

## **Phenotyping And Genotyping For Drought Tolerance In Virginia Type Peanut**

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Peanut (*Arachis hypogea* L.) is a high value crop grown in the Southern United States for oil, peanut butter, gourmet and other confectionary products, and exports. Drought is the most limiting factor for peanut yield and quality and, even though soil moisture could be supplemented with irrigation, the majority of the U. S. peanut production is under rainfed agriculture. For example, the Virginia-Carolina growing region, peanut production is over 90% under rainfed condition. The most reliable solution for peanut producers to mitigate drought is to adopt drought tolerant cultivars. To achieve this broad objective, research that integrates agronomy, physiology, genomics and breeding is further needed.

The objectives of this research are three-fold. First, to assess the current commercial cultivars for yield and quality and identify high yielding cultivars for rainfed production. Secondly, to dissect the physiological components of drought tolerance using targeted approaches. For example, the physiology of effective transpiration and photosynthesis will be used to screen the expression for the efficiency of water conservation traits in selected genotypes in the field under rain exclusion shelters. To screen these traits in large populations (RILs), we used surrogate techniques, such as visual wilting, NDVI, CT, and SPAD. Thirdly, after phenotyping, we will genotype the RILs using Genotyping-by-sequencing approach. This approach will allow generation of reliable markers to enable marker-assisted selection for drought tolerance in peanut breeding.

Our preliminary data shows that among the parent genotypes, Phillips yield was 8007 kg ha<sup>-1</sup> whereas N04074FCT had 6919 kg ha<sup>-1</sup>. The parent sequencing data revealed approximately 5000 genetic markers between these parents from which one of our RIL population has been developed. The long-term objective of this work is better understanding drought tolerance in Virginia type peanut and develop drought tolerance cultivars using phenotypic and molecular markers.