



From left: Mark Riestenberg discussed the crop's progress in July 2019 with East Otter Tail SWCD Manager Darren Newville, technician Trisha Demarais and irrigation and nutrient management specialist Nathan Wiese.

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Ann Wessel,
BWSR

Fine-tuning irrigation to improve water quality and crop yields

Clean Water Funds from BWSR and the Minnesota Department of Agriculture plus assistance from NRCS support East Otter Tail SWCD's site-specific, science-based irrigation scheduling work with farmers

PERHAM —When Mark Riestenberg installed an irrigator in 1995, he relied on a handful of soil and a look at what the neighbors were doing to decide when to turn it on.

Twenty-five years later, neighbors still rely on neighbors to determine when to irrigate. But now they're watching Riestenberg and about 45 other farmers who work with East Otter Tail Soil & Water Conservation District staff on a science-based approach to irrigation scheduling.

"It's come a lot easier to me now, but it's certainly nice to have that secondhand verification just to know you're doing it right," Riestenberg said during a July 2019 field visit. "Especially being a first-time irrigator, it's difficult to know when you should be turning that irrigator on."

About 70 people attended a February 2020 irrigation and nutrient management clinic in New York Mills that highlighted current research in Minnesota, new technologies, and how nutrient management works with cover crops.

The annual event is part of ongoing work that, since the early 1990s, has involved assistance from the USDA's Natural Resources Conservation Service, and Clean Water Funds from the Minnesota Department of Agriculture and the Minnesota Board of Water and Soil Resources.

"It seems like people don't want to believe research that was done in Nebraska. They want to see this stuff working on our local farms. They want to see it working on Mark's farm, and then they will copy it. They want to learn from each other," said Darren Newville, East Otter Tail SWCD manager.

Knowing how much and when to irrigate is good for the environment, the crops and the farmers.

Newville explained why.

"This area has very coarse-grained soils, which are very productive. But it's also very droughty. If we don't get rain, in three or four days the crops will start to suffer," Newville said. "That same soil characteristic also makes our aquifers very vulnerable to any type of groundwater contamination. If somebody's (fertilizing) and we get a 2- to 3-inch rain, or if they over-irrigate, they could potentially cause leaching down into our groundwater."

Irrigation roughly doubled yields on Riestenberg's 100-acre field.

"Twenty, 30 years ago it seems irrigation was not necessarily a novelty, but it was something you did to help improve your yield," Riestenberg said. "Nowadays, if you don't have it, with the amount of money we've got invested



Irrigation Scheduling Program Details

CURRENT PARTNERS:

West Otter Tail, Wadena, Becker, Hubbard and Todd SWCDs; city of Perham; USDA's Natural Resources Conservation Service; Minnesota Department of Agriculture; Minnesota Board of Water and Soil Resources; Minnesota Department of Health; University of Minnesota; North Dakota Ag Weather Network.

PAST PARTNERS: East Otter Tail Telephone Co., Otter Tail Power Co., Lake Region Electric Cooperative, Perham Lions Club, Perco Inc., R.D. Offutt Farms, WesMinn Resource Conservation & Development.

FUNDING: EQIP assistance from NRCS helped landowners offset the cost of irrigation water management practices. Since 2000, that assistance has totaled about \$822,000 — including low-pressure sprinkler conversions on about 125 fields, and irrigation water management on nearly 15,000 acres.

In the past 10 years funds for the irrigation scheduling program and related practices and outreach have come from the following sources.



BWSR awarded five Clean Water Fund grants totaling \$598,600 to East Otter Tail and Wadena SWCDs for low-pressure nozzle conversions (landowners paid 25% of project costs), the irrigation scheduling program, and outreach.

East Otter Tail and Wadena SWCDs used \$395,000 in Clean Water Fund local capacity dollars from BWSR to hire staff to support the irrigation scheduling program.

The Minnesota Department of Agriculture has contributed about \$247,500 via staff time, providing weather stations and offering irrigation clinics.

Hubbard and Todd SWCDs contributed a combined total of \$30,000 over three years to support Wadena SWCD irrigation scheduling staff members' time in those counties.

The city of Perham received \$10,000 from Minnesota Department of Health's wellhead protection plan to help develop the Ag Weather Network website.

in a crop, it's very difficult to farm without it."

Minnesota Department of Natural Resources data show 941 of the state's 6,357 agricultural irrigation permits are for use in Otter Tail County. Thirty percent of all permits in the state come from Otter Tail, Wadena, Todd, Hubbard and Becker counties.

