ISSUE
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November

e Newsletter

West Central Indiana Watershed Alliance

Editor's Note

This issue focuses upon Nutrient Management. When fertilizer applications are either reduced or made more efficiently, nutrient losses are typically reduced… and so are the nutrient loads in our surface waters.

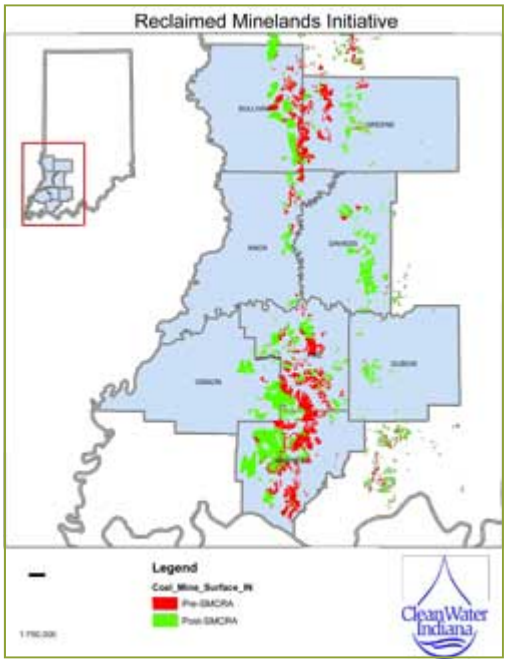
In this Issue

8-County Coalition Receives Clean Water Indiana Grant to Address Reclaimed Farmlands

A coalition of coal-belt Soil & Water Conservation Districts, including Sullivan, Greene, Knox, Daviess, Pike, Dubois, Gibson & Warrick were recently notified of their project selection for a Clean Water Indiana grant. The group will receive $60,000 over a three year period to promote the use of cover crops and gypsum on reclaimed farmlands. Other project partners include the Prime Farmlands Team - a group of government agencies, coal companies, and growers - as well as Peabody Energy, Solar Sources, and the Watershed Alliance.

Over 3/4 of Indiana's surface mining operations have been located in those eight counties. Much of the 230,000 mined acres in this area have been returning to agricultural production. The removal of soils by mining equipment results in changes to the natural structure of the soil. The most common impacts are: loss of pore space, loss of permeability, changes in the capability of the soil material to provide moisture and air for plant growth, loss of living organisms, and reduction of organic matter. Soils reclaimed after mining are considered drastically disturbed, and those changes must be managed..

The use of cover crops and/or gypsum in a farm management system can be used as management tools to help improve soil health and fragility. Through the CWI grant program, demonstration sites will be established throughout the 8-county region and an On-Farm Network hub will be established to manage field trials and allow growers to share tips and techniques of farming reclaimed ag lands. At least one field day will be hosted with a focus on the benefits of cover crop / gypsum use on reclaimed lands.



Lands affected by surface mining operations

What Might *Not* Improve Nitrogen Efficiency

From No-Till Farmer Magazine

In speaking with fertility experts, several things came up that they believe don't truly contribute to nitrogen efficiency. One misconception is that new corn hybrids use nitrogen more efficiently.

"I think most current research shows that the biggest gains come from good old-fashioned agronomics, not genetics," says Joshua McGrath, University of Maryland soil fertility and nutrient management specialist. "We're seeing greater yields with these hybrids, but the nitrogen needed to achieve a bushel of grain is about the same. The corn isn't more efficient; we're just doing a better job of applying a more appropriate rate."

Another gray area for McGrath is nitrification inhibitors.

"There are a lot of inhibitors on the market. Some work, some don't. For the cost, I recommend using good agronomy instead, such as sidedressing nitrogen," McGrath says. "The fact is that they have a limited lifespan, and product cost doesn't offset the sidedressing cost."

Soil tests are suspect for Saeed Khan, University of Illinois soil fertility research specialist, especially those obtained through the fertilizer dealer.

"Farmers need to think for themselves and take testing into their own hands. Try approaching independent agronomists for unbiased advice," Khan says.

When it comes to using yield maps for varying nitrogen rates, McGrath advises against it.

"High and low yields have little to do with nitrogen," he says. "It could be any number of things causing those variations. If you use a yield map to determine

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By Martha Mintz, Contributing Editor

Stung by roller-coaster prices, growers are scrutinizing one of their most expensive inputs and living with less applied nitrogen.

