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MAXIMIZING MOISTURE FOR TOP BENEFITS

By Tanner Ehmke

NO-TILL ADVOCATES: David Denneler (left), crop production manager, and Lon Frahm, president, of Frahm Farmland Inc. in Thomas County, stand in a dryland field of corn under continuous no-till. Their farm has been in no-till since switching in 1998.

Stretching an inch of water to produce a decent crop on the High Plains is a balancing act between residue management and the right crop rotation. After 15 years of continuous no-till farming, Thomas County farmers Lon Frahm and David Denneler of Frahm Farmland Inc. have not only succeeded in increasing yields through improved water savings, but also increased their rotation intensity and flexibility.

Every field on the 20,000-acre corn and wheat farm, including both dryland and irrigated fields, is in continuous no-till, Frahm says. The decision to make the leap to no-till and abandon both tillage and fallowing wasn't made overnight. After having investigated the costs and benefits of no-till and attending a series of "No-Till on the Plains" conferences in Salina, the Frahm farm decided to make the switch to continuous no-till in 1998 and traded off the sweep plows for sprayers.

They haven't looked back since. With the heavy crop residue that comes with continuous no-till, Frahm and Denneler saw increased yields and were able to experiment with other rotations.

Most recently, they've been able to move from a wheat-wheat-corn-corn rotation to a more intense corn-corn-wheat-corn rotation that takes advantage of strong corn prices and higher yields compared to wheat.

Cooler nighttime temperatures that come with the higher altitude and northern latitude of northwest Kansas help boost a plant's water-use efficiency, notes Frahm, president of Frahm Farmland. And thanks to increased residue and organic matter from no-till, Frahm says he keeps 4 more inches of water in the soil compared to tilled fields. With each inch of water on an irrigated field translating into roughly 15 more bushels of corn per acre, the benefits of no-till are hard to counter.

SAVING EVERY DROP

The hard proof of no-till's benefits at the Frahm operation couldn't have been clearer than on two irrigated fields that are side by side on the farm — one irrigated, one tilled. Due to unevenness in the terrain of one field that caused problems with machinery, Frahm and Denneler disked the field to make field operations smoother. Nearby was another field on the same irrigation well that remained in continuous no-till.

Weed resistance is a new challenge with no-till

THE YEAR 2011 has been a game changer with chemical-resistant weeds invading fields across the western third of the state.

Public enemy No. 1 for Kansas farmers – particularly those in the western region of the state – is glyphosate-resistant kochia. Kansas State University agronomists estimate that 30% of all wheat stubble in western Kansas was tilled this summer to control kochia. While there are no figures on prior years, the amount of tillage in 2011 was surprising.

"The kochia issue I think is wider spread than we realized," says Curtis Thompson, Kansas State Extension weed science specialist. "Anytime you drop into the western half of the state, I think you could be dealing with widespread resistant kochia. Not that all kochia is resistant, but it rolls around enough that if farmers are not dealing with it, they're going to be."

That has led some farmers to think they are going to have to till, Thompson says.

For Thomas County farmers Lon Frahm and David Denneler of Frahm Farmland Inc., going back to tillage to control resistant kochia is an option they've taken off the table. Rather, they are taking a more innovative way to staying in the no-till system they have practiced continuously for 15 years.

Stopping weeds before they start

The secret to keeping their fields free of weeds and tillage? Spraying early in the season when weeds are small and using a variety of chemical combinations. Timeliness, says Denneler, is the main factor to consider when pursuing an effective chemical treatment that gets a complete kill and eliminates escapes, or weeds that survive after spraying.

"People that sprayed late had a real problem with it, and people who sprayed their weeds early didn't. We kept ours under almost complete control," Denneler says of the corn and wheat fields he manages on the Frahm farm. "Generally, we would spray all of our wheat in the spring, and that kept the kochia out of it until late July. This year, because of thin wheat stands and weed problems, we had to spray it as soon as we harvested. We sprayed two weeks earlier than normal trying to beat the big weeds. The people who didn't had some big issues with escapes. We didn't have that issue."

And rather than relying exclusively on glyphosate, Denneler goes a step further to include dicamba and 2,4-D in the tank mix to add more punch.

Denneler and Frahm also take a preventative approach and use preemergent herbicides like isoxaflutole early in the spring ahead of corn planting to control weeds before they have a chance of becoming a problem later.

And thanks to the high organic matter accumulated from years of continuous no-till, they are also able to include atrazine for weed control. By comparison, atrazine's residual on highly calcareous soils, or soils with low organic matter, could potentially last for years and limit crop rotations.

