FARMER TO FARMER SUCCESS STORIES

History Lesson

Mark Mueller, Waverly, Ia.

History tends to repeat itself, but Mark Mueller, whose family has farmed their land since the 1890s, hopes to reverse that trend as far as our soil and water is concerned.

"It's not like my parents or grandparents purposely abused the ground; they were just following best practices of the day," he says. "But I think my kids will inherit a better field than one that isn't in conservation tillage."

All 1,600 acres of corn, soybean, alfalfa and silage Mueller farms are 100% no-till. Half of these acres now have cover crops, which he plans to increase annually.

As the Iowa Corn Growers Association representative to the Iowa Nutrient Research and Education Council (INREC), he helps educate farmers and crop consultants about the Iowa Nutrient Reduction Strategy (INRS) framework to reduce nutrients washing into the Gulf of Mexico.

Mueller is also one of the initial 20 participants in a multi-state, 10-year Soil Health Partnership (SHP) study, now encompassing 65 sites, that identifies, tests and measures practices that improve soil health. His first test strips, including cereal rye and control plots, were planted in September 2014.

Mueller has a wife, Jeri, and two daughters, Katie and Sarah. His father, Howard, is retired but still works on the farm.

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Farmer to Farmer Success Stories are a series of interviews of farmers sharing how they have found success in incorporating conservation into their operation. To follow this series, visit. *www.HarvestingThePotential.org*

Q: What sparked your transition from conventional tillage to cover crops and no-till?

A: In 2004 I sold 20 acres to some young dairy farmers recruited from the Netherlands as part of an incentive program to bring in dairies to three economically depressed Iowa counties. The understanding from the get-go was that I would produce a silage crop that they would custom harvest and pay for. We started with 125 acres.

After the first silage harvest in 2005, I saw how the ground was absolutely naked, vulnerable and unprotected. We had a heavy rainstorm not long afterward, and I saw the damage that the intense rain caused when there was no protective crop cover whatsoever. The very next year, I started planting cover crops on my silage ground.

I probably would have switched to no-till eventually, but that decision coincided with my use of cover crops. I transitioned to no-till over a period of about four or five years until eventually everything was no-till. I was a little nervous at first, because it's been beaten into all of our heads that tillage is the way it's been done and the way it must always be done. But frankly, I have had no problems with no-till.

Q: What are your current cover crop and rotational practices?

A: Our rotation is corn–corn and then soybeans on most of our acres. About half of our acres are now planted to cover crops, and that number is increasing every year. Any aerial cover crop seeding in corn is done in the standing crop about a week after Labor Day. This fall will be my first experience seeding covers into soybeans, either aerially into a standing crop or on the ground as soon as possible after harvest. After silage harvest, cereal rye is spread within a couple of days and the Kuhn Krause Excelerator vertical tillage tool lightly incorporates the seed a couple of days later to give it a head start.

In the spring, I plant soybeans into waist-high cover crops, which I like to spray immediately afterward, weather permitting. In corn, I kill the cover crop about a week before planting.

As the dairy farm has grown, we've increased annual silage acres to 275. We now have a three-year rotation of silage (two years) and soy (one year), depending on the warmth of the spring. As soon as silage is taken off around

Labor Day, we seed a cereal rye cover crop; it's a simple process, about as idiot-proof as you can ask for.

After a number of years, the dairy also arranged to custom harvest this cover crop in the spring as forage for their dry cows. Now someone else is also getting value from my cover crop. Even after the cover is chopped, the ground is not bare – there is still 6" of stubble and root mass that will decompose. The loss of any residue from cover crops taken away for forage is made up in manure from the dairy, which we knife in at 10,000 gal. per acre in fall and spring. I have not put commercial fertilizer on fields used for silage since the dairy came along 10 years ago. Soil tests and late-season stalk nitrate tests have proven it's not necessary. Even with the application cost, I am money ahead on those acres.

Mark Mueller (left) checks his soybean field with Gerben ten Hoeve (right) and Gerben's son Ian, age 8. The ten Hoeve dairy farm behind them is owned by brothers Gerben and Theo ten Hoeve and their wives, Julie and Danielle, respectively. After the first silage harvest for the dairy in 2005 left the ground unprotected, Mueller was inspired to start cover cropping. The dairy now also forages cereal rye cover crops for their 600-cow herd.

After the cover is chopped, I plant into the stubble. The timing varies: If the field is going back into silage, we'll have it chopped earlier than if it is going into soybeans, which don't seem to be as affected by cereal rye as corn is.

