

Developing a Rapid and Efficient Method for Screening Chloride Tolerance in Soybean
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Salinity has been recognized as a constraint for soybean production in Arkansas. Fortunately, genetic variation in salt tolerance is available in the soybean germplasm bank. However, current screening methodologies for salt-tolerant genotypes are time-consuming and often ineffective because of their limitations in detecting and measuring plant response to salinity. The objective of this research was to develop a rapid visual method for screening soybean genotypes in response to salt stress based on foliar symptoms. Soybean seedlings were grown in hydroponics with 0, 40, 80, 120, or 160 mM NaCl. Visual foliar symptoms of excessive Na and Cl were evident at 26 days after planting (14 days in 120 mM NaCl treatment). The NaCl level of 120 mM was most effective for salt-tolerance screening based on visual foliar symptoms on a group of differential genotypes. Chloride includers ('Williams', 'Clark', 'HBK R4924', and 'Dare') exhibited interveinal chlorosis, while Cl excluders ('S-100', 'Lee 68', and 'HBK R5525') showed no chlorosis at the 120 mM NaCl level. At this critical selection level (120 mM NaCl), leaf Na and Cl concentrations were significantly higher in Cl includers than in Cl excluders. Average Na and Cl contents were 2.64 and 1.96 times higher, respectively, for Cl includers than for Cl excluders. There was a significant and negative correlation (-0.69) between relative root dry weight and Cl concentration in the leaf. This methodology is simple, rapid, and effective for selection of Cl tolerant genotypes with a minimum investment of cost and time. Research is ongoing to confirm the reproducibility of this method and to explore if plants grown in potting mix in the greenhouse to replace the hydroponic system.