

## **Using Photosynthetic and Isotopic Techniques to Identify Different Drought Tolerant Mechanisms in Peanut**

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Drought is the main abiotic stress in peanut that can cause significant yield loss and reduce seed quality. Peanut is very sensitive to droughts during the pod filling periods which in the Southeastern U.S happens at the same time that flash droughts that can last between two to four weeks. Drought tolerant cultivars for mid-season drought exist but the mechanisms behind the tolerance are still fairly unknown. In experiments performed in rain-out shelters at the National Peanut Research Laboratory, we tested 36 drought tolerant and sensitive cultivars with the objective of finding different mechanisms of drought tolerance. We used photosynthetic and isotopic measurements to estimate the water use and nitrogen fixation of the tested cultivars. We found that among the drought tolerant cultivars there is two clear mechanisms of drought tolerance: (1) Cultivars that show low stomatal aperture under drought and therefore higher water use efficiency (WUE) and (2) Cultivars that maintain the stomata open and therefore show more efficient use of water (EUW). Although in other crops cultivars with high EUW have been demonstrated to produce more under drought conditions, this was not the case in this research for this set of cultivars. High N<sub>2</sub>-Fixation under drought was very related with the capability of the plant to maintain a good water status. More research needs to be done to determine the dependency of N<sub>2</sub>-fixation on water related traits such as WUE and EUW.