

Developing Phenotyping Tools Using Unmanned Aircraft Systems (UAS) for Peanut (*Arachis hypogaea* L.)

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In the past, the collection of crop data was performed by expensive, labor-intensive and in some cases destructive hand sampling techniques. These constraints often lead to under-representative crop information due to limited sampling as well as the introduction of possible human errors. With the introduction of Unmanned Aircraft Systems (UAS), some of these hurdles can be overcome. The 2019 crop season was the first-time data was collected on peanut by the Texas A&M AgriLife Research peanut breeding program located in Stephenville, Tx. Flights were conducted at multiple locations to develop preliminary data for analysis as well as test flight and data collection protocols. A total of 5 flights were collected at 3 different locations and were processed and analyzed where applicable. Unmanned Aircraft Systems data collection (i.e. flights) were conducted beginning in August and ending in November. To improve the quality of the data and georeferencing, multiple Ground Control Points (GCPs) were used to survey plots using a post-processed kinematic GPS (PPK-GPS) device. Raw images were processed by the Structure from Motion (SfM) algorithm to generate Digital Surface Model (DSM), orthomosaic images, and 3D point cloud data. UAS-based phenotypic data including canopy cover, canopy height and Vegetation Index (VI) was extracted. Initial results on UAS-based phenotyping is promising and will be presented.