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2018 Recipients
Jacob Kaderly, Monticello, Wis.
Stuart Lawrence, Rosetown, Saskatchewan
Richard Lyons, Harvel, Ill.

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Managing the Details with Nutrients Proves Worthwhile

Illinois no-tiller finds spoon-feeding nitrogen, cover cropping and variable-rate phosphorus and potassium application makes for efficient nutrient use and top-end yields.

By Ron Perszewski

LESS IS DEFINITELY proving to be more for Richard Lyons. Through attention to detail, the Harvel, Ill., no-tiller and strip-tiller has been reducing levels of applied fertilizer while pushing corn yields to eye-catching levels.

While corn growers in Montgomery County, Ill., averaged 199 bushels per acre in 2016, Lyons easily surpassed that mark with an average of 231 bushels per acre. It's a longtime trend with similar positive results for soybeans.

He has no-tilled soybeans on his 300-acre farm since 1988. While Lyons no-tilled corn starting in 1977, he began strip-tilling the crop in 2003. He credits efficient nutrient management for maximizing his yields and profits.

Split N Applications. Lyons, who soil tests 2.5-acre grids every 3 years, aims to use no more than 0.9 pounds of nitrogen (N) per bushel of corn. Split applications of N before and during the growing season effectively “spoon-feed” the corn, he says.

He may make as many as four applications of N for corn:

- Anhydrous ammonia at 100 pounds is applied in the fall during the strip-till pass and protected with N-Serve.
- Five pounds of N from 28% UAN is applied as a “pop-up” starter at planting. Boron, zinc, iron and sulfur are also applied as needed at planting.
- An additional 75 pounds of UAN is applied at sidedress at the 2-4 leaf stage.
- If yield potential is high, another 25 pounds of N protected by Agrotain is applied with Y-Drop technology prior to tasseling.

Lyons says this application program has produced an efficiency of 81%-90% of N use rates to yield. In contrast, the Maximum Return to Nitrogen (MRTN) method he used in trials in 2016 resulted in a yield loss of 37 bushels per acre. He says MRTN, an economic model based on the expected price of N and corn yields, cost him more in lost yield than it saved him in reduced N purchases.

For soybeans, Lyons applies 18 pounds of N per acre with 100 pounds of DAP onto corn stalks, then no-tills cereal rye into the stalks to sequester N to be used by soybeans.

Covers Build Soils. Having just begun cover cropping 4 years ago, Lyons has used cover crops on 100% of his acreage the past 3 years. He had been using spring oats and radishes prior to corn, but is moving to spring and winter oats, along with dwarf rape and cereal rye, to provide winter-long cover and actively growing roots for improved soil health.

While no-till itself was increasing soil organic matter at a rate



DETAILED APPROACH. Richard Lyons makes as many as four nitrogen applications to corn each year in an effort to keep applied nitrogen levels at 0.9 pounds for each bushel of corn produced on his Harvel, Ill., farm.

of about 0.1% per 10 years, Lyons expects cover crops to increase organic matter at a more rapid rate. And, he says, the use of N to decompose corn stalks helps retain the organic matter that might otherwise leave the field during heavy precipitation.

Variable P&K. Phosphorus (P) and potassium (K) are applied using variable-rate technology to correlate with measurements from 2.5-acre grid soil samples. Lyons uses the soil K test, along with the cation exchange capacity (CEC) of his fields, to establish a K fertility rate.

Soybean acres get a minimum of 100 pounds of potash with the added goal of reducing sudden death syndrome in soybeans planted into high-clay soils. Desired soil test values for K range from 225 to 400 pounds per acre. Potash is variable-rate applied

depending on the CEC of particular areas of fields.

To further ensure the health of his soybeans, Lyons uses foliar applications after leaf testing to deliver manganese, boron and sulfur during fungicide treatments at the R2 stage.

Lyons maintains P at the level recommended in the Illinois Agronomy Handbook for his farm location. DAP is applied to maintain a 60 P1 test, factoring in the past 2 years' corn and soybean yields.

“With my yields, 250 pounds of DAP and 300 pounds of potash are commonly recommended by fertilizer retailers,” Lyons says. “However, the soil testing, nutrient management plan and variable-rate applications reduce the need to overapply commercial fertilizers and result in a \$40.75 savings per acre,” he says.

Resisting Run-Off. The watershed in which Lyons farms has problems with P run-off and nitrates from tile lines flowing into a lake that supplies drinking water, so he takes steps to minimize the risk.

