

## **Development of a Wireless Irrigation Control System**

2008-09 Progress report to the Georgia Peanut Commission submitted by the University of Georgia Ag Technology team of: S. Pocknee, V. Garrick, C. Perry, N. Wells, G. Rains, G. Vellidis, M. Tucker, E. Macheski-Preston, and C. Kvien UGA-Tifton Campus/NESPAL, P.O. Box 748, Tifton, GA 31793, Phone - (229) 386-7274;

**Objective:** Our objective is to develop a prototype Wireless Irrigation Control System with the aim of reducing barriers to Variable Rate Irrigation and improving pivot, fuel, and water management.

**Rational and economic significance:** Variable Rate Irrigation (VRI) can save water and optimize the spatial distribution of applied water. Farmers in Georgia and other irrigating states are now able to retrofit a UGA designed commercial VRI system. Over 35 systems have been installed on Georgia farms with an additional 10 scattered in other states across the USA.

Although the current generation of VRI has been commercialized we are continuing to look at methods of making the system less expensive and more farmer friendly. We believe that a fundamental redesign of system components based on wireless communication technologies can greatly reduce the cost of the system while improving the installation time and maintenance requirements. In addition we believe we can alter the system architecture to allow remote monitoring and control.

**Progress:** We have tested several prototype models of 'smart' nozzles and powering systems which will retrofit onto existing center pivots. The first generation prototype has been assembled and tested for proof of concept by a Macon, GA company lacked an adequate power supply. With the UGA electronic design unit we came up with a design which would use an in-line wheel for both power and shut off, however this design also had significant friction and likely a shorter life-span than hoped. We have additional designs currently being explored, some in cooperation with Georgia Tech. Once complete, the nozzles will be fully self-contained, and self-powered, control and communications devices. We still are confident that the best design will incorporate a water micro-turbines for power, and that the water application rate is best adjusted at the individual sprinkler head based on time on/time off (20 sec/minute, 40 seconds/minute...) similar to our current systems.

The whole system design, like the current version, will establish desired watering rates for each field area, GPS at the end-tower will provide field location and each 'smart' nozzle will be linked to the master control using a wireless ZigBee network. These 'smart' nozzles should completely obviate the current need for air hoses, air lines, communications wires, and electrical wires. Besides eliminating these costs, there will be substantial benefits from not having to install and maintain this infrastructure.