

# Reducing Nitrogen Rates

Mike Werling - Decatur, Indiana

Mike Werling started no-tilling and planting cover crops to reduce erosion on his 350-acre farm. He's also reducing his nitrogen rates. His goal is to produce a bushel of corn with 0.75 pounds of applied nitrogen—to meet his 180-bushel target on 125 to 145 pounds of N—but he often ends up doing even better, harvesting over 200 bushels per acre.

Despite his success, Werling is the first to warn farmers not to cut rates until they've built up their soils with years of no-till and cover crops.

"I don't promote lowering rates when you're starting this kind of thing—that will bite you," says Werling, who started with minimum tillage in the 1980s and switched to no-till in 1994, boosting his soil organic matter by more than 50% and in some fields, even doubling it. Today, his whole-farm average for soil organic matter is 3.3%, and some areas boast 4% or even 5%.



Mike Werling put wheat and oats back into his rotation.

## Nitrogen-Efficient Farm

The trick to creating a nitrogen-efficient farm, he says, is building up a bank of soil fertility and then forcing the crop to glean some of its needs from the soil organic matter.

"Soil is lazy," Werling explains. "If it doesn't have to produce nutrients, it will work off of the applied nitrogen."

Werling established nitrogen rate test plots in 2010 as part of the INField Advantage program (formerly the OnFarm Network), a program designed to help farmers fine-tune their cropping systems by conducting their own trials.

Werling created plots with 50, 100, 150, 200 and 250 pounds of applied nitrogen and took them to yield, year after year. In 2014, the 50-pound N plot yielded more than 160 bushels of corn per acre.

"That's the soil returning the nutrient cycling from over the years," he says.

In general, Werling notes, higher rates of nitrogen increased yields, but the economic payoff from investing in the nitrogen dropped steadily. In other words, he explains, "each step up in nitrogen paid for itself, but it always took more nitrogen to produce a bushel of corn."

## Highs and Lows

Applying lower rates of nitrogen and batting for triples instead of home runs in yield reflect Werling's strategy of steady, profitable performance.

"I probably don't hit the highs, but I also don't hit the lows," he says. "It's interesting that I can hit that goal every year. Even when we had a dry year in 2012, I hit 172 [bushels]." (County average that year was 111.8 bushels.)

Soybean yields are also consistent with county averages on Werling's farm.

Werling shoots for steady, consistent success on his bottom line, too. That's why he includes wheat in his rotation.

"Wheat ground is less profitable that year than what corn or beans would be," he acknowledges. "That year gets less return, but it pays back two or three years down the road compared to corn/bean or corn/corn/bean rotations, and the beans the following year are better."

## Burying Phosphorus

Though his success with reducing nitrogen rates has put Indiana farmer Mike Werling in the spotlight, much of his attention is focused on phosphorus. He points out that runoff from his farm drains to Lake Erie, which garnered headlines as it battled algal blooms caused by high levels of P.

He's excited by a new Salford rig purchased by the Allen and Adams County Soil and Water Conservation Districts with funds from the Great Lakes Commission. The unit allows him and his neighbors to band phosphorus on or below the soil surface while seeding cover crops. The combination of nutrient-scavenging, erosion-fighting cover crops and subsurface bands of phosphorus are a perfect fit for Werling's farming philosophy.

"The right place for phosphorus is in the ground, not broadcast," he says.

That's a theory he believes in wholeheartedly, and is hoping to demonstrate in strip trials in future collaborations with Purdue University and the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS).

## Bringing Back Cover Crops

Werling's grandfather used to plant clover on wheat ground, fixing nitrogen and covering the soil. In the mid 1990s, as he was learning the tricks of planting no-till corn with his new Kinze planter, Werling started seeing the value of cover crops for himself.

"I figured out my best no-till corn—as far as ease of no-till, ease of planting—was in a field that had been in oats," he says. A local Amish community creates a market for oats, which he soon adopted as a cover crop, seeding one to two bushels per acre unless forecasts of bad weather suggest that more cover might be needed. He aims to get oats up four to six inches tall before they winter kill, then will often follow them with soybeans, wheat or even a cash crop of spring oats.

"In '98 and '99, I started using radishes and peas," Werling says, describing his rotation of cover crops. "In wheat and oats ground in the summer, I can use them to build organic matter because you've got a longer growing season."

Today, Werling also has a neighbor seed cereal rye into standing corn with a Hagie boom in mid-September to give the cover crop a few vital weeks of head start before it slows for winter. He's continually on the lookout for new cover crops, ranging from Austrian winter peas to buckwheat, crimson clover, black oats, leguminous sunn hemp and bee-friendly phacelia.

Whatever the crop, whatever the cover, the long-time no-tiller in Werling comes out when he sums up the look of a healthy field.

"It's nice to see all the residue on the surface," he says.



Werling's cover crops allow him to cut N rates.

## The 4Rs of Nutrient Stewardship

Mike Werling's farm is a shining example of the 4Rs of Nutrient Stewardship: using the right source at the right rate at the right time in the right place. Sticking to the 4Rs, Werling has reduced his nitrogen applications, shifted to spring fertilizer applications and bands his phosphorus beneath the soil surface with his planter. Together, those tactics allow him to reduce off-farm nutrient loss, protecting the environment and his bottom line.



Werling is always on the lookout for new cover crop species.

This is part of a series of sheets on the economics of conservation systems developed as part of Indiana's Conservation Cropping Systems Initiative (CCSI) in cooperation with the Conservation Technology Information Center and Purdue University. For more information on the Conservation Cropping Systems Initiative, visit [ccsin.org](http://ccsin.org).

### CCSI's Partners in Conservation:

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This material is based upon work supported by the Natural Resources Conservation Service, U.S. Department of Agriculture, under award number 69-3A75-12-215.

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