“My nitrogen plan uses rates based on actual yields instead of projected yields,” he says. “This gives me the flexibility to add additional N when it might be needed to accomplish the top-end yield without going overboard in years where the yield potential may not be there for the corn crop,” he says

And the use of N to decompose corn stalks helps retain organic matter and nutrients that might otherwise leave his fields during heavy precipitation, he adds.

In addition, he has planted CRP buffer strips along all creeks and drainage ditches on his land to reduce particulate P lost through surface runoff. Lyons is just starting to monitor nutrient losses throughout the growing season and winter months with drainage-water management structures installed on field tiles.

Solid Soil Sampling Foundation Helps No-Tiller Hit Higher Yields

Grid sampling, sidedressing nitrogen with stabilizers, starter fertilizer and cover crops give Jake Kaderly improved yields on highly erodible ground and exceptional yields on his best ground.

By Lynn Betts

GRID SAMPLING every 2 years on a 2-acre grid is the foundation Jake Kaderly built his fertility program on. It continues to be the basis for placing the right amount of nutrients in the right place for optimum yields on land he farms in southern Wisconsin.

"I move sample points biennially to get a better understanding of the field's fertility, then I correct for lime, phosphorus and potassium with variable-rate spreading," the Monticello, Wis., farmer says.

Every fifth sample is tested for trace elements.

The year he doesn't test, he broadcasts 175 pounds per acre of diammonium phosphate (DAP) and 175 pounds of potash.

Kaderly, who's more detailed in his fertility program than most, also applies 5 pounds each of zinc, boron and manganese. He applies zinc on corn in-furrow, foliar applies manganese on soybeans and bulk spreads boron on soybeans and corn.

"I've been following that pattern for 12 years," he says. "It took 4 to 5 years for everything to kick into gear, but now we're getting really close to the right amount of fertility in the right place. The yield monitor gives me proof of that.

"It's not just N, P and K that are important; it's the balance of all elements in the soil."

For example, 5 years ago his manganese levels were 20-25 parts per million, so he applied 25 pounds per acre in one shot to begin bringing levels back to 50-60 parts per million.

"There's a lot of research that says glyphosate is tying up manganese. That slows plant metabolism, so I watch that," Kaderly says.

Improving Soil Balance. Every fall, Kaderly spreads 900 pounds of gypsum (calcium and sulfur). He says soils in his area are derived from dolomitic limestone, so he's getting close to the base saturation goal for calcium.

"The gypsum is loosening and bringing more life back into the soil, and helping promote excellent stalk decomposition. The residue is gone by midsummer of the next year," Kaderly says.

Cover crops have a place in his cropping rotation of corn, soybeans and wheat. He's found he gets 20 bushels per acre more corn yield following a cover crop of crimson clover, radish and sunn hemp that's planted in August after he harvests his wheat crop.

Focused, Protected Fertility. Kaderly converted both corn



SOILS THAT PRODUCE. Jake Kaderly says gypsum is loosening soils and bringing them back to life by meeting the base saturation goal for calcium. Nitrogen (N) efficiency has improved, as he has reduced applied N rates to 0.7 to 0.85 pounds per bushels of corn produced.

and soybeans to 22-inch rows. On corn, he applies 4 gallons of Rhyzo-Link 3-10-13 liquid starter in the furrow.

"I think a high-grade, low-salt fertilizer is the only product that's safe in the row," he says.

He doesn't apply any nitrogen (N) in the fall. In the spring, he applies 32% UAN (urea and ammonium nitrate) with Agrotain Plus stabilizer pre-merge.

"I think nitrogen stabilizers are a must in a no-till system because of the residue present in no-till and from cover crops," he says.

Kaderly also sidedresses 100 units of N as SuperU, a urea-based granule containing Agrotain Plus, in June at V5 on fields with 40,000-population corn stands — the best ground where he wants his highest yields.

"I think farmers who want higher yields need to be aggressive with their fertility programs and experiment with a high-yield field to learn what works for them to achieve higher yields," he adds.

Despite being aggressive with N rates, Kaderly applied only 0.85 pounds of N per bushel of corn produced last year with yields of 273 bushels per acre on his best-producing Downs soil. The figure was 0.7 pounds of N per bushel of corn produced on his hill ground that yielded 220 bushels per acre.

That's significantly less N than the traditional 1.2 pounds of N used to produce a bushel of corn, and he thinks applying gypsum is making his N more efficient.

He's tried foliar fertilizer, which pushed yields a little, but may not have been cost-effective, he says.

Top 10 in Corn Yields. While he has no Class 1 soils on his farm, Kaderly has placed in the Top 10 in Wisconsin in the National Corn Growers Association yield contest every year he's entered over the past 7 years. Last year, he captured 4th place in the no-till division with a yield of 261 bushels per acre.

