

Declining aquifer focusing more attention on irrigation water savings

Forrest Laws
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'We can produce equivalent yields with half the water'

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JASON KRUTZ shows the programmable control panel for a surge valve during a break at the Delta Ag Expo. Krutz is an irrigation specialist with Mississippi State University.

If you had any doubts about how important irrigation has become in the Mississippi Delta, all you had to do was look around the room at the Mississippi Cooperative Extension Service's Delta Ag Expo in Cleveland, Miss., on Jan. 23.

Most of the 150 or so chairs were filled and farmers were standing along the walls at the rear and sides of the room as MCES crop and irrigation specialists discussed the developing water crisis and the voluntary metering program being conducted by the Mississippi Department of Environmental Quality.

"Starting out, we'll look at our results on our corn and soybean program up and down the Delta," said Jason Krutz, irrigation specialist with Mississippi State University, who kicked off the Irrigation, Voluntary Metering Program & Water Conservation Roundtable. "We will talk about improving irrigation application; timing – when do we pull the trigger – because that is the No. 1 question you asked.

"That is, 'When do I start, when do I stop and what do I do if I get a rainfall event in the middle? As a team, our solution is use soil moisture sensors. There are other techniques out there, and I'm not really concerned about them. We know these things work because we rolled them out in an extensive format, and we beat you in nearly every field we were in using soil moisture sensors and plant physiology.'

With 80 percent of the Delta's irrigation coming from furrow watering systems, Krutz said, farmers are also asking specialists "to make us better furrow irrigators.

"To do that, we will have to improve how that furrow irrigation system is delivering water," he noted. "We have two techniques for doing that: Surge irrigation and some kind of computerized hole selection system whether it be PHAUCET or Delta Plastics Pipe Planner."

PHAUCET or Pipe Hole and Universal Crown Evaluation Tool and Pipe Planner are programs that enable growers to determine the most efficient size of plastic tubing, pumping rates and hole placement for flexible irrigation pipe. PHAUCET has been around a number of years while Pipe Planner is a relatively recent innovation.

Growers say the PHAUCET system has helped them cut water usage and pumping costs by 50 percent or more in many fields.

Krutz went through a series of case studies where MSU specialists used a combination of soil moisture sensors and the PHAUCET program in farmers' fields and produced the same or better yields than growers harvested at less cost and 40 percent to 50 percent of the amount of water.

In one of the studies, the producer irrigated corn four times on either side of a test strip that was irrigated by the MCES specialists. On one side, he harvested 233 bushels for a \$784 per acre return and, on the other, he cut 248 bushels for an \$840 return. The specialists, meanwhile, irrigated twice and harvested 256 bushels for an \$881 return.

“So in this case, I’m 16 bushels an acre ahead of him, I’m \$70 an acre ahead of him, and I did it with half the water he used,” said Krutz. “In these mixed to heavy soil types, we know how sensitive corn is to nitrogen dynamics, and I’m telling you if you’re oversaturating these fields you’re setting up denitrification, and denitrification in corn is not a good thing.”

Pumping costs were not the only issue the specialists addressed on one farm. The producer had recently installed surge irrigation and had begun using PHAUCET for setting up his flexible irrigation tubing. But he was not using soil moisture sensors or other timing devices.

“He was doing what a lot of our growers do, irrigating every seven to 10 days,” said Krutz. “On this Dundee silt loam, the producer put six irrigation shots out or 18.4 inches of water. Does anyone know what that means? His permit says he can apply 18 inches of water so he is in violation of his permitted value.”

The grower harvested 217 bushels of corn per acre while the specialists cut 222 bushels per acre with three irrigations, 8.1 inches of water total. They spent \$50 an acre less for pumping with a 55 percent reduction in water used, and the grower would not have been in violation of his well permit.

Krutz also discussed a study in a soybean field which the grower had never been able to irrigate with much success.

“A lot of times when we get called out, they’re trying to stump us,” said Krutz. “The field in the upper right corner of the map being displayed is this grower’s problem field. His well is always running in that field, but he never quite gets it irrigated properly.”

The grower begins irrigating in the upper right corner and starts putting water across the field. By day four or five, he still doesn’t have water to the other end, but he stops irrigating and moves to the next corner so that he doesn’t get behind on his watering schedule.

“He went back to look at his yield data, and he said that over the last several years, this field is usually about 10 bushels per acre behind the other ones,” he said. “That makes sense because he’s not irrigating the bottom third or fourth of the pad. He’s probably like a lot of our growers – he doesn’t have it set up on PHAUCET, he doesn’t have a surge valve and he doesn’t have a scheduling tool.”

Krutz and the MCES specialists installed surge valves on the irrigation pump, set the grower up on the PHAUCET program and installed moisture sensors at six-, 12-, 24- and 36-inch soil depths in the problem field. The producer irrigated five times with 12.85 inches of water and harvested 87 bushels of soybeans per acre in one corner and watered five times with 14.9 inches of water and cut 85 bushels in another.

“This is the problem set,” said Krutz, displaying figures for the upper right quadrant of the field. “We got across it. It takes a little bit of time, but we do it. This well sits idle part of the season. We put three shots out with a total of 9.4 inches and cut 86 bushels per acre. On our other 40-acre set, we gave it three shots with about 7.2 inches of water and cut 84 bushels.

“So if you look at it just for this year alone, we’re about a bushel per acre behind, profitability is about equal, and we did it with about 40 percent less irrigation water. In reality, we probably did it with half the water. We were trying to set up the surge valve, and we blew out that pipe. We had to come back in and re-irrigate that field. And I left all that in there.”

Delta Farm Press (<http://m.deltafarmpress.com/management/declining-aquifer-focusing-more-attention-irrigation-water-savings>)