

## **Phenotyping and Genotyping RIL Population of Virginia-type Peanut for Drought Tolerance in Virginia Carolina Region**

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Drought is one of the major constraints in peanut production in Virginia Carolina (VC) region because 90% of peanut production is under rainfed conditions (no supplemental irrigation). To mitigate drought effects, the most reliable solution for peanut growers is to adopt drought tolerant cultivars; but, for this, development of molecular and phenotypic markers to use in selection is needed. Therefore, our research focuses on phenotyping and genotyping of three populations (consisting of 722 lines) of recombinant inbred lines (RILs) for drought tolerance. Five parents for these populations were selected on the basis of previous studies showing contrasting traits for drought tolerance. The RILs were phenotyped at the Tidewater Agricultural Research and Extension Center in Suffolk, VA, and the Peanut Belt Research Station in Lewiston-Woodville, NC, in 2018, 2019 and 2020. Measurements included plant height, lateral branching, normalized difference vegetation index (NDVI), canopy temperature depression (CTD), wilting, disease rating and pod yield. Based on phenotypic data, we have identified 15% of the population (Pop 3) with contrasting characteristics when grown under rainfed conditions. This subset, which includes high and low drought tolerant lines from Pop 3 was further studied for physiological traits for drought tolerance in the field, under controlled rainfall and soil moisture using rainout shelters. In addition to NDVI, CTD, wilting, the subset was phenotyped for carbon assimilation rate and the relative chlorophyll content of the leaves (SPAD readings). The results indicated significant differences for photosynthesis, wilting and CTD among high and low drought tolerant lines. The RILs will be genotyped using a standard genotyping-by-sequencing approach. This will facilitate the identification of genomic markers associated with drought tolerance to allow generation of reliable markers to enable marker-assisted selection for drought tolerance of Virginia-type peanut breeding.