



8th Annual Responsible Nutrient Management Practitioners Program

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2016 Recipients
Eric Odberg, Genesee, Idaho
John Kemmeren, Bainbridge, N.Y.
Jerry and Nancy Ackermann, Lakefield, Minn.

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Variable-Rate Fertilization Works Well in Hilly Terrain

With the help of technology, Idaho no-tiller Eric Odberg is able to keep nutrients on his steep hills and out of a local river by accurately placing fertilizer and only using what he needs.

By Jim Steiert

ERIC ODBERG knows well the challenges of thin soil atop rolling hillsides, which slope as steeply as 45-50 degrees in the Palouse.

No-tilling 2,200 acres of winter and spring wheat, malt barley, garbanzo beans, canola, millet, sunflowers, quinoa and flax in Genesee, Idaho, the area lacks summer rainfall, and when it does rain or snow, erosion occurs from too much water coming off the hillsides too fast.

Still, his wheat yields are usually above the county average of 85-90 bushels — his recent winter wheat yielded 102 bushels per acre. That comes on terrain where hilltops may yield only 50 bushels per acre, while bottoms and meadows may hit 140 bushels.

Keys to Odberg's farming success in this challenging landscape include using no-till to keep cover on the soil so that soil moisture doesn't evaporate, using a variety of rotational crops, soil- and plant-tissue sampling annually, yield mapping and variable-rate fertilization.

Technology Efficient. Most of Odberg's farm drains into the Clearwater River, a salmon-bearing stream crucial to spawning, he says.

"I can sit in my tractor seat and see exactly where Catholic Creek, a drainage of the farm, drains right into this environmentally sensitive salmon stream," he says. "I'm very conscious of what leaves the field via the creeks — I want the fertilizer to stay on the farm."

He finds the best way to take care of that concern, while saving money, is to avoid applying too much fertilizer in the first place.

That means soil and tissue testing in season, creating variable rates for all fertilizer applications based on yield maps and infrared imaging, using auto-boom control, banding anhydrous ammonia and liquid fertilizers, and applying starter fertilizer as a liquid in-furrow.

Among the first to enroll, Odberg took advantage of the NRCS' Conservation Security Program in 2006 for assistance in acquiring yield monitor and fertilizer rate controller equipment.

He realizes a 7% savings with variable-rate fertilization and another 8% with auto-steer, for a total of 15% savings by using fewer nutrients more efficiently.

Odberg also began a soil liming program 5 years ago, broadcasting 1 ton per acre each fall. It's brought up soil pH levels and increased wheat yields by as much as 15 bushels per acre in wetter years.

At a cost of \$70 an acre, he limes only one field each fall, and hopes to variable rate his lime one day as well.

"I save money by not putting on nutrients I don't need. I know which areas of the farm are low in productivity and which areas are high," Odberg says. "A lot of it comes down to water-holding capacity — it's more obvious here. We face a real challenge increasing soil organic matter on the hilltops."

A fourth generation farmer, he notes that former family members had livestock, and he may look at bringing that back to his operation to add more organic matter.

"For now, we are protecting the soil, holding moisture and managing fertility with the best means we have available," he says.

Jump Start. At the heart of Odberg's fertility program is banding nutrients in a one-pass no-till application with a John Deere 1895 air drill.

The drill is rigged with mid-row banders modified to a 19.6-inch diameter in three ranks on 20-inch centers. He seeds on 10-inch centers and fertilizer is applied 5 inches to the side and 5 inches below the seed.

He finds starter fertilizer critical to getting the crop going and uses a formulation including 13.7% nitrogen (N), 27.5% phosphate, 2 pounds of zinc, and humic acid.


Magnesium is added, depending on soil testing, and 10% of the phosphate is Orthophosphate.

"With the starter fertilizer program, fertility is available right away and jump-starts the crop quickly so it can grow right into the deep fertilizer," Odberg explains.

Adjusting Anhydrous. For anhydrous ammonia application, an ammonia bottle rides on the tongue of the rig, giving the advantage of short coupling to allow better navigation of hillsides with less draft. Odberg adds weight to the drill and down pressure on the wings to keep the drill in the ground on the varying terrain.

Anhydrous ammonia is channeled through an Exactrix TAPPS pump that liquefies the gas from the tank at high pressure so it goes into the ground as a pure liquid rather than a gas. The drill is modified with Keeton seed firmers, and Thompson closing wheels follow the fertilizer injector to keep fertilizer in the soil.

"Ten years ago, I didn't like a lot of the fertilizer systems that were available on drills," Odberg says. "That's when Guy Swanson of Exactrix showed me the high-pressure anhydrous ammonia fertilizer system with liquid phosphate and sulfur. It had great uniformity across the drill and the TAPPS system reduced the fertilizer rate by 20 pounds per acre."

