FARMER TO FARMER SUCCESS STORIES

Insure Your Soil, Protect Your Water

Tim Smith, Eagle Grove, IA

Tim Smith's century farm in Eagle Grove, Iowa, is nestled in Wright County, a region known more for large agribusiness operations than cutting-edge conservation. Always interested in preserving the soil, Smith decided to take things a step further in 2011 by enrolling in a three-year Natural Resources Conservation Service (NRCS) incentive project called the Mississippi River Basin Healthy Watersheds Initiative (MRBI). The 13-state voluntary program aims to mitigate hypoxia in the Gulf of Mexico by reducing nitrate leaching into streams, including Smith's Boone River watershed.

That year marked his last fall application of anhydrous on his 800 acres, which he plants in corn and soybeans. He also aerial seeded his first cover crop, cereal rye, over 300 acres. The following spring, he switched from disk chisel system to strip-till and, by the spring of 2013, water samples exiting the woodchip bioreactor installed the previous fall showed that nitrate levels were less than half that of his nearby stream.

Although Smith had already been following what he felt were best management practices and conservative use of nitrogen (N), the experience had a profound influence on his view of soil and water conservation. Smith now encourages other producers to think more proactively about the resources that are most precious to farmers, but also most often taken for granted: clean water and healthy, renewable topsoil.

Vol. 1, No. 4
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: How did this project change your view of nitrate loads?

A: I had assumed for years that nitrate levels in streams and rivers came from urban areas. In fall 2011, baseline water nitrate levels coming off my farm's tile lines tested at 19 parts per million (ppm), higher than the stream levels. The threshold for safe drinking water is 10 ppm.

That was the beginning of new practices. In 2011, I seeded my first cover crop. In spring 2012, I began only spring sidedressing of N. My nitrate levels that spring were down to 13 ppm to 14 ppm. In fall 2012 I installed the bioreactor and seeded another cover crop. In spring 2013, my peak nitrate loads were down to 12 ppm to 13 ppm, while stream levels were 25 ppm to 30 ppm.

I'm being more judicious with N; I use multiple sources and am more careful about timing. I also use a nitrogen rate calculator and do fall stalk nitrate testing in corn. I think the idea of being compelled to reduce inputs worries a lot of farmers, but people are realizing that N is a potentially leachy nutrient; it moves through the soil profile via tile lines.

Q: How did cover crops and strip-till factor into this program?

A: When the NRCS manager asked me if I wanted to do cover crops, I thought, "Why would anyone want to do that?" But the more practices you agreed to, the more likely you were to get accepted into the program. After some research, I jumped right in. I discovered that cover crops sequester N in the soil, which helps mitigate nitrate loads. The first year we had only 800 lb. of biomass per acre, but it contained over 30 lb. of N, which was captured for the next year's crop and not lost through tile water.

Among other reasons, tillage is used to dry out the soil, but it actually damages it. With strip-till, I can apply nutrients in that strip and it will warm better in the spring. Strip tillage replaces the field cultivator and disk chisel.

Q: What other benefits did you discover from cover crops and strip-till?

A: The biggest surprise was going out with a spade in the spring and seeing how crumbly the soil was, even though I hadn't tilled it. Without tillage, earthworms

were able to do their work. They actually come up to the surface and pull residue down into soil. Water infiltrates many feet down through all those little worm holes, too. And the soil now has aggregate stability.

Cover crops provide a place for microbes to function surrounding the roots. They process inorganic fertilizer and help make it biologically available for plants to use. And I'm not changing my cropping system away from corn and soybeans; I'm just having something growing out there two to three more months of the year while my cash crops are drying down and before I plant my next crop in the spring.

Q: Economically, do cover crops make sense?

A: A lot of farmers say, "Show me the money and then I will do it." While I haven't gotten to the point where cover crops are cutting my N use, in future years there will be an economic factor to cover crops. For example, in a drought year, my yields were comparable to a nearby, conventional farm. In Iowa, where we're putting cover crops on later in the season, it's still a tremendous benefit. In other parts of the country, such as Ohio – where a producer can put small grains in the rotation – the economic value is more dramatic.

Q: How can you quantify improved soil structure?

A: Farmers spend a lot of money on insurance, such as yield loss protection and crop protection chemicals. This $30 per acre I spend on cover crops is soil insurance. Soil scientists tell us that 150 years ago, Iowa had an average of 14" of topsoil. In 2015, that's dropped to 8" on average. Our soil is still productive because of that remaining 8". But what do we do when we're down to 3" to 4"? The solution is not to simply apply more nutrients. The economic picture of profit per acre does not factor in soil loss. In 2014, Iowa State University agronomy professor Rick Cruse estimated that soil erosion in Iowa may add up to $1 billion in losses per year. If you had to buy enough 40-lb. bags of topsoil at $2 per bag to replace just 1 ton of lost topsoil per acre, it's not hard to do the math. Am I willing to spend a total of $30 per acre in cover crops to recoup that loss? Yes!

We also need to take into account that we are in a period of weather extremes, and every drop of rain has the potential to take soil with it. I was glad I had cover crops in a wet year because of their soil-erosion protection benefits.

As a participant in the Mississippi River Basin Healthy Watersheds Initiative, Tim Smith installed a woodchip bioreactor in 2012 to reduce nitrate loads coming out of his tiled fields. Water from 30 to 40 acres can be diverted through the underground bed, which is composed of 125 cu. yd. of woodchips and permeable fabric, before flowing into a nearby stream. The flow of water can be controlled via stop gates. The Iowa Soybean Association both takes and examines the samples.

Q: Do you see the need for a cultural shift in farming practices?

A: Back in the 1970s, wind erosion was a big issue. When my dad sold his moldboard plow, our neighbor commented, "How are you going to farm without a plow?"

Now we've gone full circle: 40 years from moldboard plowing to having a full cover crop growing before you plant. Farmers today need to factor in soil sustainability for future generations.

We also need to talk to our consumers, who care about how food is grown and how we protect the land.

If you told me five years ago that I'd be doing this, I would have shaken my head. More and more, I just see the benefits of doing this. It's a systems approach. All of these practices are good, but when you combine them, you get much greater benefits.

HARVESTING THE POTENTIAL
FARMING TO FEED THE WORLD

THE HOWARD G. BUFFETT

The Howard G. Buffett Foundation's primary mission is to catalyze transformational change to improve the world and the lives of the most impoverished and marginalized population. The Foundation has to date invested nearly $250 million to support sustainable agricultural development and improved nutrition initiatives in 50 countries around the world, including in the United States.