Economic, conservation and scientific reasons appear to be pushing no-tillers toward applying less nitrogen in their fields.

The 2010 *No-Till Farmer* No-Till Practices Survey of 471 subscribers found 17% of respondents were applying less than 0.8 pounds of nitrogen per bushel of expected corn yield, well under the 1.2 pounds per bushel recommendation bandied about for many years.

"There are multiple factors forcing farmers to be more frugal with their nitrogen applications, but the spike in prices is probably the leading cause," says Joshua McGrath, a soil fertility and nutrient management specialist at the University of Maryland.

After years of hedging their bets by applying more nitrogen than truly needed, many farmers are now settling into much lower rates without suffering yield losses.

Strip-tiller Donn Branton of LeRoy, N.Y., has set onfarm yield records in the past 2 years while minimizing nitrogen rates. His actual application rate calculates out to a scant 0.46 pounds of nitrogen per bushel of actual yield.

He used to apply a pound or more, going off the recommended rates based on yield goals.

"I started looking at yields. We were putting on a certain amount of nitrogen and were getting yields that exceeded the applied nitrogen according to the formula," Branton recalls. "We had to start questioning where that extra yield was coming from and what our nitrogen needs really were."

He no longer bases nitrogen applications on yield goals. Instead, he considers crop history, rotation and cover crops when determining rates, usually ending up at 130 to 140 pounds of applied nitrogen per acre.

"For years, the thinking has been, 'When in doubt, put on more nitrogen,' because we can't afford to lose yield," says Richard Mulvaney, University of Illinois professor of soil fertility. "It's a fear-factor tactic used as a means to sell more fertilizer and doesn't necessarily pay out in higher yields."

"Seeing is believing," Khan says. "Instead of applying 200 pounds of nitrogen per acre, he's now applying 120-130 pounds and getting 160-

No-tillers are using a variety of tactics to cut down on applied nitrogen, while others are finding they never needed the amount they were putting down in the first place.

It's a familiar scenario for Saeed Khan, a soil fertility research specialist for the University of Illinois.

"Sales of phosphorus and potassium were way up in the 1970s and '80s, and when prices increased, producers reduced rates and yields still went up," Khan says. "The same is happening with nitrogen. The application rate is coming down and yield is going up.

"Yield is not dependent only on nitrogen. Higher populations, better hybrids and other agronomic factors impact increased yields."

The following are some tips from experts and growers that may help whittle down the fertilizer tab while maintaining, and possibly even improving yields.

1 Do what works on your farm.

It's important to get this rule out front, as some of the following advice is conflicting. What works on one farm may not work on a farm just 30 miles away.

That's why Cleghorn, Iowa, strip-tiller Tom Oswald stresses the need to do onfarm trials and calibrate nitrogen applications to the individual operation.

"Don't just take recommendations blindly. You need to test practices on your farm under the management system you are using,"

20 Ways to Shave Nitrogen Without Nicking Yields

says Oswald, who runs many trials as part of the Iowa Soybean Association's On-Farm Network. "Success of some techniques is largely dependent on your management system and field conditions.

"I wouldn't use my recommendation for somebody farming just down the road from me."

That's especially true for no-tillers, McGrath says.

"With long-term no-till, most nitrogen equations and recommendations go out the window," he says. "You've built soil organic matter, changed the chemical properties of the soil and have improved biological activity.

"The research may not be there yet, but it appears that under long-term no-till, you really need to look at possibly cutting back nitrogen rates."

2 Don't use nitrogen as an insurance policy.

Gone are the days when nitrogen was inexpensive enough to throw on a few extra pounds per acre, whether the crop needed it or not..

"When farmers estimate nitrogen needs based on projected yield, they would always hedge their bets toward having a great year. But in 2 or 3 out of every 10 years, they don't hit that yield — leaving plenty of nitrogen in the field," McGrath says. "I think farmers are now cutting back and seeing that they're still able to make the same yield without that cushion and are becoming more comfortable with what their fields actually need."

3 Separate yield from applied nitrogen rates.

While some applied nitrogen is usually needed to achieve top yields, many experts advise against basing nitrogen rates on yield goals.

"Yield potential actually has little to do with nitrogen applications," McGrath says. "Once the plant has a sufficient amount of nitrogen, yield is determined by other factors, especially rainfall."

