



12th Annual Responsible Nutrient Management Practitioners Program

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2020 Recipients
Don Villwock, Edwardsport, Ind.
Lowell King, Loma, Colo.
Karl Dirks, Mount Joy, Pa.

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No-Till Farming Pays Monetary & Efficiency Dividends

For Don Villwock, the economics of no-till have helped his farming operation remain sustainable in challenging times.

By Laura Handke, Contributing Writer

As President of the Indiana Farm Bureau for 14 years, Don Villwock has traveled the country, sharing the message of no-till farming, and the economic independence and environmental benefit the production practice can provide.

“I started no-till farming in 1985 for economic reasons. If I hadn’t adopted the practice, our farm would have been another casualty of the 1980s. I converted (to no-till) to save money — I sold my Steiger Panther PTA 310 tractor and bought a no-till planter for one-fifth the cost,” Villwock says. “To survive in agriculture, you have to be efficient.”



Today, Villwock’s management practices haven’t strayed from the no-till model, and the forward-thinking producer continues to look for opportunities to proactively manage and engage his farming operation in the 4Rs of responsible nutrient management: the right source, the right rate, the right time and the right place.

Targeting Nutrients with Soil and Tissue Tests

Based in Edwardsport, Ind., Villwock’s operation covers 3,500 acres, two-thirds of which are devoted to white corn and popcorn, with the remaining one-third in soybeans.

Typically, Villwock’s corn yields are more than 200 bushels per acre, while his county average is 185 — a difference he says can be attributed to the good stewardship and management of nutrients and topsoil.

“We utilize a certified crop advisor (CCA) and have for 30 years,” Villwock says. “As no-tillers we pay extra attention to fertility and pH levels, and when you practice the 4Rs, soil and tissue tests are critical.”

Fields on a 3-year rotation get a soil test every third year, with newly purchased and rented farms tested immediately. And because numerous soil types are often present in one field, soil sampling is done by type and fields are managed by zone.

Per soil tests and the nutrient test results of the turkey litter Villwock applies as a source of phosphorus (P) in 2-year rotations, the operation’s CCA provides prescription maps that the local co-op uses in their application.

On fields with non-erosive flat soils, Villwock broadcasts 0-0-60 potassium (K) in the fall. If additional P is needed, which is rare, he applies 18-46-0 at the same time. On highly

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erodible soils, all nutrients are broadcast just ahead of planting to minimize runoff.

For corn, Villwock applies anhydrous ammonia along with N-Serve pre-plant only on small patches, ends and point rows. At planting, corn and popcorn receive 10 gallons per acre of 32% nitrogen (N) as row starter, injected in a 2-by-2-inch configuration on each side of the row.

At around 6 inches of growth, all corn is sidedressed with anhydrous ammonia at 150-160 pounds per acre. Tissue tests are taken and if they show an N deficiency and yield prospects are good on irrigated fields, 32% N and sulfur are fertigated, as needed. These applications are typically split-applied into three applications throughout the season.

Dryland acres also receive 32% and sulfur, if tissue tests warrant. The application is dribble applied on both sides of the row with

a Hagie sprayer that is equipped with Y drops.

Irrigation soil probes are also used throughout the growing season, to make sure that water isn’t over applied.

Improving Soils with Cover Crops

Villwock has been seeding cover crops for about 25 years. Typically he has about 1,000 acres of cover crops, but in 2019 the operation was only able to seed around 550 because of the weather challenges.

Villwock has gone strictly to seed wheat over the past few years, citing the ability to achieve a good stand, good cover and easier burndown with the crop.

“Before we went to wheat, we were flying on cover crop cocktails in late August or early September. We had really mixed results in getting a stand, so it has been a challenge for us to determine what the best option is,” he says. “2019 was atypical in every regard. We planted our crops in June, which led to an October harvest — we usually start right after Labor Day.

“After 20 years of using cover crops, we are still experimenting,” Villwock says of the challenges of finding the perfect cover cropping blend and strategy to maximize return on investment, weather planting challenges and nutrient cycling.

Villwock shares that the most gratifying aspect of no-till has been the progression of change he has seen on his land.

“What we’ve seen is an overall improvement in our soil health,” he says. “When we started no-till 35 years ago, we didn’t know a lot about soil health. But the improvement is visible to the naked eye; we have better water infiltration and improved drainage that you can see. We have more earthworms — they are the ones doing our tilling today.