"Most fertilizer systems reduce the pressure where anhydrous ammonia is applied, but we're increasing it to get the liquid at the injection point. With environmental concerns, it's especially important that the N stays where it's placed. The variable rate fertilization has proved to be easily attained with yield monitors and infrared mapping. Monitoring equipment can change from low to high fertility rates in 1-1½ seconds across zones in the field." 



STAYING IN PLACE. Despite hills that slope as much as 50 degrees, Eric Odberg is able to keep the right amount of nutrients where they need to be through no-till, fertilizer banding and variable-rate technology.

Integrated Fertility System Optimizes On-Farm Resources

No-till, manure, cover crops, crop rotation and careful pH management allow John Kemmeren to produce high corn and forage yields while cutting commercial fertilizer by 75%.

By Lynn Betts

RECIPROCATION IS what John Kemmeren's integrated, carefully built fertility program is all about.

The 40-year no-tiller has created his crop and livestock operation to take full advantage of one component feeding off another, and in turn that component giving more back to the entire operation. His system has translated to higher yields with lower out-of-pocket inputs, as well as land and water protection.

Kemmeren no-tills 750 acres of corn, hay and pasture near Bainbridge in central New York. He milks 100 cows and keeps 100 replacement heifers, as well as a few beef cattle. Three-fourths of his farm is classified as highly erodible land (HEL), with some steep C and D slopes, while the other fourth is more level bottomlands.

Corn yields average 190 bushels an acre, 25% higher than the county average of 140 bushels. His forage yields hit 6-7 tons of dry matter, compared to the county average of 3 tons.

These yields come at the same time Kemmeren has cut his use of commercial fertilizer by 75%.

Managing Manure. Kemmeren's success comes from using the resources on his farm, like most dairy farmers, but what sets him apart is how he uses them. That's where timing and reciprocity come in.

For instance, Kemmeren takes full advantage of the manure his cows produce. He knows his steep hills have to be protected against soil erosion, and no-till alone won't always do the job. So he seeds

"I was never a believer in daily spreading of manure on cornstalks. Our thought is to get the manure applied quickly so the cover crop can use it..."

cover crops and feeds those covers with manure. The cover crop, in turn, holds the manure in place, as well as some nitrogen (N) for the following crop.

"I was never a believer in daily spreading of manure on cornstalks. You'll have wet weather that causes ruts, you'll have runoff, and you'll be applying before the crop can use it," Kemmeren says. "Our thought is to get the manure applied quickly so the cover crop can use it."

He has his own manure tank and hires custom applicators so he can put manure where it's needed when he needs it.

"All our silage ground gets manure shortly after its seeded to cover crops, and the next priority is the earlier harvested corn for grain," Kemmeren says. "We can put fertilizer on more acres at lighter rates this way. Our goal is to lightly manure every field every year, if we can."

Kemmeren's standard manure rate is 4,000 gallons an acre.

3-Year Rotation. The manure and cover crops, combined with a 3-year rotation Kemmeren often uses, has almost eliminated the need for commercial N in corn.

In his standard rotation, he'll drill cereal rye and red clover the day after corn silage harvest, then apply manure. The next June, he'll harvest the cereal rye for straw — he says it's very valuable in his area and yields about 4 tons per acre.

Kemmeren then no-tills sudangrass and red clover into the cereal rye stubble. He'll get two cuttings of sudangrass before it dies in the fall, which is when the red clover takes off. He cuts the red clover the next year as either silage or hay, and no-tills corn into the clover the following spring. The red clover provides 200 pounds of N per acre, Kemmeren says.

He uses some N in a 200-pound-per-acre corn starter package of 10-18-14, applied dry in a 2-by-2-inch band with the planter. He also topdresses corn and grass if needed, with urea mixed with ContaiN stabilizer. That can be the case in a really wet June, he says.


With that rotation, use of cover crops, and topdressing as needed, Kemmeren says he's never seen his corn lack N, and takes late-season corn stalk N tests to check.

Adamant on pH. Kemmeren soil tests every 3 years, taking samples on 2.5-acre grids on larger fields, and applies phosphorus, potassium and micronutrients accordingly.

He's a stickler on making sure soil pH is at the proper level to ensure optimum nutrient availability.

"The common pH around here is 5.2, but that's not high enough," Kemmeren says. "I want it to be at 7 on alfalfa and 6.6 on grass fields."

After difficulties in getting applicators to apply lime when he wanted, Kemmeren bought his own 5-ton spreader. He now applies up to half a ton of lime on each field every other year.

"That's so much better than the usual 5 or 6 years — lime really makes potash available," Kemmeren says. "We apply very little potash." 



RECYCLING NUTRIENTS. A 3-year rotation that includes cover crops and manure applications has allowed John Kemmeren to almost completely eliminate the need for commercial nitrogen for his corn.