When plants fulfill that requirement, trying to get any further nitrogen into the plant is like pouring water into a full glass, McGrath explains, adding that university recommendations are partly to blame for linking yield to pounds of applied nitrogen.

They apply varying rates of nitrogen to a field and where the production curve levels off, that's the rate they recommend, he says. But an easy way of reporting that is by reporting it in pounds-per-bushel yield.

Khan says that yield-based nitrogen recommendations don't adequately account for differences in soil nitrogen availability. One example he gives is central Illinois, which has plenty of quality, deep soils that produce 200-bushel-per-acre corn crops. In southern Illinois, the soil is thinner with less organic matter and yields are typically in the 120- to 150-bushel range.

"If you apply fertilizer based on yield, you would assume that farmers in central Illinois would need to use more fertilizer because they produce more bushels," Khan reasons. "In actuality, southern Illinois should use more fertilizer because poor soils need more nutrients from outside."

4 Gradually reduce nitrogen in test strips.

Nitrogen applications shouldn't be cut severely from one season to the next, but rather inched back in small strips.

Khan proved to his father-in-law that he could get by with less nitrogen by having him back off his rate by 10 pounds of nitrogen per acre in a 10-acre strip. After a year or two of no yield difference, he went ahead and backed his rates off on all acres.

"Seeing is believing," Khan says. "Instead of applying 200 pounds of nitrogen per acre, he's now applying 120 to 130 pounds per acre and getting 160- to 200-bushel yields."

Check strips don't have to be large and can tell a lot about the soil being farmed, Mulvaney says. He recommends making at variable nitrogen rates, you could end up way off base. It's just too little data."

McGrath does see potential if more data is included, such as soil maps.

Mulvaney agrees. In one variable-rate study, nitrogen rates were varied based on yield mapping, such that higher nitrogen rates were applied to the top-producing areas of the field.

Four Rs

AKA the Four Fertilizer "Rights"

Many different practices can be beneficial in reaching goals of lowering nutrients in our Nation's waterways. Industry has taken to discussing fertilizers application as the 4 R's or Four Fertilizer "Rights". These four "Rights" are not independent of each other but incorporated as a system where decisions in one area affect the "Rights" in another area.

1 Right Source

Match fertilizer type to crop needs.

2 Right Time

Match nutrient availability to when the crop needs them.

3 Right Place

Keep nutrients where the crops can use them.

4 Right Rate

Match the amount of fertilizer to the crop needs.

Playing the C:N Game

Carbon to Nitrogen ratio (C:N) is a ratio of the mass of carbon to the mass of nitrogen. Since the C:N ratio of everything in and on the soil, it can have a significant effect on crop residue decomposition and crop nutrient cycling,

Management of these ratios can improve soil health and economic productivity. Resulting decreases in soil and nutrient losses also have the benefit of improved water quality

24:1 Rules the Soil

Soil microorganisms have a C:N ratio near 8:1. To acquire the carbon and nitrogen a soil microorganism need to stay alive, it needs foodstuff with a C:N ratio near 24:1. It is this C:N ratio (24:1) that rules the soil!

Feeding the Soil Community

If foodstuff such as mature alfalfa hay (C:N = 25:1) is added to the soil, the soil microorganisms will consume it relatively quickly with essentially no excess carbon or nitrogen left over.

When fed something with a higher C:N ratio like wheat straw (80:1) the soil microorganisms will have to find additional nitrogen to go with the excess carbon in order to consume the wheat straw. Conversely, a food source with a lower C:N ratio like a hairy vetch cover crop (11:1) will allow the soil microorganisms to consume the vetch and leave the excess nitrogen in the soil.

Everything else being equal, materials added to the soil with a C:N ratio greater than 24:1 will result in a temporary nitrogen deficiency and those with a C:N ratio of less than 24:1 will result in a temporary nitrogen surplus.

Effects on Soil Cover

The faster crop residues are consumed by soil microorganisms, the less time those residue will be covering the soil surface. While it is important to maintain

least three one-pass strips of a reduced nitrogen rate to help dial in nitrogen needs while not putting yields at risk.

"Check strips are fundamental for getting a better handle on nitrogen needs," he says.

Oswald, who tests nitrogen rates every year, recommends making field-length strips and not being shy about cutting rates in the test strips.

"If you are typically applying 150 pounds of nitrogen, I would at least drop your rate in a strip by 25 pounds, and maybe try a strip with only 100 pounds of applied nitrogen," he advises.

