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

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This study is part of a $15,000, 1-year project funded by the Georgia Peanut Commission. A portable **Soil and Environment Measurement System V2.A (POEMS)** prototype sensing system was designed and developed at Purdue University with added functionalities. The POEMS is equipped with four external sensors: Vegetronix, Seesaw, Thermistor, and AM2302. Vegetronix analog sensor measures moisture content within the 3D printed sensor enclosure. Seesaw sensor measures soil capacitance within the falcon tube sensor enclosure. Thermistor analog sensor measures soil temperature directly, not within the enclosure. The AM2302 digital sensor measures the ambient temperature and humidity (Fig. 1). The POEMS can be connected with an Android smartphone via Bluetooth. This allows the user to access data on the SD card remotely. Our team will continue on-farm trials on Fort Valley State University's (FVSU) new farm in 2023. Soil moisture sensor will be installed in FVSU fields, planted with peanuts and soil moisture levels will be monitored on a cell phone using the app.

Fig. 1. Soil and Environmental Measurement System V2.A (POEMS) developed at Purdue University

This easy-to-use, affordable soil moisture sensor will help peanut growers improve water-use efficiency and increase average net income while significantly reducing water and energy use. We will continue conducting cost-benefit analysis of conventional and sensor-based technique in peanut farming, including prerequisites of adoption, costs of implementation, benefits of water efficiency, quality products and higher yield.

Preharvest and postharvest growth parameters
Three varieties of peanut (Georgia-06G, Georgia-12Y, Georgia-18RU) were planted in 12 experimental plots in FVSU's new farm in 2022. The air temperatures, soil temperatures at 10 cm (4 inch) depth, and rainfall from May to October 2022 were monitored. Plant height and width, flower numbers, biomass, pod numbers and weight, and seed weight were measured.

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