

Development of a New Protocol to Screen Peanut Genotypes with Superior Vigor by Assessing Root Architecture Traits

M. D. GOYZUETA* and B. L. TILLMAN, North Florida REC, Agronomy Department, University of Florida, Marianna, FL 32446; and D. L. ROWLAND, Agronomy Department, University of Florida, Gainesville, FL 32611.

Seed germination and vigor are important traits for peanut farmers, but are largely overlooked in the breeding process. One major hurdle in breeding for seed germination and vigor is the lack of an assay to discriminate among genotypes. The objective of this research was to identify a method to evaluate and select peanut genotypes, which exhibit superior seed germination and/or seedling vigor. Multiple genotypes developed by different breeding programs were assessed based on root traits including total root length, projected area, surface area, fine root length and principal root length by using *in situ* rhizotron chambers (RC). Root traits from the scans of the RCs were highly correlated ($p < .0001$) with the same trait measured after the removal of the roots from the RCs per the Pearson correlation analysis. This confirms that it is possible to use the RCs to assess early peanut root traits indestructibly. The correlation diminished at 14 DAP as compared to 7 DAP apparently because the roots expanded throughout the tube and were not visible against the tube wall, therefore the harvested roots tended to be greater in size and number compared to the tube scan. Root traits were more affected by the genotype effect, the treatment effect and their interaction at 7 than at 14 DAP. Therefore, it is suggested to make the assessment of root traits at 7DAP for better results. Seed germination and the seedling vigor index also correlated significantly ($p < 0.05$) with the analyzed root architecture traits, and it was possible to find differences among genotypes for seedling vigor index. When emergence in the field affected by cold temperatures was assessed, it was possible to identify that some genotypes performed better than others. The emergence percent also showed correlations ($p < 0.05$) with some of the root architecture traits. Suggesting that the root traits from the RCs are representative of the emergence under field conduction to some extent. The results from this study confirm the clear relationship between good development of the root system and seedling vigor index. Genotypes that had more robust root systems tended to have greater seedling vigor.