He has been shocked at just how low he can go, noting that even his zero-nitrogen end checks performed better than he thought they could.

"I used to think there was no way I could get down to 90 pounds of applied nitrogen, but I've discovered I can drop down to 25% of what I used to apply, but that is a bare minimum," he says.

Oswald says if typical applied nitrogen rates are already trimmed, cut nitrogen rates less severely in test strips to truly dial in the nitrogen rate for that farm.

5 Know where the nitrogen is.

"The general assumption usually is that a third of nitrogen comes from the soil and two-thirds from fertilizer, but it's actually exactly the opposite," Mulvaney says. "Soils are the main source for nitrogen."

Nitrogen provided by the soil will vary by soil type and previous crop rotations. Branton varies his nitrogen application rates and methods based on crop history, typically applying nitrogen either during a spring strip-till pass, by zone-tillage with his planter, or a combination of the two.

"In fields that we feel have low nitrogen requirements, such as corn following alfalfa or a clover cover crop, we will put down all the nitrogen in the strip-till pass," Branton says.

He divides applications when more nitrogen is needed.

6 Sidedress nitrogen.

"The No.1 way to increase nitrogen efficiency is to shift to a sidedress application," McGrath says. "The more time there is between application and uptake by the crop, the more chance for loss there will be and more nitrogen will have to be applied to account for that loss."

It's possible to see a 10% to 20% yield improvement by sidedressing nitrogen instead of applying it all before planting time.

7 Carefully time sidedress applications.

Corn starts rapidly using nitrogen when it hits the V6 growth stage. Applying nitrogen during that rapid uptake means greatly reducing the risk of nitrogen being lost to leaching or volatilization, but it doesn't come without risk.

"If corn gets stressed going into the rapid growth stage, it does tend to lose yield," McGrath says.

A few ill-timed rain showers could really put a damper on yields if this critical time is missed. McGrath suggests building in a time buffer to make sure all acres can be reached with a timely sidedress application.

"While rapid nitrogen uptake begins at the V6 stage, you want to get in the field a little earlier to account for the time it takes to apply and to hedge your bets against rain," McGrath says. "No-tillers can start applying at the V4 stage and still get excellent results."

He says it's possible to see a 10% to 20% yield improvement by sidedressing nitrogen instead of applying it all before planting time.

"If you plant April 15, corn doesn't reach the V4 stage until about the end of June. That's 40 to 50 days during a season where high rainfall is common and nitrogen is at risk," McGrath says. "Applying nitrogen when it's needed protects it, allowing producers to boost yields or cut rates."

8 Split nitrogen applications.

Sidedressing can be risky business, so some no-tillers build in a little protection by applying 20% or more of their nitrogen as a starter at-plant, then sidedressing the balance.

David Hula puts on 60 pounds of nitrogen at planting to spread out the window of opportunity for timely sidedressing on his 2,200 acres of no-till corn. He's not a fan of broadcasting nitrogen, so he places fertilizer with his planter.

"Instead of a more normal 2-by-2-inch placement, we place nitrogen 3 inches away from plants and 2 inches under the row since we normally apply 60 pounds of nitrogen with our 12-row Kinze planter," says Hula, a Charles City, Va., no-tiller. "We also apply 2 or 3 gallons per acre of 3-18-18 with the planter to get corn plants off to a fast start so they can quickly reach the additional nitrogen located in the 3-by-2-inch band."

Hula's farm starts sidedressing nitrogen at the four-leaf stage and typically sidedress twice during the season.

9 Bump populations to get greater yields without increasing nitrogen applications.

If a field consistently produces

tall, thriving corn with plenty of double ears, Khan recommends considering a population increase.

"That's an indication that the soil is nitrogen rich and can support higher populations," Khan says. "There's more nitrogen in the soil, so take advantage of it."

10 Evaluate nitrogen at the end of the growing season with a corn-stalk nitrate test.

This came up more than once with experts and successful no-tillers. Evaluating the nitrogen present in corn stalks at harvest can determine if nitrogen was a limiting factor during the growing season.

"As long as corn is taking up water, it's taking up nitrogen. Once the ear is filled, the nitrogen isn't going to grain production; it's being stored in the stalk," McGrath explains.

If the corn-stalk nitrate test shows more than 2,000 ppm of nitrogen in the stalk at harvest, then there was more nitrogen than needed for yield.

