SEED PRIMING FOR ENHANCING GERMINATION RESPONSE UNDERWATER, SALT AND TEMPERATURE STRESS[1]

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Abstract: Seed priming is a pregerminative seed treatment in which seeds are equilibrated at a subgermination water content that allows water uptake but prevents radicle extension. Germination enhancement by seed priming may reflect metabolic repair processes, a buildup of germination metabolites, and/or osmotic adjustment during imbibition. The magnitude of the priming effect depends upon the priming solute used, priming water potential, priming duration and whether the seeds are redried after treatment. A matric priming system was used to enhance germination response of four bunchgrass species that are native to the Great Basin region of the western United States. Seeds of bluebunch wheatgrass, thickspike wheatgrass, bottlebrush squirreltail and sandberg bluegrass were evaluated to determine optimal priming conditions of temperature, water potential, and treatment duration. Optimal priming conditions were found to be at intermediate water potential and treatment duration that would normally result in radicle extension if the seeds were not redried after treatment. Primed and nonprimed seeds were evaluated for post-treatment temperature, water potential and specific salt effects on germination response. Primed seeds exhibited significant germination enhancement in water, temperature and salt stress environments. Primed and nonprimed seeds were planted in the field on twelve dates over a two year period and monitored for seedling emergence. Seedbed temperatures were measured hourly, transmitted to the laboratory, and used to program environmental chambers to simulate field-variable temperature regimes. Germination response in the laboratory was compared to field emergence patterns for equivalent temperature scenarios. The magnitude of seed enhancement was similar for both laboratory germination and field emergence.

Additional Key Words: Seedbed, germination enhancement, stress response

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