

Phenotyping the US Mini-core Collection to Identify Drought Tolerant Peanut Genotypes Using Environmental Control Plots

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Drought is a major abiotic stress in peanut that can cause significant yield loss and reduce seed quality. Breeding for drought tolerance has been challenging due to multi-allelic affect and variable environmental factors. The US mini-core peanut germplasm collection provides a small and diverse genetic panel that can be evaluated to identify potential drought tolerant genotypes. This research aims to associate physiological, agronomic, and molecular plant responses to identify drought tolerant lines by evaluating 162 peanut accessions, including the US mini-core collection. Peanuts were evaluated during the 2017 and 2018 growing seasons, utilizing environmental control rainout shelters (Dawson, GA). A middle-season 30-day drought was applied at 70 days after planting followed by re-irrigation until harvest. Physiological measurements, such as specific leaf area (SLA), relative water content (RWC), and leaf dry matter content (LDMC) were taken every week during drought and one week following irrigation. Drought was rated on a scale of 1 (no wilting) to 5 (complete wilting) taken just before irrigation. Pod yield (pod weight and number) was measured at the end of the growing season. Correlation of measured traits was utilized to identify drought tolerant genotypes. A genome wide association study (GWAS) is in progress to identify quantitative trait loci (QTLs) associated with drought tolerance. Results will facilitate development of drought tolerant peanut varieties for the US peanut industry.