## Understanding the Physiological Basis of Carbon Allocation of Peanut Cultivars Under Water-Stress Conditions

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The second-largest peanut (*Arachis hypogaea* L.) producing region in the U.S is the semi-arid Texas High Plains (THPs) which experiences a high temperature and low precipitation. Growers are concern about the sustainability of the irrigated peanut production due to the rapid decline of the Ogallala aquifer, the source of irrigation. Hence, drought-tolerant peanut cultivar will most likely increase as it enhances the soil health, reduces irrigation footprint, and N inputs. Therefore, to understand the physiological basis of carbon allocation and identify the peanut cultivar to optimize the water use efficiency and regional production a field experiment was conducted at the USDA-ARS, Lubbock, Texas during the 2020 and 2021 growing season. An experiment was conducted with irrigation treatment (dryland and irrigated) and peanut cultivar (AG18, Georgia-09B, Lariat, and C7616) with four replications. The leaf gas exchange was measured using the infrared gas analyzer portable photosynthesis system, LiCOR-6800. The partitioning of biomass into the root, stem, leaf, and nut was done at physiological maturity. The net assimilation rate, stomatal conductance, and internal $CO_2$ concentration were 14%, 26%, and 26.3% higher in irrigated as compared to dryland treatment. Among cultivars, C7616 had a higher assimilation rate (13% and 7%), stomatal conductance (10.9% and 21.4%), and internal $CO_2$ concentration (4.7% and 3.9%) compared to Georgia-09B and Lariat, respectively. Also, carbon allocation towards root growth in dry land conditions was the greatest in C7616 (95% more) compared to Georgia-09B (27% less) and Lariat (5% more). Similarly, in dryland conditions decrease in the seed yield was relatively less in C7616 (35%) than Georgia-09B (390%) and Lariat (215%) when compared with irrigated treatment. The greater rate of assimilation and a higher allocation of resources in root growth indicates that C7616 has the best resiliency to the dryland conditions in the THP.