His farm averaged 230 bushels per acre in 2016, compared to a county average yield of 199 bushels. Kaderly has also produced 108-bushel-per-acre wheat the past 2 years.

A Certified Crop Adviser, Kaderly talks with his customers and neighbors year-round about profitable fertility programs.

"Everyone has his own fertility program. You see it all, including fields that haven't been tested for years," he says. "But for the most part, my customers are open to recommendations.

"Talking with them also gives me an opportunity to discuss no-till and conservation practices."



Precision Technology Helps No-Tiller Avoid Deficiencies

Saskatchewan farmer conducts annual soil testing for all nutrients and uses remote sensing to create zone maps as a guide for his three-phase, variable-rate fertilizer application program.

By Angela Lovell

WHEN HIS FATHER, a pilot, first got a GPS system installed on his plane in the mid-1990s, Stuart Lawrence knew that this was the management technology he needed on the family farm.

Since then, the Rosetown, Saskatchewan, no-tiller has used precision ag technology to carefully manage fertility levels to improve soil health, nutrition, crop performance and productivity.

Lawrence farms 2,700 acres of barley, durum, spring wheat, canola, lentils, flax and canary seed with his father, Garry. He says he makes every effort to follow the concept of 4R nutrient management through the right source, right rate, right timing and right place.

Annual Soil Tests. A complete battery of soil tests, including a review of micronutrients, are conducted on every field zone each year.

Lawrence has learned that soil nutrients vary annually, partly due to weather-related mineralization. That's why he feels annual soil tests are crucial, so he can make fertilizer decisions based on what's actually present in the soil rather than on calculated values.

Lawrence places non-mobile nutrients like phosphorus (P) and potassium (K) in the seed furrow where plant roots can quickly access them. The high clay content of his soils creates a high cation-exchange capacity, so P quickly ties up.

Lawrence uses a combination of liquid orthophosphate starter in the seed row to get the plant growing and maximum seed-placed dry fertilizer as a soil build or replacement strategy.

Plant Tissue Tests. In-season plant tissue testing allows Lawrence to determine what nutrient deficiencies are present during the growing season. This allows him to apply nitrogen (N) and micronutrients, such as zinc, in-season to meet the needs of the crop and drive full yield potential.

"We depend on the tissue test because it's our report card on our zone management. If the crop is deficient in something, it's an opportunity to correct it," he says.

Lawrence has tried various methods to manage N losses due to denitrification. What works well in his program is mixing a stabilizer like Agrotain with a liquid N and sulfur blend.

His goal is to protect the N for a couple weeks to allow time for moisture to move the N into the soil toward the root zone.



PASSING ALONG PRECISION. Three generations of the Lawrence family are working at being precise, effective and efficient with nutrient applications in Saskatchewan, including (l-r) Garry, Jakin and Stuart.

Zones of Fertility. Lawrence switched to Geosys remote sensing technology about 5 years ago. Prior to using the satellite-based system, he was using soil electrical conductivity to create zone maps.

Each field is divided into three zones. With Geosys, he can create maps for variable-rate fertilizer applications and monitor plant health throughout the year.

"I hear other growers say all the time that they won't do variable-rate fertility and they'll just spend that money on more fertilizer," Lawrence says. "My soil samples show some zones have more nutrients than the zone is capable of using. In others, the amount of fertilizer I could buy with my agronomist's fee wouldn't be sufficient to meet yield potential.

"I don't think it's responsible to overapply fertilizer on certain zones, and the yield left on the table in other zones more than pays for the agronomy services I buy."

Yield Map Learning. Lawrence made his first yield map in 1996 and

became a precision ag dealer with a leading company in the field.

Now back to farming full-time, he uses his experience to learn more about the variability of his farm fields. For example, he found that in one field, 75% of the grain was coming from 25% of the acres.

Yield maps have helped him identify less-productive saline areas on the farm. The yield maps hold a crucial role in his three-phase, variable-rate plan.

Phase 1 allowed him to stop spending money applying nutrients on areas where he's not making any money. The second phase is reallocating nutrients and resources to areas that are yielding well.

The third phase, which he's working on, is to try and correct the saline areas by doing some pH modification using sulfur and cover crops. That's showing promise, he says.

Trusted Agronomy Team. Lawrence has been working with the same agronomist for 12 years and has complete trust that he and his team are providing solutions that work for his farm. Overall, Lawrence is not trying to achieve perfection, but be as good as he can at what he does.

"If we take care of the soil, the soil will take care of us," he says. "That's not always putting the maximum amount of nutrients into the ground.

"We take a balanced approach and make sure we are not creating a deficiency, and we're doing our best to meet crop needs." 🌻