

EFFECTS OF ARBUSCULAR MYCORRHIZAE ON WATER STRESS TOLERANCE OF BIG SAGEBRUSH SEEDLINGS

by

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Abstract. Reestablishment of Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*) on mined lands has been difficult in the past even though it is widespread in the western U. S. Its reestablishment on mined lands has recently become law where wildlife is one of the post-mining land uses and it represented the primary premining shrub species. One hypothesis thought to contribute to its difficult reestablishment is the reduced or lack of mycorrhizae inoculum present in the disturbed topsoil and the resulting effect on the seedling's ability to extract water from the soil under the arid/semiarid climate of this region. A greenhouse study was conducted to evaluate the effect of mycorrhizae on sagebrush seedling water stress tolerance. Seedling ages evaluated ranged from 30 to 150 days. Seedling survival was greater for mycorrhizal seedlings compared to non-mycorrhizal seedlings when soil moisture tension was -2.5 to -3.8 MPa. At all ages, the degree of soil dryness necessary to cause sagebrush seedling mortality was significantly greater for mycorrhizal than non-mycorrhizal seedlings. Seedling age and mycorrhizal infection exhibited a significant statistical interaction, suggesting that as the sagebrush seedling aged, the benefits of arbuscular mycorrhizae (AM) increased the plants water stress tolerance. These findings lead us to conclude that topsoil management that prevents/reduces the loss of AM inoculum in the topsoil will significantly enhance the success of sagebrush establishment on mined lands.

Additional Key Words: rangeland, wildlife, native shrub, arbuscular mycorrhizal fungi.

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