On our field corn acres in spring, we knife in anhydrous preplant and do a starter fertilizer in-furrow. In fall or spring we apply dry fertilizer. We do two, maybe three passes with our weed program, including a preplant burndown on soybean acres that don't yet have cover crops.

Q: Do you have a long view that sustains your conservation farming convictions?

A: I am a student of history. Why are so many civilizations from throughout history, like the ancient Greeks, no longer the powerhouses they once were? Soil degradation is not always the reason, but it's often a factor in their inability to support themselves. For example, in ancient Rome, it became increasingly difficult to feed the empire until eventually, Rome bullied its way into Egypt, which could still grow grain. My reading of history tells me that soil degradation can lead to the downfall of a civilization or even of civility. I think the fabric of our society is stronger when our soil is stronger.

My big reason for doing no-till and cover crops is to protect this soil. We talk about how thin the atmosphere is relative to the Earth, like a skin of an onion. But what do we have for topsoil? Three to six feet? Now that is thin. We're not going to be able to feed ourselves, much less the world, on less soil than we have here in Iowa right now. We have already used up more than half our topsoil in the 150 years since Bremer County got settled, and losses really kicked into high gear in the last 50 to 60 years with bigger machinery. It takes 500 years to make an inch of soil, and frankly, the rest of our topsoil could be gone in a century. We're not going to make it up any time soon. We just need to quit losing what we have.

In the past, every farm used to have diversity. But in my lifetime, we have moved to an intense monoculture, which has also brought intense tillage. We have made some improvements, but even if I am as conservative as possible – cover crops, no-till and hay fields – I'm not really gaining any topsoil. At best, I'm only keeping our precious, finite resource in place. I may even still lose half a ton of soil per acre. That's just the thickness of a dime, but those dimes add up.

When I started farming in 1995, I wasn't as aware of soil loss as I am now. Our family has always been keen to adopt something early, though. My dad was one of the first to get a chisel plow back when everyone had moldboard plows.

No-till has been promoted for years, so it's not anything new; I am just part of a wave of change. Almost every farmer I've met from the "Dust Bowl" states, where water conservation is paramount, practices no-till farming. But I believe that 30 years from now, you'll see more no-till than conventional tillage east of the Missouri River, which still lags in conservation practices.

Q: How does this relate to water quality?

A: Another important reason I am using no-till and cover crops is to help clean up our water. There are unintended problems with heavy-handed federal dictates to solve this problem, so I much prefer a voluntary approach like the INRS. It is believed that in Iowa, we

are putting on less nitrates and using them more efficiently than we did years ago, but we are still working to get a new baseline established to help us track our progress. In my opinion, it will take decades to confirm the benefits of INRS; I have yet to see a complex problem, like water quality, that has a simple answer.

Telling farmers, "You are going to give someone better water 100 miles downstream" is a tough sell. Instead, we need to explain how these practices will help their pocketbook in the short term by keeping costly nitrates or phosphorus in their own soil. In the end, it may not be about what you gain if you do something, but what you are going to lose if you don't.

Q: OK, but aren't you sacrificing profit, yields and clean fields for your philosophy?

A: When I started practicing no-till, I told skeptics, "I might be making 95 cents for every dollar you make, but that is a small price to pay for doing things the right way." But in 10 years of doing this, my yields don't seem to be suffering, and I think I am even with those guys in terms of profit. And in many years, my land will even be more productive than theirs, because I'll have better topsoil, organic matter and water infiltration, and no compaction layer to break up every few years.

There are other skeptics – my father was one of them, by the way, but not anymore – who have told me, "You have to work up the ground or you're going to have compaction." If there is compaction, I haven't seen it. I'm not going to evangelize, but I hope I can show that I am saving myself a whole lot of labor and machinery and making as much money as I was before.

I agree that it's great to point to something at the end of the day, like nice black fields, and say, "That is what I did today." But I have enough work to do without the recreational tillage.

As far as profit goes, I may not always get the highest yields, but neither am I spending the most money. The market is telling us that we have enough corn already, so frankly, do I need to have the most yield per acre or make the most profit per acre? I think I am on track to making more money per acre. And if we ever get a dry year, my yields will actually be ahead because I do not have a compaction layer, which stops water from infiltrating the soil and causes more of it to run off the field, taking soil with it.

My agronomist notes that structurally, the soil is in markedly better condition with much better water infiltration, our erosion is greatly reduced and there are more earthworms. On this year's May 19 field day, our soil pit – which was dug over an area of heavy traffic – showed cover crop roots as long as 4' and continuing down the wormholes without a compaction layer. Water follows the same route. Soil that keeps its organic matter has more available nutrients and retains water better.

