METER
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USING SOIL MOISTURE SENSORS TO IMPROVE IRRIGATION OF PEANUTS, COTTON, AND CORN

Ron Sorensen, a researcher at the National Peanut Research Laboratory in Georgia, is working to help small-scale peanut, corn, and cotton farmers in Georgia optimize irrigation.

Shallow subsurface drip irrigation is a very economical alternative for these farmers. “If you can put in a pivot, most of those are already in,” says Sorensen. What he’s working with are “small, irregularly shaped fields that go around swamps or in trees or backwoods where they might have 10 to 15 acres that used to be an old farmstead.”

Sorensen helps revitalize these old farmsteads by revamping old wells and plowing in drip tape. In many cases, farmers can have water running the same day they start the project.

Subsurface drip offers significant benefits to these farmers. “What I like about drip is that…I can fill up the soil profile, and I know I can fill it up. With the pivot, I’m putting out water today, and I may be coming back two days later and doing it again,” Sorensen says. “And I’m putting all this water on the leaves, creating the incidence for disease… With cotton, you can actually wash the pollen out of the flowers, and you won’t set a boule. There you’re losing yield. Whereas with drip, you can turn it on, you’re never wetting leaves, you’re getting full pollination… I’m an advocate for drip on small irrigated fields.

"Irrigating down here [using diesel-powered irrigation pumps] is upwards of $11 an acre any time the farmer turns it on. So if he can wait a day, he's saved that irrigation."

"I love pivots on big fields, but we have to manage the water correctly. Farmers are starting to see that. We can save the farmer money, save him time, save him labor. Those...are all side benefits of irrigating correctly," says Sorensen.

As farmers begin to see the benefits of efficient irrigation, Sorensen's challenge is to help them know when to water and how much water to put on.

Sorensen is at the end of his third year gathering data with METER water potential sensors. He buries sensors at 10- and 20-inch depths in three separate plots, then irrigates when the average water potential reaches -40, -60, and -80 kPa respectively.

"We started in corn, because we know it has a shallow root system, and when you don't irrigate corn, you don't get any yield." Initially, they allowed the profile to dry out to -120 kPa, but "we discovered it doesn't work. We weren't ever irrigating, and we had really bad yields. -120 was much too dry, and we cut back to -40, -60, and -80."

The researchers used water potential readings with moisture release curves to determine how much water to add to bring the profile to field capacity.

METER TEROS 21 water potential sensor

They found that allowing the soil to dry to -60 allowed them to save water without impacting yields in corn. Cotton and peanuts are a different—and more complex—story. "Both cotton and peanut, if you don't get any rain or water, they just hunker down, and when you do get a rainstorm, they flourish. When the rainfall comes at a funny time, it changes everything," Sorensen explains.

Take this year, for example. Until the first of June, Sorensen's plots got very little rain. Then from June to the end of July, he got 24 – 26 inches. "All the differences between our plots are just gone. Irrigated is the same as the non-irrigated because by the time we started to irrigate, it started raining."

Despite this setback, Sorensen is confident that the data will ultimately help produce a reliable irrigation tool for farmers. His goal is to add a drip irrigation module to Irrigator Pro, a computer program currently used by pivot irrigators.

He is working with several farmers who already use sensors in conjunction with the Irrigator Pro model. "They can use the computer model as a guess to get close, and then they can use a sensor to really get down to the exact day," he says. And in Georgia, the exact day can matter quite a bit.

"What it comes down to is: Do I need to turn the pump on or not?" he explains. "Irrigating down here [using diesel-powered irrigation pumps] is upwards of $11 an

acre any time the farmer turns it on. So if he can wait a day, and if we have one of these gulf storms come through, and the farmer gets 3/4 inch of rain, he's saved that irrigation.

"And if you can save two, three, maybe four irrigations a year, we're conserving water, we're making the farmer more sustainable, and he can take that money and reinvest it into his farm, or into his children, or wherever he wants to put it. And that makes it so we have food on the table, clothes on our backs, cotton, corn, or peanuts, we've got food to eat."

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