

# Researcher uses RFID to water crops better

By Brad Haire  
University of Georgia

Radio Frequency Identification helps many retail super centers track their supplies. It can allow a prescription bottle to speak to a disabled patient and help pet owners find lost pets. George Vellidis says it can help a farmer water his crops better.

RFID is a system that can wirelessly retrieve information from RFID tags, small devices that contain silicon chips with antennas, said Vellidis, an engineer with the University of Georgia College of Agricultural and Environmental Sciences.

The idea of using RFID came up several years ago in a meeting among engineers in Georgia. Vellidis figured it could be the key to a system farmers can use to precisely schedule irrigation.

But he and research engineer Mike Tucker could find no published research on using it for irrigation. So they decided to develop a prototype system that uses RFID tags to wirelessly transmit soil moisture data from a field to a central location.

"We wanted to make something workable, wireless, low-maintenance and relatively cheap," Vellidis said, "and something that could relay information in real time."

Knowing the real-time soil condition in his field can improve a farmer's yields, he said, by giving his crops water when and where they need it. This improves his bottom line and can save water, too.

Research shows that cotton plants can lose as much as 200 to 300 pounds of cotton per acre if they become

water stressed. The harm can be done before the plants show any signs of damage.

But sometimes the price of knowing may outweigh the benefit, he said. Commercial irrigation-scheduling systems use nodes with sensors in the soil throughout a field. The sensors collect data like soil temperature and moisture. A farmer can manually check each sensor or have the data sent to a central place. The latter is more helpful.

But commercial wireless systems can cost \$700 or more per node, Vellidis said. Solar panels are often needed to supply the power. And systems with wires or cables can get in the way of farm work.

Georgia farm fields can vary in soil type. Each soil type holds water differently. To know precisely when and

where to water, farmers need many nodes throughout a field.

The more nodes in a field, the more precise a system would be. About 20 per 80 acres, Vellidis said, would be ideal.

With RFID, one node in the UGA system costs about \$70. That includes two soil-moisture sensors and two thermocouples for soil temperatures. A 9-volt battery, he said, would supply enough power for one season for a watertight circuit board the size of a playing card.

The circuit board reads the sensors' data and writes it to an active RFID tag, made by WhereNet Corporation. The RFID tag has a flexible antenna a tractor can easily pass over.

A central receiver could wirelessly retrieve the data. The farmer can use the data to decide when and how

much to water.

The system, still in the research mode, isn't commercially available. But the projected cost for a 20-node system for an 80-acre field is about \$2,700, Vellidis said, or about \$35 per acre.

The research was funded by Cotton Incorporated and the Georgia Peanut Commission, Georgia Cotton Commission and Georgia Research Alliance.

Vellidis hopes the system can become commercially available through a startup agribusiness. Another product developed on the UGA

Tifton, Ga., campus, called variable-rate irrigation, can now be bought through a startup company in Ashburn, Ga.

This isn't the first agricultural use of RFID. Canada uses it to identify cattle. It can trace a beef carcass at a packing plant back to its herd of origin. The U.S. Department of Agriculture is developing its own tracking system using RFID.

(Brad Haire is a news editor with the University of Georgia College of Agricultural and Environmental Sciences.)



## Stocking the family pantry

In the past, families stocked their pantry with homemade preserves and canned foods.

## Cotton has made a comeback

Georgia was the first colony to produce cotton commercially, first planting it near Savannah in 1734.

In 1793 school teacher Eli Whitney invented and patented the cotton gin. The first major textile mill was built in 1811 near Washington, Ga.

The cotton-destroying boll weevil first appeared in Georgia in 1914. By 1921 it had swept over the entire state, and cotton yields fell by more than half. Many farmers stopped growing cotton, causing a mass exodus of farm labor to Northern cities in search of other economic opportunities.

In 1987, Georgia launched the Boll Weevil Eradication Program, which was so successful that in 1994 the weevil was declared economically insignificant. Growers have reduced their insect control costs by as much as 70 percent.

Cotton is actually two crops: seed and fiber. Cotton seed is crushed in order to separate its three products: oil, meal and hulls. The oil is used for shortening, cooking oil and salad dressing. Some cotton seed is used as a high-protein concentrate for food products.

The meal and hulls are used in products such as



livestock, poultry and fish feed, while the stalks and leaves are plowed under to enrich the soil. The most important part of the cotton plant is the fiber or lint, which is used to make textile products.

The common characteristic among all cotton species is that each fiber has a single-cell composition, a characteristic science has yet to imitate. This gives cotton its qualities of absorption and ability to breathe.

Georgia ranks third nationally in cotton production and acres planted. The 2000 crop covered 1.5 million acres and yielded 1.66

million bales. The 1995 Georgia crop, at 1.97 million bales, was the largest since 1918.

The products that consume the most cotton are men's and boy's clothing, towels and wash cloths, drapery, upholstery and slip cover fabrics. About 40 percent of the U.S. crop is exported.

Cotton related professions provide 53,000 jobs in the state of Georgia. Cotton's overall impact exceeds \$3 billion.

### Fast Facts

- Cotton makes up 35 percent of Georgia crop income and grows in more than 100 counties.

- More than 2,000 cotton-related businesses provide about 33,000 jobs in Georgia, adding more than \$3 billion to the state's economy.

- Cotton was an ingredient in the first light bulb, the telegraph, the Wright brothers' plane and the first automobile tires.

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When cotton was three or four weeks old, the rows of closely spaced plants were chopped out with hoes, leaving them divided into small clumps separated by hoe-width spaces. This required the help of the whole family.

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