

# Turkish Journal of Agriculture and Forestry

Turkish Journal

of

Agriculture and Forestry

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## Effect of Salinity Stress on Dry Matter Production and Ion Accumulation in Hybrid Maize Varieties

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**Abstract:** The salt stress tolerance of 19 hybrid maize (*Zea mays* L.) varieties was tested in nutrient solution during the early growth stage under controlled environmental conditions. For the salt stress treatment, sodium chloride (NaCl) was applied to nutrient solution at a concentration of 250 mM for 6 days before the harvest. Plants were harvested after 17 days of growth and analyzed for shoot and root dry matter production, severity of leaf damage (necrotic patches on older leaves), and the concentrations of potassium (K), sodium (Na) and calcium (Ca) in the roots and shoots. The varieties differed greatly in their response to the NaCl treatment. The development time and severity of leaf symptoms caused by 250 mM NaCl were varied markedly among the varieties. Based on the severity of leaf symptoms, the varieties Maverik and C.7993 were classified as the most tolerant and sensitive varieties, respectively. The decreases in the shoot dry matter production as a consequence of the NaCl treatment were higher than the decreases in root growth. There was also a marked genotypic variation in concentrations of K, Ca and Na in roots and particularly in shoots. The higher salt tolerance in maize varieties based on the severity of leaf symptoms was associated with significantly lower Na concentrations in shoots. The K/Na and Ca/Na ratios were significantly greater in most of the tolerant varieties. The most sensitive variety, C.7993, contained a 4-fold greater Na concentration in shoots than the most tolerant variety, Maverik. The varieties RX.9292 and MF.714 also contained very high Na in shoots and showed severe toxicity symptoms on leaves. Besides Maverik, P.3394 and P.3223, with their low shoot Na concentrations, could also be considered tolerant varieties. Under salt treatment significant correlations were found between K/Na ratios and shoot dry matter production ( $r = 0.541^{***}$ ), K/Na ratios and leaf damage ( $r = -0.411^{***}$ ), and Ca/Na ratios and shoot dry matter production ( $r = 0.444^{***}$ ). The results indicate the existence of a large genotypic variation in tolerance to NaCl toxicity in maize that should be exploited in breeding programs aiming to develop maize varieties with high NaCl tolerance during the early growth stages. Among the ions measured, shoot Na concentration was a reliable screening parameter in ranking varieties for their tolerance to salt stress.

**Key Words:** Genotypic variation, ion accumulation, maize, salt stress, sodium chloride

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Turk. J. Agric. For., **30**, (2006), 365-373.

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