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Effects of Salt and Drought Stresses on Germination and Seedling Growth of Pea (Pisum sativum L.)

Gamze OKÇU
University of Ankara, Faculty of Agriculture, Department of Horticulture, 06110 Dışkapı, Ankara - TURKEY
Mehmet Demir KAYA
University of Ankara, Faculty of Agriculture, Department of Field Crops, 06110 Dışkapı, Ankara - TURKEY
Mehmet ATAK
Mustafa Kemal University, Faculty of Agriculture, Department of Field Crops, 31034 Hatay - TURKEY

Abstract: The effects of salt and drought stresses at the water potentials of -2, -4, -6 and -8 bars induced by NaCl and PEG 6000 (polyethylene glycol 6000) each, on germination and early seedling growth, were investigated for 3 pea cultivars (Bolero, Sprinter and Utrillo). Electrical conductivity (EC) values of the NaCl solutions were 4.5, 8.8, 12.7 and 16.3 dS m^{-1}. Germination percentage, mean germination time, root and shoot length, and seedling fresh and dry weight were measured in the study. The objective was to determine genotypic differences among pea cultivars in terms of salt and drought stress and to determine factors (salt toxicity or osmotic stress due to PEG) inhibiting seed germination. The germination results revealed that the genotypes significantly differed for salt and drought stress. Bolero appeared to be more tolerant to salt stress, but Sprinter cv. gave higher values under drought stress. Both NaCl and PEG inhibited germination and seedling growth in all cultivars, but the effects of NaCl compared to PEG were less on germination and seedling growth. All cultivars were able to germinate at all NaCl levels without a significant decrease in germination, while a drastic decrease in germination was recorded at -6 bars of PEG. It was concluded that inhibition in germination at equivalent water potentials of NaCl and PEG was mainly due to an osmotic effect rather than salt toxicity.

Key Words: Pea (Pisum sativum L.), salt and drought stress, cultivar, germination, seedling growth

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