Predicting Harvest Maturity and Enhancing Yield and Quality of Peanuts Using Sensor-based System and Economic Appraisal

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The portable Soil and Environment Measurement System V2.A (POEMS) prototype sensing system was used to determine soil moisture content in the peanut field (Fort Valley State University, FVSU) and labs (Purdue University and FVSU). Calibration models were developed using various statistical methods, including linear and nonlinear models. The correlation coefficients ranged from 0.80 to 0.95.
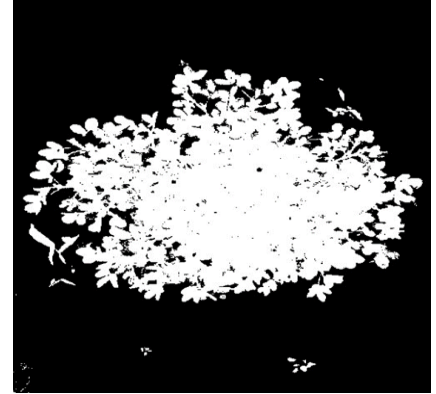
In addition, for the development of peanut crop models, we postulated a new hypothesis for determining the relationship between the canopy properties and peanut yield. For preliminary analysis, we captured images of the canopy of peanut plants using a cell phone (2-D images). The images were analyzed, and the calculated projected area (pixels) were related to biomass and yield. Figures 1 to 3 show a sample image of peanut plant canopy and its processed images. After excluding the potential outlier, we found that model-based relationship could be developed between canopy properties and peanut yield. Thus, we plan to conduct experiments in the forthcoming planting season to continue this study with additional modifications in our experimental design and targeted data analysis.

(**Fig 1**. Sample canopy image) (**Fig. 2**. Processed image) (**Fig 3**. Processed binary image)