My soil is protected. My cereal rye cover crop residue is all gone by early August, and my cornstalk residue is like a bamboo mat, protecting the soil and holding in moisture while it decomposes. Even where that residue is gone, the water percolates, so I am not sinking in and sliding around. The ground is not greasy. It's a tremendous difference, and it opens up the number of days I can spray. For example, about 48 hours after a 5" rain early this summer, I was able to get out in the fields with a full 1,200-gal. sprayer without sliding or getting stuck. My chemical dealer was shocked. Calm days are such a rare commodity in Iowa that we have to take advantage of them!

While tillage might conceal a lot of little wounds and injuries to the soil temporarily, a combination of cover crops and no-till keeps a lot of those wounds from happening as often. With each passing year, I am coming across fewer washouts or gullies that bounce the tractor wheels and swing the booms wildly. That is my satisfaction – my soil is staying where it belongs, and I can spray at 7 mph to 8 mph without worrying about gullies. Also, since we have gone to no-till, I probably spend half the time I used to picking up rocks.

Weed control has also gotten better because I can spray in a timely fashion, and expenses are a little lower. I've noticed a big difference with cover crops. For example, in 2014, the weather was so wet and windy I couldn't get

A "bamboo mat" of cornstalk residue protects against erosion. No-till and cover crops speed water infiltration, which opens up opportunities for spraying on calm days – a rarity in Iowa.

Mueller grows 150 acres of alfalfa, which the ten Hoeve dairy also buys and custom harvests, as they do with the silage and cover crops. The alfalfa ground is rotated with field corn.

Soybeans are planted into a cereal rye cover crop. The no-till planter has helpful "bells and whistles" such as row cleaners, seed firmers, pneumatic down pressure and drag chains.

a second spray pass on a field, which yielded so badly I made a crop insurance claim. Coincidentally, that fall I planted a cereal rye cover crop in that same field as part of a Conservation Stewardship Program. The next spring, the covers had choked out the weeds. Immediately, that field went from my dirtiest field in 2014 to my cleanest in 2015. It has continued to stay clean in 2016 while using cover crops. I started putting covers on problem fields that I would have burned down anyway, but now I am burning down cereal rye and not dealing with troublesome, chemical-resistant weeds. I've seen a slight dropoff in the number of problem areas, which are now easier to take care of.

I am also spending less on machinery and less on labor for fewer operations. There is a little more management called for, such as waiting an extra day to plant in a cool, wet spring, but in my 10 years of doing this, I've planted all my crops in a timely fashion.

While monetary advantages are not always easy to quantify, since 2014, my farm has been involved in the SHP's 10-year, multi-state study that aims to place a dollar value on these practices, specifically cover crops. SHP is a farmer-led initiative of the National Corn Growers Association. On my farm, the research involves intense soil sampling and microbial respiration tests on a grid system every other year.

Q: What's the price of not learning from history?

A: Part of the inertia is the idea of, "It's not how I was raised to do it." For example, the traditional Band-Aid for a gully is to plow through it. But the problems that result from using iron don't happen fast enough for us to react to them; therefore, we tend to ignore them.

While there is now an increasing awareness of the fragility of our soil, I wish practices were changing faster. We won't run out of topsoil in my or my children's lifetimes, but maybe we will three or four generations from now.

The damage done to the soil with heavy rainfall is a certainty, and if anything, we can count on more heavy rains in the future. Around 1960, Iowa averaged four 4" rain events annually; now we average 11 4" rain events annually. Iowa has gotten wetter, and the rains come harder and faster. Our soil is increasingly at risk.

At the SHP field day held at Mueller's farm on May 19, 2016, Neil Sass, Natural Resources Conservation Service, demonstrates long vertical cover crop root growth, water infiltration, soil structure and lack of compaction in a soil pit.

Soil preservation is measurable. Fifty years from now my land will be worth more than farms that didn't do conservation tillage. Someone is going to inherit that. How do we want to be remembered by future generations? As part of the group that squandered our chance when we saw what was happening and chose not to act? We keep kicking the can down the road when it comes to the serious, more painful things. The price of inaction now means paying a bigger price down the road.

Q: What legacy would you like to leave?

A: I would like to see no less topsoil on the farm than it has now. In my mind, it is a no-brainer to keep soil in place. Do I need those extra few pennies that a whole lot of extra work would get me?

I want to be the best steward of the land that I can. Leaving things better than you found them should be a general goal in life, but in this particular area, I'd like to leave a better field for my children than what I started with.

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