IDT3-018 | Root distribution of drought resistant peanut genotypes in response to early season drought stress

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Drought limits peanut yield in the semi-arid tropics. Root traits are important as a selection criterion for improving the ability of crops to maximize water uptake. Peanut varieties with different drought resistance levels might be related to the difference in root responses and yield maintenance under drought. The objective of this study was to investigate the effect of early season drought on root distribution patterns of drought resistances peanut genotypes. A 2×3 factorial experiment was carried out and the treatment combinations were assigned in a completely randomized design with three replications for two years in a rainout shelter. Factor A consisted of two water regimes (well-watered and drought treatments),and factor B comprised of three peanut genotypes (ICGV 98305, ICGV 98324 and Tifton-8).The plants were grown in rhizoboxes with pin-board method. The data were recorded for root distribution pattern with a black sheet and scale bar to study whole root systems and root length was divided into 11 layers with 10 cm intervals. After water withholding, ICGV 98305 had significantly higher root length in deep soil layers under drought stress than under well-irrigated treatment. ICGV 98324 had a large reductions in root length in both upper and lower soil layers. Tifton-8 grown under drought had smaller root systems than under well-watered control for all root length in most soil layers, showing negative response to drought. The results suggested that ICGV 98305 had a high magnitude of root traits in deeper soil layer under early season drought might provide drought avoidance mechanism.

IDT3-019 | Root system architecture phenotyping of durum wheat reveals differential selection for a major QTL in contrasting environments

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This study reports the characterization of 183 elite durum wheat (*Triticum turgidum* ssp. *durum* Desf.) for RSA and shoot developmental traits. Plants were grown in controlled conditions up to the 7th leaf appearance (late tillering) using the phenotyping platform GROWSCREEN-Rhizo at the Institut für Bio und Geowissenschaften Pflanzenwissenschaften. The following RSA traits were measured: seminal root length, nodal root length, lateral root length, root system convex hull, root system width and depth distribution (twice per week). Measurements of leaf area, leaves number and tiller number were performed twice per week and SPAD measurements were collected twice along the experiment. Root dry biomass and shoot fresh and dry biomass were collected at the end of the experiment. A genome-wide association study (GWAS) based upon the Illumina Infinium 90K SNP assay identified many QTLs for RSA and/or shoot growth traits (p-value < 0.0001). GWAS confirmed a highly significant effect on adult plant root system width due to two major QTLs on chromosomes 6AL and 7Ac previously identified on seminal roots at the seedling stage (Maccaferri et al. 2016). Notably, haplotype frequency at one of the main QTL cluster on chromosome 7Ac found to be significantly associated with root depth, root system width, root specific weight and shoot/root ratio revealed a strong, contrasting selection pattern between the rainfed and the irrigated breeding programs conducted at ICARDA and CIMMYT, respectively, suggesting an indirect but major role of RSA in durum wheat breeding.