Techniques for Enhancing Saltgrass Seed Germination and Establishment

Y. L. Qian,* J. A. Cosenza, S. J. Wilhelm, and D. Christensen

ABSTRACT

Because of its exceptional salinity tolerance, inland saltgrass \[Distichlis spicata\] has great potential for use as a turfgrass and revegetation species of saline sites. However, saltgrass seeds have a low germination rate due to seed dormancy. Three experiments were conducted to evaluate different seed treatments to enhance germination and establishment of inland saltgrass. In Experiment I, seven different seed treatments were tested for their ability to enhance germination percentage in the growth chamber and compared with a control of no treatment. These treatments included treatments with hot water, hydrogen peroxide (H\(_2\)O\(_2\)), sulfuric acid (H\(_2\)SO\(_4\)), potassium nitrate (KNO\(_3\)), bleach, machine scarification, stratification, and hand nicking. Results indicated that germination percentage was increased only by stratification, hand nicking, and machine scarification treatments as compared with the control. In Experiment II, machine scarification, stratification, hand nicking, and the control were tested in the growth chamber. Eland nicking, scarification, and stratification increased percentage germination from 13.0% to 54.0 to 61.7%. Stratification resulted in the fastest germination, followed by hand nicking and scarification. Experiment III was conducted in the field, and seed treatments included machine scarification, stratification, and the control. Two months after seeding, pints seeded with stratified and scarified saltgrass seeds established adequate plot coverage as a turf, whereas the coverage for the control was inadequate, exhibiting inferior turf quality. In summary, stratification and machine scarification improve germination and establishment of seeded saltgrass.

Inland saltgrass, native to Western America, is a dioecious, rhizomatous, perennial, salt tolerant, warm-season grass. Inland saltgrass is commonly found in saline environments, including salt and alkali salt flats, and along the sides of highways that are frequently subjected to winter deicing with salts (Nielson, 1956; Gould, 1968; Hansen et al., 1976). Mature inland saltgrass stands have been reported to tolerate full strength seawater soil salinity (approximately 36 000 to 43 000 mg L\(^{-1}\), i.e., 56 to 67 dS m\(^{-1}\)) under dry salt playa conditions (Kemp and Cunningham, 1981; Dahlgren et al., 1997). Alshammary et al. (2004) found that saltgrass shoot growth was not reduced as salinity increased from control to 23 dS m\(^{-1}\) and root growth was stimulated at salinity levels ranging from 5 to 20 dS m\(^{-1}\). In laboratory experiments, Hansen et al. (1976) found that maximum growth of saltgrass was obtained at 15 000 ppm (about 23 dS m\(^{-1}\)) of soluble salts in nutrient solution cultures.

MATERIALS AND METHODS

Seed Sample Collection and Pregermination Treatments

Saltgrass seedheads were collected in October 2004 from an Arkansas River riparian area (for Experiment I). For Experiments II and III seedheads were collected in August 2001 and