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Influence of salinity on seed germination of 10 alfalfa varieties

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Key words: alfalfa, *Medicago sativa*, salinity, germination rate

Introduction It is estimated that salinity affects at least 20% of world's arable land and brings more than 40% irrigated land to various degrees (Rhoades and Loveday, 1990). Alfalfa (*Medicago sativa* L.) is moderately sensitive to salinity and is considered as the most important forage crop. Germination is very important to the plant establishment in saline-soil region. The present investigation was aimed to study the effect of NaCl salinity on alfalfa germination.

Materials and methods Seeds of 10 alfalfa varieties were sterilized with 0.5% sodium hypochlorite solution for one minute and then washed twice with distilled water. Seeds were germinated on 2 sheets of 9 cm diameter filter paper in 10 cm diameter Petri-dishes at concentrations of 0, 50, 100, 150 mM NaCl with 10 ml solution. Each treatment included three replications, and fifty seeds were used for each replication. Germination was recorded at 24h intervals. After 10 days, ungerminated seeds were transferred to distilled water for 9 days to determine the recovery of germination.

Results and discussion The experimental results indicate that the difference of the germination rate for alfalfa varieties in the same NaCl concentration is significant and that the difference of germination rate for the same variety in the different NaCl is also significant. In general, salinity inhibited seed germination and increasing NaCl concentration significantly reduced germination rates (Table 1). The percentage of recovery from high salinity concentrations was higher than low concentrations. Under the treatments with 100, 150 mM NaCl solution, the percentages of germination and those after being transferred to distilled water were lower than the none-saline control, indicating that parts of the NaCl treated seeds have permanently lost their germination ability (Table 2).

Table 1 Germination rate.

Variety	Different concentration in the same variety				Different variety in the same concentration			
	NaCl concentration				NaCl concentration			
	0 mM	50 mM	100 mM	150 mM	0 mM	50 mM	100 mM	150 mM
Maverick	76.67a	42.00b	22.67b	0.67c	76.67def	42.00e	22.67de	0.67e
Vernal	87.33a	76.67a	18.00b	0.67b	87.33bcd	76.67bc	18.00e	0.67e
Pioneer5446	95.33a	87.33ab	76.00b	4.67c	95.33a	87.33ab	76.00a	4.67cde
Legend	62.67a	50.67ab	30.67b	0.67c	62.67f	50.67de	30.67cde	0.67e
Archer	67.33a	71.33a	40.00b	2.67c	67.33ef	71.33bc	40.00bcde	2.67de
ABI700	92.67a	84.67a	45.33b	2.67c	92.67abc	84.67ab	45.33bcd	2.67de
Dona Aan	95.33a	95.33a	72.67b	24.67c	95.33ab	95.33a	72.67a	24.67ab
Pierce	84.67a	83.33ab	63.33bc	43.33c	84.67ed	83.33ab	63.33ab	43.33a
CUF101	82.67a	84.00a	54.67b	18.00c	82.67d	84.00ab	54.67abc	18.00bc
Zhongmu No. 1	80.67a	64.00ab	42.00b	13.33c	80.67de	64.00cd	42.00bcd	13.33bcd

Table 2 Germination rate after transferred to distilled water in 10 alfalfa.

Variety	0 mM	50 mM	100 mM	150 mM
Maverick	0.00±0.00	7.33±2.31	20.67±3.06	40.00±4.00
Vernal	1.33±1.15	2.67±1.15	20.67±4.16	28.67±10.26
Pioneer5446	0.00±0.00	6.67±3.06	13.33±1.15	39.33±3.06
Legend	5.33±2.31	4.67±2.31	18.00±2.00	36.00±4.00
Archer	4.67±1.15	6.67±1.15	10.00±2.00	37.33±8.08
ABI700	0.67±1.15	2.00±2.00	18.00±5.29	42.67±9.02
Dona Aan	0.00±0.00	0.00±0.00	17.33±5.33	39.33±10.26
Pierce	0.00±0.00	1.33±1.15	8.67±3.06	23.33±5.77
CUF101	2.67±1.15	3.33±2.31	7.33±4.16	30.00±6.00
Zhongmu No. 1	3.33±1.15	7.33±3.06	8.67±1.15	46.00±12.17

Reference

J.D. Rhoades, J. Loveday. (1990) Salinity in irrigated agriculture. In American Society of Civil Engineers, *Irrigation of Agricultural Crops* (Steward B.A. and Nielsen D.R. eds), Am Soc. Agronomists, Monograph 30, 1089-1142.

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