Final Report for Fiscal Year 2017/2018 Report for SPRI

Project Director: Wesley Porter

Co-Principal Investigators: George Vellidis, Mark Freeman, Vasileios Liakos

Soybean App Evaluation in Georgia for 2017: The purpose of this project was the development of a Smart Irrigation App for soybeans to help soybean growers irrigate their fields more efficiently. Several experiments were conducted in 2016 and 2017 in order to develop a model which calculates how much water is stored in the soil profile through irrigation and rainfall events and how much water is lost to the air every day through evapotranspiration. This model will be operated by a Smartphone App to inform soybean producers about the current soil water deficit and when to trigger the irrigation. During the growing season of 2017 two experiments were carried out at the University of Georgia's Southeast Georgia Research and education Center (SEGREC) near Midville, Ga and at the University of Georgia's Stripling Irrigation Research Park (SIRP) near Camilla, Ga. At SEGREC the soybean plots were irrigated with subsurface drip while at SIRP they were irrigated with overhead sprinkler irrigation from a lateral irrigation system. At both locations a replicated block study was established in which we evaluated the performance of three irrigation treatments on Group IV, V, VI, and VII soybeans. The same varieties were used at both locations. The App model was set to trigger irrigation when the soil water balance was at the equivalent of 25kPa soil water tension. We compared scheduling irrigation with the App model to sensor based irrigation at 25 and 50kPa. The soil moisture monitoring was done by using twelve sensors in the Group V and Group VI plots at SEGREC and twenty one sensors in the Group V and Group VI plots at SIRP. The comparison of the performance of the treatments at SIRP showed that there were no significant differences in yield among the treatments. The overall yield at the plots irrigated with 25kPa threshold was 71 (bu/ac), with the App 70 (bu/ac), and with either 50kPa threshold or without irrigation was 67 (bu/ac). The total irrigation used in the App plots was 4.75 in, with 25kPa threshold 3.75 in and with 50kPa threshold 2.25. At this point it should be mentioned that the total rainfall during the 2017 growing season was 26.4 in. At the SEGREC the yield of the rainfed plots was significantly lower than the yield of the other treatments. To be more specific the average yield of the plots irrigated with threshold 25 kPa was 46 (bu/ac), with 50kPa 44 (bu/ac), with the App 41 (bu/ac) and the rainfed had 31 (bu/ac). On the other hand the App plots received 3.5 in of irrigation, the 25 kPa threshold treatments 10 in, and the 50 kPa treatments 5 in.

To sum up, from all the above it is clear that the plots which were irrigated based on the soil moisture sensors with 25 kPa threshold (wet soil) and based on the App model had very good yield. This means that in order to achieve high soybean yield we have to keep the soil wet enough during the growing season (Figure 1).

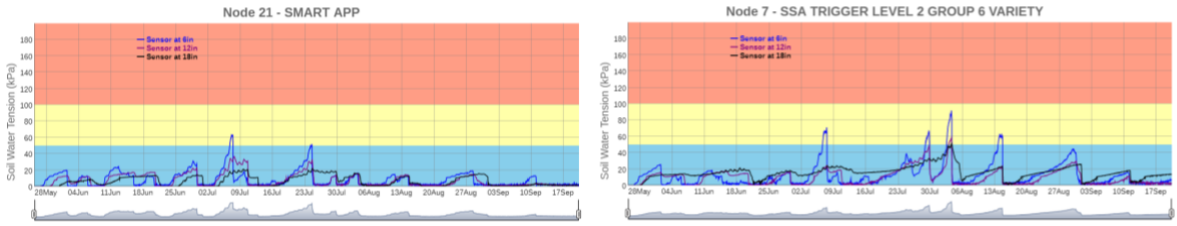

Figure 1. Node 21 received irrigation based on the App's model and node 7 based on the sensor readings when the soil moisture was over 50 kPa. It is obvious that the App's model keeps the soil more wet and thus the average yield of the App plots was higher than those plots which were irrigated with 50 kPa threshold.