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Salt Tolerance of Germinating Alfalfa Seeds

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PROCEDURES

Plant..... Scarified seeds not previously treated with fungicides or inoculated

Container ..... 100-mm petri plates containing a single piece of Whatman no. 2 filter paper

Media..... Seeds are germinated in eight concentrations of NaCl: 0.00, 0.50, 0.75, 1.00, 1.25, 1.50, 1.75, and 2.00% (wt/wt) in deionized water; these salt treatments may also be expressed as 0.0, 85.6, 128.3, 171.1, 213.9, 256.7, 299.4, and 342.2 mM NaCI solutions; twenty-five scarified seeds are placed in a petri plate, 4.5 mL of an appropriate salt solution is added, and the plate sprayed with 0.75 mL of 0.8% aqueous solution of a fungicide (0.0006g Phenyl mercuric ammonium acetate); osmotic values of the germination media are verified as mmol kg^{-1} with a vapor pressure osmometer and converted to MPa units by means of the following empirical equation obtained from S. E. Smith (1988, Personal Communication) MPa = [0.173 - (0.0269)(mmol kg^{-1})] x 0.10

No. of reps ..... 2 replications in a randomized complete block design have been sufficient to differentiate populations such as plant introduction accessions and cultivars; more replications may be required for other types of breeding materials; incomplete block designs may be appropriate if the number of populations to be evaluated is relatively small

Germination..... Sufficient vacuum grease is placed under the top of each lid to seal the petri plate and prevent evaporation; the plates are placed in a dark growth chamber or germination cabinet maintained at 25°C

Counts..... Germinated and hard seeds are counted after 7 days

DATA ANALYSIS

Germination in each plate is computed by subtracting the number of hard seeds from 25 to obtain a corrected total. Divide the number of germinated seeds by the corrected total to obtain the fraction germinated. Adjusted germination is computed by dividing the fraction germinated in each plate by the germination of the same accession in the same replicate at the control (0.0 mM NaCl) treatment level and multiplying by 100 to convert to percent. The adjusted germination data are analyzed by probit procedures, as suggested by Carlson et al. (1). The statistic to be used as the standard descriptor is the osmotic potential (MPa) required to inhibit germination of 50% of the viable seeds, i. e., IC(50) values. The corresponding standard error will provide a measure of precision.

CHECK CULTIVARS

	Approximate Expected Reaction IC(50) (MPa)
Tolerant	
Malone	- 0.81
Mesa Sirsa	- 0.76
Susceptible	
Saranac	- 0.65
Rambler	- 0.58

SCIENTIST WITH EXPERTISE

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HELPFUL INFORMATION

Care should be taken that air movement within the chamber is not restricted excessively or condensation may occur inside the plates. The range of IC(50) values for the cultivars tested was -0.30 to -0.95 MPa. Nondormant germplasm is more tolerant than dormant germplasm.

REFERENCES

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