“I’m a pilot, and when I take someone up who isn’t familiar with our ground, they can pick out our farms. There’s no standing water, there is some kind of cover on our highly erodible fields — there is a visible, distinct difference, and when someone can pinpoint one of those fields from the air, there’s no better feeling!”



No-Till Makes the Impossible Possible

For Lowell and Mark King, keeping soils covered and managing irrigation are keys to no-tilling in the harsh environment of Mesa County, Colorado.

By Laura Handke, Contributing Writer

When Lowell King and his brother, Mark, moved from Pennsylvania to Fruita, Colorado's Grand Valley in 2005, the duo quickly learned that conditions weren't what they were used to out east.

"The soil in Colorado is different than the soil in Pennsylvania, it is high salt and high pH. So when we started, we were farming just like everyone else in the Valley — moldboard plowing with fall tillage and furrow irrigation to supplement the 9 inches of annual rainfall," says Lowell.

When the brothers purchased their first farm in 2009, they began to put into action some of the agronomic practices they had utilized in Pennsylvania.

Being familiar with cover crops, the Kings began seeding rye after corn to provide winter forage for their cattle. In 2016, Lowell went to a soil health conference where Gabe Brown provided the keynote address.

"My interest in regenerative agriculture exploded after that conference and that same year we bought our first no-till drill. It took us a little bit of time to work into 100% no-till, but that is where we are today — we don't till anything," he says.

Maximizing 'N' Credits

Today, the brothers specialize in high-quality alfalfa and grass hay for the horse market, rotating fields between alfalfa, corn, a small grain crop such as wheat or oats and an Elbon rye cover crop.

In rotation, they plant 30-inch corn into alfalfa stubble or legume covers to maximize nitrogen (N) credit, and apply 5 gallons per acre of 7-17-3 in-furrow starter through Keeton seed firmers. At V6-V8, N is sidedressed and immediately covered with residue.

An additional application of 7-17-3 may be applied in July if they do a pass to spray for spider mites. A special sprayer pass is never done just to apply foliar fertilizer.

When planting corn into grass covers, the brothers apply 100-150 pounds per acre of urea at planting and sidedress additional N at V6-V7.

For winter wheat and rye, 250 pounds per acre of urea is watered in before spring green-up. Broadcasted urea is immediately covered with residue.

To minimize leaching and denitrification, the Kings use Agritain with liquid N at V6-V7 and N-Lock with dry N.

Keeping Inputs on Track

Soil samples are pulled on a 4-year rotation. Using one field as a control, with annual tissue and soil samples pulled, Lowell and Mark ensure the operation's nutrient levels stay on track in spite of not doing an annual 11-52-0 application — a standard practice

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— Lowell King

for the area. Potassium is naturally high in their western soils and the Kings are utilizing cover crops to cycle phosphorus.

"In 2019, after our wheat harvest, we planted buckwheat to cycle phosphorus and sprayed it down before we planted alfalfa," says Lowell.

Tests done in 2019 revealed the farms' soil pH is around 7.6, comparable to other soils in the area. However, the improvements can be seen in the farms' organic matter which has risen from 1.6-1.8% to 2.8-3.5%.

"On a normal corn crop, most guys are spreading around 200 pounds of nitrogen and plowing it in. We didn't do that, and our tissue samples pulled at the beginning of the growing season and at silking registered sufficient," says Lowell.

In 2019, the brothers recorded an average corn yield of 220 bushels per acre while the county average saw 183.

Managing Irrigation

The brothers say that perhaps more important than what they've achieved in their

operations is where they've achieved it — in Mesa County, Colo., under furrow irrigation.

"Most people in our area say it's impossible to farm the way we are farming because of furrow irrigation," Lowell says. "If you can't get your water through the irrigation furrows, nothing will grow. Irrigation isn't a backup plan, it is a necessity and keeping furrows free from debris that prevents water movement is one of our biggest challenges with our high amount of residue.

"Managing irrigation furrows that are up to a quarter mile long and preventing compaction are continual challenges," he says.



To alleviate these challenges, the Kings adapted a no-till drill, which provides 4 planting units on each bed and leaves a 10-inch gap to prevent planting into the water mark. They use vine cutter attachments and shovels to clear the water crease and a roller to push residue into the bed.

For some, the challenges of farming in a geography that receives only 9 inches of annual rainfall would limit opportunity and experimentation. For the Kings, however, the challenge has fueled their desire to learn more about the ways they can not only conserve, but preserve their most valuable investment: the soil.

