Studying wireless moisture monitors

Irrigation Extra

Key Points

- Many growers hesitate to use technology due to cost, installation and usability.
- Many systems are on the market and use similar wireless technology.
- Researchers found all systems were equally efficient after installation.

By **EVERETT BRAZIL III**

CAN YOU HEAR ME NOW? Cellphone technology is under scrutiny across U.S. irrigated farm fields in the South to determine which systems are most efficient in helping irrigators keep tabs on their sprinklers and soil moisture.

ONE of the more handy advancements in cellphone technology allows growers to monitor irrigation systems and soil moisture content with cellular networks, giving them the ability to make irrigation decisions without being in the field.

The technology isn't entirely new and is widely available, but many growers seem hesitant to adopt the technology out of concerns over cost, installation and usability. To help growers, Cotton Incorporated is sponsoring research across the Southeast to find how efficient the systems are, and whether they'd be practical in real-world scenarios.

Calvin Perry, superintendent of the University of Georgia's C.M. Stripling Irrigation Research Park in Camilla, is one such researcher. He is using university sprinkler systems to test a variety of wireless systems.

"Growers are busy and don't have time to go out and download data on a regular basis, especially in far-flung areas," he says. "We are looking at how a grower can get the data from sensors, and how we can help him get that data in a cost-effective manner and still be user-friendly," Perry adds.

Many systems are on the market, and the wireless technology is largely the same among them, using cellphone networks and towers to transmit data to a website or server where that data can be downloaded via cellphone or computer. How the systems gather the data, however, varies with the system.

Systems differ

Many systems use probes that can be buried vertically in the ground, with sensors along the column that measure soil temperatures and moisture levels, among other field conditions, at varying depths. The data are transmitted to base stations at the field edges and transmitted to each company's server through cell towers.

Alternative systems use individual sensors buried in the ground that are tied to a logger that collects and stores the data, before transmission through cellular networks via an internal cell modem.

These systems tend to be more involved in installation due to the extensive wiring with each sensor.

Wireless technology also has taken advantage of radio waves to transmit data over a shorter distance, though they can be limited by range or topography.

"Not having radios is ideal, and having that spot in the field to communicate to a cell-based network is much more preferred over some of these technologies that are limited," Perry says.

Researchers found that systems with probes were much easier to install than alternative systems that may have more wires or parts. That doesn't make the systems more efficient, but it eases the installation process.

"You can use a power auger to get the depth you want, put a sensor in the hole and backfill," says Brian Leib, a University of Tennessee, Knoxville, Extension irrigation specialist. Leib has been testing wireless systems at the East Tennessee Research and Education Center in Knoxville and the West Tennessee Research and Education Center in Jackson.

Researchers found that once the systems were installed, they all displayed equal efficiency and usability, and for the most part were efficient in monitoring soil moisture and transmitting data through a cell network.

Strengths and weaknesses

Each system also was discovered to have its strengths and weaknesses.

"Every year we've lost a couple of sensors, and there are a few bugs to work out every year, but they're all working," Leib says. "The sensors are very sensitive to changes, and you can see where moisture is being taken out of the profile. And when rain hits, I can see how much it's penetrating. It's a very nice tool."

Though the cost has the potential to be steep, the ability to save money through monitoring soil moisture can improve irrigation to allow the system to pay for itself. The price is slowly declining as the technology gains wider acceptance.

Research is finding new applications, as well. Leib has tested equipment in apple orchards and alfalfa crops in independent studies, and Perry is initiating research in variable-rate applications.

"It is not a 'one size fits all'; you have to know what you're looking for and you have to learn how to use the tool," Leib says. "If you know soil and water conditions, it makes sense when you look at the data, and you can see why it's different."

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