

Evaluating the Potential Of UAV-Based Imagery for Detailed Measurement of Above-Ground Growth Characteristics in a Peanut Breeding Application.

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Stand establishment, early-season seedling vigor, and mid-season canopy closure ensure a grower's timely and efficient achievement of a vigorous crop that can resist weeds, take advantage of available moisture and nutrients, and produce optimal yield. In large breeding trials however, direct measurement of these traits is prohibitively time consuming. Estimations based on visual ratings are prone to high levels of variation and low accuracy. Thus, the utility of using unmanned aerial vehicles (UAV) for the measurement of plant growth-related traits is currently being evaluated in replicated yield trials and early generation trials. In 2019 at the University of Georgia's Gibbs Research Farm in Tifton, GA, images were taken by UAV at 43 DAP. Visual rating of mid-season vigor were assessed the same day, and plant height collected 53 DAP. In 2020, images were taken by UAV at 16 DAP, 33 DAP, and 47 DAP. Visual rating of stand establishment and seedling vigor were taken 15 DAP; plant height was directly measured and mid-season vigor visually estimated approximately 56 DAP and 58 DAP, respectively. Moderate correlations were achieved for early-season measurements, however, high correlations were evident comparing UAV-derived mid-season growth characteristics and visual vigor ratings as well as direct plant height measurements. Individual plants within an F2 nursery were assessed in 2020, and the resulting F2:3 progeny rows were planted in 2021 for comparison. Adoption of UAV-based imaging for high throughput phenotyping of above-ground growth characteristics in cultivated peanut is promising.