High-Throughput Techniques to Estimate Above Ground Biomass in Peanut.

S. SARKAR*, A.B. CAZENAVE, and M. BALOTA Tidewater Agricultural Research and Extension Center, Virginia Polytechnic Institute and State University, Suffolk, VA 23437.

Biotic and abiotic stresses diminish growth and development of shoots and leaves of peanut (*Arachis hypogaea* L.) affecting the total above ground biomass (AGB). Above ground biomass is also influenced by peanut canopy architecture which varies among peanut biotypes. This makes AGB is an important physiological trait to monitor in relation to crop health. Manual measurement of AGB is time-consuming, but remote estimation, i.e. using aerial sensors for leaf reflectance, is possible. Remote sensing of AGB could be useful for the breeding programs when fast and relatively inexpensive selection of AGB is required. The objective of this study was to high-throughput (HTP) phenotype AGB from leaf reflectance using several sensors on an unmanned aerial vehicle (UAV) platform. The study included eight peanut genotypes, Virginia-, runner, and Spanish-types, planted in four replications and harvested for AGB four times over the growing season. Aerial red-green-blue (RGB), near-infrared, and thermal images were taken before destructive sampling for AGB. Results showed that manually measured AGB was correlated ($r = 0.88$, $p < 0.0001$) to green area (GA) ($r = 0.75$) and greener area (GGA) ($r = 0.80$) derived from RGB reflectance. Our results show that peanut biomass can be monitored throughout the growing season and estimated from aerial pictures with fair accuracy.