SALT RESPONSES OF FOUR COTTON GENOTYPES GROWN IN TWO SOILS

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Abstract

Cotton is one of the major crops grown in the semi-arid and arid region of the American Southwest, where secondary soil salinization is a prevalent consequence of evapotranspiration, improper crop management schemes, poor irrigation water, and saline soils. Cotton yield can adversely be affected through the variable interactions of plant responses to soil salinity. Although genetic variation of salt tolerance in cotton genotypes grown in saline conditions exists, no commercial cotton cultivars are known to be developed for salt tolerance and whether cotton genotypes respond to salt differently under different soil conditions is also poorly understood. The objective of this study was to investigate genotype x soil and genotype x salt treatment interactions, when four genotypes were grown in 1-gallon pots containing two different soils (loam and clay) under saline and non-saline control conditions over three plant growth stages. The experiment was a randomized complete split-split block design with the genotypes as the main plots, soils as subplots and salt treatments as sub-subplots and four replicates. The four genotypes were from a backcross inbred line population derived from the cross of *G. hirsutum* cv. Sure Grow 747 and *G. barbadense* cv. Pima S-7 followed by two backcrosses with SG 747 as the recurrent parent and three generations of self pollinations. Plant height was measured before salt treatment and significant differences due to genotype and soil were detected. The salt treatment (200 mM NaCl) was initiated after the 2nd true leaf stage (3 weeks after sowing-WAS) and applied every other day through the first growth stage (3 weeks after treatment-WAT, or 6 WAS), the second growth stage (6 WAT) and the third growth stage (9 WAT). Plant measurements were recorded on chlorophyll content, chlorophyll florescence, plant height, leaf length, node and fruit number, average internode length, and shoot biomass. Significant genotypic variation was observed in the first two growth stages, suggesting that screening for salinity tolerance in cotton is optimal within the first six weeks of salinity exposure (i.e., 9 WAS). Effects due to soil type were detected for few traits in one or two growth stages. However, effects from salt treatment were the most profound in that salt treatment significantly decreased all the plant growth characteristics in the three stages. The lack of genotype by soil interactions of the above phenotypic measures suggests soils have little to no bearing for screening for genotype tolerance or susceptibility to salinity in this experiment. The lack of genotype by treatment interactions suggests that non-saline control plants may not be needed when evaluating different genotypes for salt tolerance in cotton.