Above- and Below-Ground Evaluation of Peanut Genotypes for Improving Soil Water Acquisition and Utilization

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Advancing technologies are enhancing phenotyping efforts which are being used to identify superior crop traits for improving drought tolerance. Some of these phenotyping efforts have focused specifically on quantifying root system architecture (RSA) often making assumptions about root function and crop water use. The aim of this study was to characterize both the structure and function of above- and below-ground phenotypes to assess their ability to acquire and utilize soil water. Two peanut genotypes with contrasting root system architectures were grown *in-situ*. Mini-rhizotrons were installed to evaluate genotypic root architecture and root morphological developmental changes to early season water management. Over the growing season, measurements of leaf level gas exchange and soil water depletion were coupled with root system architecture evaluations across a range of soil water conditions. Soil water depletion around the roots visualized in the minirhizotron was positively correlated with transpiration indicating that this method is likely reflective of actual soil water uptake. Despite contrasting RSA among the genotypes, soil water uptake in the soil was primarily influenced by soil water availability in the soil profile, not simply having a greater amount of root presence in the soil. Evidence of stomatal sensitivity to soil drying also occurred when comparing the two genotypes. Phenotyping both above- and below-ground traits quantifying crop water availability and use can be used to screen germplasm for drought tolerance.