Testing Salt Tolerance To Improve Crop Sustainability

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Cotton is a cash fiber crop impacting the economies of over 80 countries. Salinity, an abiotic stress, is a major issue affecting cotton yield and fiber production. Improving salt tolerance of cotton will facilitate efficient and sustainable use of agricultural land, maximizing crop yields for a rapidly increasing population. An in-vitro experiment was set up to evaluate the effects of different salt concentrations on the root mass, shoot mass, and root length of cotton plants. Two cotton varieties were used: U1, resistant to Fusarium oxysporum f.sp. vasinfectum race 4 (FOV4) due to mutations in glutamate receptor-like (GLR) genes, and CSX8308, which is susceptible. Four treatments were tested using Murashige and Skoog (MS) media: a control (0 mM) and three salt concentrations (50, 75, and 100 mM NaCl). Surface sterilized seeds of each variety (U1 and CSX8308) were placed on media in glass germination bottles and kept in a growth chamber with standard cotton growth conditions. After 10 days root and shoot masses were recorded and root length were scanned using Epson Twain Pro Scanner. The root scans were analyzed using WinRhizo software. Both varieties were stressed as salt concentrations increased; however, U1 was not affected until about 75mM, while CSX8308 showed significant stress beginning at 50mM. U1 also showed lower percent reductions for root masses, shoot masses, and root length while CSX8308 had higher percent reductions. Therefore, our results demonstrated that U1 has greater salt tolerance than CSX8308. These results prove that disease resistance could improve salt tolerance.

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