"I have always loved to farm," Lowell says, "but now I am passionate about it. We are farming based on preserving life, rather than trying to kill everything and that has made all of the difference." 

Reducing Applied Nutrients with No-Till, Cover Crops

Located in the Chesapeake Bay watershed, Wolgemuth Farview Farms practices no-till with cover crops to reduce nutrient runoff into this delicate tidal basin.

By Laura Handke, Contributing Writer

Conservation agriculture is a way of life for Karl Dirks of Wolgemuth Farview Farms, which is nestled midway between Hershey and Lancaster, in Mount Joy, Pa. For the past 15 years, no-till practices have been an integral component in the farm's operation.

"When no-till started to catch on in our area, we adopted it pretty quickly. We learned about it from a couple of neighbors, attended a few conferences and got better at implementing it," he says.

Farmed under stringent regulations in the Chesapeake Bay watershed, Farview Farms stays ahead of new compliance requirements with the help of no-till practices.

"We started no-till farming for the reduction in work, primarily," Dirks says. "But it didn't take very long before our yields increased and we started to see the moisture and erosion savings that came with it."

Today, the operation continues to practice the 4Rs of responsible nutrient management and has reduced the amount of high-salt commodity fertilizers used in its farming practices while continuing to increase yields.

Managing 'N'

In 2019, Farview Farms out-performed the county average by producing 240 bushel corn, 100 bushel wheat and 80 bushel soybeans. The Lancaster County averages for the crops were 177, 86 and 57 bushels per acre, respectively.

This bounty was achieved despite the fact that Farview Farms hasn't ever used a starter N-P-K fertilizer package.

To prevent over-application of nutrients, Dirks monitors manure load and rotation to apply nutrients on an as-needed basis. Typically, Dirks applies 30-60 gallons per acre of 30% UAN at planting and through split applications during the critical uptake periods of corn and small grains. Sulfur is added only in a pre-emergence application.

For corn, Dirks injects 40 pounds of actual nitrogen (N) at planting, followed by 45 pounds per acre applied with pre-emergence herbicides. The remainder of the crop's N needs are sidedressed when corn is knee-high using pre-determined rates based on credits

taken from the legume cover crop and manure application for the field.

For the small grains that are grown before double-cropped beans, 30 pounds of N per acre is used only if needed, as indicated by the soil tests. Spring N is split-applied, with an early spring rate of 50 pounds per acre and a late spring application of 30 pounds per acre.

Plant and Soil Tests

To monitor micro- and macronutrient availability, Dirks pulls both plant tissue and soil samples. Plant analysis has shown an increased need for magnesium, sulfur, boron and copper in small grains as well as an increased demand for magnesium in corn acres.

"I'm spending as much time making sure that I'm not over-applying nutrients as I am making sure that I'm applying enough nutrients," says Dirks. "In 2019, we pulled soil

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— Karl Dirks

samples immediately after harvest to see if we got full use of nitrogen from the soil. We did, which is ideal — we have really honed in on our base fertilizer needs for a crop."

Typically, Dirks samples half of all farmed acres annually to direct hog manure application and uses grid sampling to determine macronutrient availability in fields with a high level of variability. Dirks says that soil testing has improved profit returns.

"Soil testing has increased our yields through better potassium (K) and secondary nutrient management," he says. "It has also allowed us to increase our management strategy in each field."

Manure from Dirks' hog confinement operation is utilized to reduce the amount of

K applied and currently replaces the need for commercial phosphorus (P). For the corn, wheat and soybeans Dirks grows, potash and kieserite are used to supplement the manure applications on an as-needed basis that is determined by soil testing.

"Some of our fields have a higher phosphorus load, so we pull soil samples on those fields every year to find the balance and make sure that we are maximizing yield potential," Dirks says. "Since we started closely monitoring our phosphorus levels, we have continually decreased our phosphorus rates and increased our yields."

Cover Crop Benefits

Cover crops became a staple in Dirks' management practices 4 years into adopting no-till farming. Today, he says the operation utilizes cover crops on nearly 100%



of farmed acres. The cover crops, typically small grains or a multispecies mix, help to cycle nutrients and hold topsoil in highly erodible fields.

"We farm on 6 inches of topsoil that covers limestone, and since we began using cover crops, we've noticed that our water-holding capacity and infiltration have both increased," Dirks says.

Looking forward, Dirks says that he is encouraged by the adoption of no-till practices in his area and continues to share the message of responsible nutrient management through his work as an advisor on the Pennsylvania 4R Nutrient Stewardship Association board.

