

Peanut project (2018) report to the Georgia Peanut Commission

Project title: The influence of planting dates on water use and yield in peanut: A field-scale evaluation

PI/co-PIs: Monique Leclerc, R. Scott Tubbs, W. Scott Monfort

Peanut is an important crop in the southeastern US with the state of Georgia contributing 46-56% of US peanut production. With water restrictions looming on the horizon coupled with more frequent water stress and drought, pressure is mounting to improve water-use efficiency in peanut while maintaining high yield through management practices. While the planting period takes place from typically a period of months in the southeastern US, the degree to which the planting date impacts water-use efficiency remains undetermined. The objectives of this project are to evaluate, at the field scale, the influence of different planting dates on peanut water-use efficiency, evapotranspiration, net CO₂ uptake, and yield.

In 2017 and 2018, experiments took place at the Southwest Research and Education Center in Plains, GA. Peanut cultivar Georgia-O6G was planted in three adjacent, large, flat, irrigated peanut fields on three different planting dates in an interval of two weeks, with one planting date per field. Peanut evapotranspiration, carbon dioxide intakes, and water-use efficiency were monitored at field scale continuously 24/7 throughout the entire growing season using the state-of-the-art eddy-covariance method (Figure 1). Soil CO₂ effluxes and soil temperature and water content were also simultaneously monitored in each field (Figure 1). Leaf area index in each field was measured every week. The information would help explain the difference in peanut water use efficiency between different planting dates.



Figure 1. (Left) Eddy-covariance system including a fast-response sonic anemometer and an open-path fast-response CO₂ analyzer with solar panel and (Right) soil CO₂ efflux measurements including soil CO₂ probes, time-domain reflectometry and soil thermocouples

Preliminary results indicate that the influence of planting dates on peanut water-use efficiency changes with peanut growth stage. At the early growth stage, peanut in the late planting date has higher water-use efficiency. On the other hand, peanut sown at the late planting date experiences lower photosynthesis in the late growth stage leading to less carbohydrates to fill peanut seeds. Further analysis of the results related with peanut yield and plant properties (LAI, height, etc.) is still ongoing.