In mid-July, Riestenberg's corn was starting to produce silks and just about to tassel — the most critical growth stage, when moisture is most important. The crop on this field would produce an average yield of 217 bushels per acre.

Yield drops if insufficient moisture stresses crops. Irrigation scheduling allows farmers to irrigate the right amount at the right time — which uses less water and less electricity.

"If you don't run it even one turn, you can probably save \$1,000 pretty easily," Riestenberg said of his center pivot irrigator.

"And you can make several thousand dollars by turning it on at the right time," Newville said.

Riestenberg fertigates, too, applying nitrogen through the irrigator. Instead of twice-a-year applications, he now fertilizes less per application — but more frequently, when the crop needs it most. Ensuring the crop will take up nitrogen saves money and helps protect groundwater.

Perham's municipal water supply meets state health guidelines, but nitrate levels in some city wells are elevated. The Minnesota Department of Health has linked nitrate to blue baby syndrome.

"Big picture, the nitrate issue is a real important issue for us. By doing the proper irrigation management, they're not leaching nitrogen into the groundwater due to over-irrigation," Newville said.

The city worked with East Otter Tail SWCD and others to develop a wellhead protection plan promoting practices that minimize the potential for groundwater contamination.

Luke Stuewe, who supervises the Minnesota Department of Agriculture's fertilizer management unit in Detroit Lakes, said irrigation scheduling provides tools to protect groundwater.

MDA has provided soil moisture sensing equipment and precipitation monitoring equipment for remote fields. It's involved in the [Central Minnesota Ag Weather Network](#), an online resource that gathers information from eight weather stations within the five-county area.

"As we looked at the utility of this particular service, we heard loud and clear: Producers are more likely to trust information from equipment on the ground," Stuewe said.

Farmers enrolled in the irrigation scheduling program receive a chart showing available moisture, crops' water use and growth stage.

The chart is based on weekly rainfall totals and irrigation amounts

“ Irrigation really is an insurance policy for these guys. They have a huge amount of money invested in just getting the crop planted and fertilized. And irrigation makes sure that it produces more.”

— Darren Newville,
East Otter Tail SWCD manager



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that farmers report, plus rain gauge readings and field soil samples that SWCD staff collects. Staff members enter data into an irrigation checkbook. Developed by North Dakota State University and the University of Minnesota Extension, the checkbook accounts for soil moisture and evapotranspiration — and factors in the weather forecast.

"We can't control the rain but we can control the irrigation," Newville said.

East Otter Tail SWCD staff in 2019 worked with farmers in 115 fields throughout Otter Tail, Wadena and

Todd counties. In previous years, they had worked with Hubbard County farmers. Becker SWCD started its own program.

Farmers pay the SWCD \$200 a year for the service.

The SWCD doesn't make money from the program, which occupies 6.5 staff days a week, but Newville said board members wanted to support the endeavor.

Irrigation scheduling was a condition of NRCS assistance. In the 1990s, the most common NRCS practice related to irrigation water management was low-pressure nozzle conversion.

Most producers continued irrigation scheduling after the required three years.

"Production agriculture and conservation go hand in hand if done correctly," said Alan Lepp, NRCS' Detroit Lakes-based assistant state conservationist for field operations. "I think irrigation water management would be a prime example of that. Only using water needed, saving money on inputs and not flushing those inputs away

from your crop is good for both worlds."

East Otter Tail SWCD used a \$58,000 accelerated implementation Clean Water Fund grant from BWSR to pinpoint what groundwater protection and ag production practices farmers wanted to try next — and what was stopping them. From a series of meetings organized by the Freshwater Society, the SWCD learned producers wanted to try technology such as precision irrigation and practices such as cover crops.

In response to that feedback, cover crop demonstration sites will be planted this season via East Otter Tail and Wadena SWCDs. East Otter Tail SWCD was one of five SWCDs to receive a combined \$1 million in Clean Water Funds for cover crop demonstration grants this year.

"This area is kind of slow to adopt some of that technology, and it's because we don't have anybody locally pushing it," Newville said.

"There's been no research locally, so nobody's using it. They don't see it on their neighbor's farm and that's really what they wanted. They wanted somebody to be able to show that it's working here locally and they wanted to be able to go a neighbor's farm and say, 'What worked and what didn't?' so that they don't have to learn everything themselves by adopting it."



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