root colonization. These inoculum proportions were selected for rates of field inoculation because they were the lowest proportions that were both infective and effective in increasing shoot biomass of *A. gerardii*. In both soils, this level of root colonization was about one-third of the maximum colonization (50%) obtained with 25, 50, and 100% proportions of inoculum. Using adapted AM fungi and *A. gerardii*, MIP bioassays can be used to determine a field inoculation rate that has the potential to establish populations of beneficial mycorrhizal fungi and enhance chances of successful revegetation.

Additional Key Words: arbuscular mycorrhizal fungi, mineland reclamation, native prairie grasses, mycorrhizal inoculum potential, *Andropogon gerardii*