Screening Peanut Germplasm for Superior Root Growth

Craig Kvien, UGA, Tifton, (ckvien@uga.edu) 229.392.3507, Corley Holbrook, Peggy Ozias Akins and Cristiane Pilon

Objective: To identify peanut lines with superior root growth for use in peanut variety development and to aid development of molecular makers for this trait.

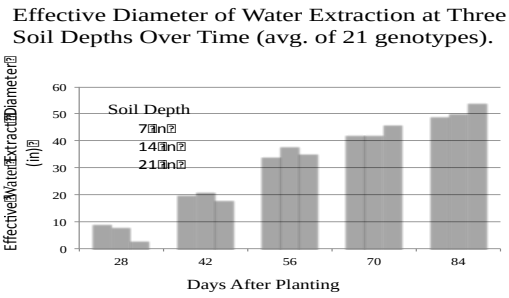
Rational & economic significance of project

Root growth is closely linked to shoot growth, and varieties with superior root growth are better able to explore the soil for water and nutrients and yield more. Superior root growth benefits irrigated and non-irrigated growers as it improves both nutrient and water use efficiencies.

Many studies have documented genetic differences in peanut root growth. Over the past several years we screened over 100 peanut lines for speed and depth of root growth under irrigated conditions. Many of these lines had root systems much larger than 06G, and many were smaller. For example, the effective volume of water extraction for A100 (one of the smallest root systems) was less than ½ the volume of drought tolerant selections C431-1-1 C431-1-6 and C75-13. Genotype ICG 1102 explored twice the soil volume at 18-22" that TUFRunner 511 had throughout the season.

Comparing 4 genotypes for Roots Growth at 3 soil depths
(Blue is better than Red)

		28 DAP **			42 DAP			56 DAP			70 DAP			84 DAP		
Depth (cm)	seed	0-15	20-35	40-55	0-15	20-35	40-55	0-15	20-35	40-55	0-15	20-35	40-55	0-15	20-35	40-55
Entry	g	-	-	-	-	-	-	-	cm	-	-	-	-	-	-	-
A100	0.80	15	15	9	38	40	49	66	63	73	87	81	87	106	108	103
C75-13	0.69	25	23	15	60	58	62	101	108	90	118	121	128	130	134	151
C431-1-1	0.51	21	15	20	52	65	58	91	106	106	130	129	139	147	147	156
C431-1-7	0.53	20	25	4	55	65	52	100	125	103	121	136	135	145	151	149



We believe these lines will help breeders and molecular biologists better define the number and location of the genes that control root characteristics, and expedite variety development with improved rooting characteristics.

In 2018 Dr Pilon with her post doc Dr. Thangthong will be studying the anatomy of peanut root systems. Dr. Thangthong's PhD research discovered that some peanut lines respond to drought by reducing the diameter of xylem vessels (which aid water movement in the plant), thus aiding the extraction of water from a drying soil profile.

Identification of peanut lines with superior root growth characteristics, and learning more about the genetics associated with root growth will lead to varieties that are more efficient in gathering water and nutrient from the soil, more resistant to stresses, and higher yielding.