Mixing atrazine and isoxaflutole, Denneler says, is a great combination to kill weed seeds as they germinate. "In the spring, I'll still put the atrazine on it and then put wheat on in the fall. That's a five-month difference between application and planting," he says. "Because we have the higher residue levels, you can put on that pound of atrazine and not affect the following crop. If you have low organic matter and you put on atrazine, it'll kill wheat for a whole year."

The high amount of residue, though, can prevent herbicide from reaching young seedlings that lie underneath, Denneler adds. Spraying early helps resolve this issue, too, he says. "If you're trying to spray on a preemergent, and you sprayed it on top of all your cornstalks, the [volunteer] wheat comes up under all the cornstalks," he says. "By putting it on early in the spring and letting the rain take it into the soil, we've gotten good results."

Thompson concurs that early spraying with different chemistries will be required to effectively control resistant kochia. March applications, he says, are advisable for maximum control. "If we get some herbicide activity out there early and do a burndown with something like [glyphosate-dicamba] before a lot of that kochia has even come up – or maybe even [glyphosate-dicamba-attrazine] – we've got some residual and can alleviate that solid mat of kochia," Thompson advises.

For more information, see *www.agronomy.ksu.edu/extension/p.aspx?tabid=150*, as well as *www.ksre.ksu.edu/library/crpsl2/srp1045.pdf.*

Disking that field, Denneler recalls, ended up costing them heavily on corn yield. "The fields were treated all the same, except for the one disking," he says. "And it cost us 40 to 50 bushels [per acre] just to work it once."

The severe yield penalty was a direct result of burying residue that otherwise would have shaded the soils. Just by removing the cover left over from the previous crop, valuable moisture was sucked into the atmosphere via heat and evaporation.

The benefits of no-till, though, don't stop with shading the soil. Years of no-tilling continuously have also improved the overall quality of the soil at the Frahm farm.

Before switching to no-till 15 years ago, organic matter, which acts as a storehouse for water and nutrients, was in the 1.2% to 1.8% range, Denneler says. Now, after years of no-tilling continuously and returning crop residue back to the soil, organic matter is in the range of 2.8% to 3%.

With the higher level of organic matter and improved water-holding capacity of the soil, nearby creeks rarely run because of the lack of runoff from fields. Terrace channels also rarely see standing water after major rain events. "Even with the big rains, we just don't have the runoff," Denneler says, explaining that with the improved soil structure, water infiltrates through the soil's capillary structure and is stored for the following crop.

COZY CORN: This cornstalk, surrounded by moisture-saving residues, is higher-yielding in this environment than under conventional tillage at Frahm Farmland.

INNOVATING WITH NO-TILL

While the benefits of increased residue are proven when it comes to saving water and boosting yields, residue can be too much of a good thing when it comes to irrigated crops, say Frahm and Denneler. The heavy residue accumulating with irrigated corn can create planting issues for following crops. The two handled the problem by going to strip till in 2002, which leaves strips of undisturbed residue between strips of tilled soil, allowing enough space for soil to dry for planting and fertilizer applications, but still leaving residue in place to capture moisture.

With strip till, Frahm and Denneler can stay in a continuous corn rotation on 4,000 acres of their most heavily irrigated fields, allowing for more manageable field operations. "The strip till really leaves a nice seedbed," Denneler says. "It leaves that one strip dry, but leaves the rest of the field wet. It keeps the ground nice and wet right underneath the residue."

They also boost profitability by fertilizing with anhydrous ammonia on dryland fields rather than streaming on liquid fertilizer. By applying anhydrous ammonia 8 inches into the soil via a rolling coulter on a no-till planter rather than applying liquid through a shank, Frahm and Denneler not only reduce nitrogen volatilization, but also precisely place fertilizer near the corn plant's root zone for maximum uptake by the plant.

The best part, Denneler adds, is the cost efficiency. Anhydrous ammonia is 20 cents cheaper per pound of actual nitrogen than liquid alternatives. With nitrogen applied at 200 pounds per acre for irrigated corn, no-tilling with anhydrous ammonia has added money to the bottom line.

Frahm and Denneler also change the angle of the corn rows by 10 degrees each year on their irrigated strip-till cornfields. This way, they can apply the anhydrous with a coulter without following the previous year's rows.

"Every year we switch it 10 degrees back and forth, so we don't plant down the same old row." Denneler says. "By splitting the row at a 10-degree angle, we're trying to split the crown and plant right on one side and right on the other side. We get a pretty nice seedbed and good stand, and we get our fertilizer put on at a reasonable price."

Building on the concepts of increased residue with no-till remains a constant effort, says Frahm. But no matter the method, one rule never changes: If you're not doing no-till, you're wasting water.

"They say if you have enough moisture to raise a weed, you've got enough moisture to raise a crop," Frahm says. "We're always trying to get the right rotation and approach to make that work."

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