

**Screening and gene expression analysis of cowpeas and black-eyed peas for Aluminum tolerance.**

Aluminum toxicity is a prevalent issue in many acidic soils, especially in regions where liming is not possible. Developing varieties that are well-adapted to regional needs, such as low pH and aluminum toxicity tolerant, is one of the most sustainable ways to fortify food security. This experiment utilized 22 commercial cowpea [*Vigna unguiculata* (L.) Walp.] varieties with two treatments being a 0.5 mM CaCl<sub>2</sub> solution at pH 4.3 and a 0.5 mM CaCl<sub>2</sub> solution at pH 4.3 with 50  $\mu$ M AlCl<sub>3</sub>. Primary root length measurements were taken at 0, 24 and 48 hours after treatments began. Results show hydroponic systems are useful for screening cowpea under aluminum toxic conditions, as all cultivars showed reduced primary growth rates when treated with 50  $\mu$ M AlCl<sub>3</sub>. Lines with the lowest reduction in relative primary root growth rate after 24 and 48 hours of treatment included Mississippi Pinkeye 2 Purple Hull, Top Pick Brown Crowder, and Mississippi Silver, while the lines with the greatest reduction in relative primary root growth rate included White Acre, Texas Cream 8, and Queen Anne Blackeye. Other traits measured included average root diameter, root volume, and number of root tips. RNA was extracted from two lines, Mississippi Pinkeye 2 Purple Hull and White Acre, displaying the greatest difference in reduction of root growth rate after 24 hours of aluminum toxicity stress and will be used for RNAseq analysis. These results indicate the qualitative nature of this trait in cowpea and warrant further research into the causal genes and mechanisms responsible for aluminum toxicity tolerance.