Strategic Tinkering Decreases Fertilizer Use, Improves Profits

Through improved timing, products and rotation, Jerry and Nancy Ackermann have been able to reduce fertilizer inputs while improving both yields and soil health.

By Laura Barrera, Associate Editor

IN SOUTHWESTERN Minnesota, Jerry and Nancy Ackermann have a goal of raising 200-bushel corn on 140 pounds of nitrogen (N). At 190-bushel yields, they're pretty close to achieving it.

Strip-tilling corn and no-tilling soybeans and alfalfa on 1,200 acres, the Lakefield, Minn., couple has eclipsed county yield averages — typically by 5 bushels for soybeans and 20 bushels higher for corn — while lowering fertilizer inputs through calculated experimentation and a constant desire for improvement.

Stabilizing Nutrients. One of the first adjustments the Ackermanns made to their fertility program was with N.

When they started strip-tilling corn, they put all N down as anhydrous ammonia in the fall. Jerry says they knew they were probably losing some N because of volatilization, so they would add an extra 30-40 pounds to make up for it.

One year they had a really dry fall and Jerry drove by as a neighbor was applying anhydrous with a chisel plow.

"I had to gasp to get some air as I was driving by," he recalls. "And I'm thinking, 'How much N are they losing? Right there, they're just losing it.'"

That year he decided they needed to switch to urea, which they've been using now for 7 years. The Ackermanns now either apply ESN, a controlled-release N product, or urea with Agrotain N stabilizer in the fall.

They also apply their phosphorus (P) and potassium (K) in the fall and will put down a P stabilizer with it.

Adjusting Nitrogen. Adopting stabilizers has allowed the Ackermanns to time their fertilizer applications better, which has resulted in an overall reduction in the amount they apply.

They went from applying 100 pounds N in the strip down to 60 or 50 at first, and are now down to 40 pounds. Each time they cut down on what they applied in the fall, they increased their sidedress applications a bit, which led to higher yields.

Currently, they sidedress 100 pounds of 32% liquid N around the V5 stage, depending on weather. With the 40 pounds applied in the fall, the Ackermanns are only applying 140 pounds N per acre total.

Jerry says he hears about no-tillers using higher rates of N and is wondering if he's missing something. He'd like to do a test with a Hagie highboy, applying 30-40 pounds of N later in the season to see if they would gain yield.

"If that's the case, maybe we should be cutting back more at sidedress time and putting more on later," he says.

But Jerry's not just looking at yields — he wants to know whether it's actually profitable.

"Sometimes the highest yields aren't the most economical," he explains.

The Ackermanns did decide to do an experiment with their sidedress application after Jerry talked to NRCS conservation

agronomist Ray Archuleta, who recommended they skip a sidedress application on a test strip to see how much they were gaining from sidedressing.

"We lost about 35 bushels an acre by not doing the sidedress," Jerry says. "At fertilizer and corn prices, that's substantial."

Get It Growing. In addition to the N applied in the fall and at sidedressing, the Ackermanns apply 10-34-0 as a starter in-furrow at planting. They also add Ascend, a growth regulator from WinField, which provides some micronutrients.

"It seems like it gets the corn out of the ground quicker," Jerry says.

The Ackermanns are also applying some zinc with their starter, a nutrient their crop consultant company, Extended Ag Services, recommended after taking tissue samples. Most field areas require 1 quart, but Jerry says some need up to 2 quarts.

Alfalfa Payoff. The Ackermanns grid sample their soils every 3-4 years, and while they do keep on top of changes occurring, part of the reason for the frequent testing is due to having alfalfa in the rotation.

"You have to be careful with alfalfa. We have a tendency to be low on potash because it sucks a lot of it out of the soil," Jerry says.

One year the Ackermanns did an 80-acre test with soybeans, where they had four different blocks of P and K applications. When they had the yield maps done, they started to see where the differences were in application.

Jerry says they'll be pushing the pencil this year to determine where they're going to make their potash applications.

While alfalfa does impact their potash levels, having it in rotation has positively impacted their fertilizer program overall, Jerry says. If they have a fairly decent stand of alfalfa, he can terminate it in the fall and no-till corn into it in the spring with just starter fertilizer, and still expect 200-bushel corn yields.

"It also shows up in the second and third year after that," he adds. "Soybeans do better the following year, and when it goes back to corn we expect good yields too, and can cut back on fertilizer a little bit.

"I make most of my money on alfalfa when I rotate out of it, because of virtually no fertilizer costs and I still get good yields."

Adding alfalfa has also improved his soil health. His home farm is averaging 5.8% organic matter levels, which he thinks is due to having alfalfa twice on it over 15 years, along with the cover crops he's been seeding.



MORE WITH LESS. Nancy and Jerry Ackermann are shooting for 200-bushel corn on 140 pounds of nitrogen. At 190-bushel yields, Jerry says they're getting close.