"If it was a normal yield," McGrath says, "it means either you or the soil supplied too much nitrogen and you can cut back."

If yields are high and there are still high levels of nitrogen in the stalk, he recommends putting in test strips with significantly less nitrogen, maybe 50 pounds less, and doing corn-stalk nitrate tests in those strips. Using yield and nitrate test data, producers can dial in applied fertility needs.

"We've seen irrigated operations that are able to fertigate that have used corn-stalk nitrate tests to go way below university recommendations without hurting yields," he says. "They're spoon feeding three-quarters of a pound of nitrogen per bushel and getting 225-bushel corn."

11 Drain the carbon sink with a small fall nitrogen application.

High-carbon residues tie up nitrogen, which can be an especially significant problem for no-tillers raising corn-on-corn, or cover crops such as small grains.

"Carbon must be paid for. You have to feed the microbes before you feed corn," Mulvaney says.

To avoid nitrogen tie-up during the growing season, Mulvaney offers up the strategy of making a small application of nitrogen — 40 to 50 pounds per acre — in the fall to promote residue decomposition.

"This should reduce the nitrogen needed the next year because you're cutting down on nitrogen tie-up," he says.

12 Apply nitrogen deep.

When Branton switched to strip-till and started placing his nitrogen 8 inches deep, he saw a significant increase in yields. He says microbial activity is a little slower deeper in the soil profile because the soil is cooler, resulting in less nitrogen consumption.

"At a grower meeting on our farm, we dug root pits and the biggest root balls were in the strip-till plot with deep-placed nitrogen," Branton says. "Since we started strip-tilling and placing our nitrogen deep, we've seen significant yield increases."

13 Put nitrogen where the root can reach it.

Oswald wants to make sure his corn plants have access to sufficient nitrogen when they need it.

He puts down the bulk of his nitrogen in the fall with strip-till anhydrous applications, placing the nitrogen about 8 inches deep — too deep for a seedling to use.

To get germinating corn off to a good start, Oswald applies 10 to 15 pounds of 28% nitrogen with ammonium thiosulfate in a dribble band with the planter.

"Positioning and timing are more important than actual rate," he says. "I don't want corn to go deficient, so I make sure the right amount of nitrogen is placed in the correct spot to feed the plant when it needs it."

The starter application carries the plant until roots reach the larger nitrogen load deeper in the soil profile. Ammonium thiosulfate (ATS) also helps to stabilize the planter-applied nitrogen.

Ammonium thiosulfate has many benefits, including slowing nitrification.

Ammonia loss was reduced by more than 60% by adding 5% ATS by volume to UAN or UAN-APP mixtures in one North Dakota State University study, though effects can vary widely depending on soil type — im-

Tip #10: Evaluate nitrogen at the end of the growing season

Photo courtesy Stearns Co. SWCD (MN)

Evaluating corn stalks at harvest can determine if nitrogen was a limiting factor during the growing season.

As part of the On-Farm Network, the WCIWA performed similar sampling. Results will be available this winter.

SLOWER

Material	C:N
Rye Straw	82:1
Wheat Straw	80:1
Oat Straw	70:1
Corn Stover	57:1
Rye Cover (Headed)	37:1
Pea Straw	29:1
Rye Cover (Veg.)	26:1
Mature Alfalfa Hay	25:1
Ideal Microbial Diet	**24:1**
Rotted Barnyard Manure	20:1
Legume Hay	17:1
Beef Manure	17:1
Young Alfalfa Hay	13:1
Hairy Vetch Cover Crop	11:1
Soil Microbes (Ave.)	8:1

Decomposition Rate

FASTER

soil cover - to reduce erosion and provide good earthworm habitat - it is also essential that residues decompose to release plant nutrients and build soil organic matter.

Cover Crop Influence - Balance the Highs with the Lows

Cover crops added to a cash crop rotation can help manage nitrogen and crop residue. A low C:N ratio cover crop containing legumes (such as Austrian Winter Peas) and/or brassicas (like Tillage Radishes) can follow a high C:N ratio crop like corn to help the break down of residue and release of nutrients for the next crop. Similarly a higher C:N ratio crop (like Rye) can help provide soil cover after a low residue, low C:N ratio crop like soybeans, yet decompose during the next growing season to make nutrients available to the following crop.

Fall Nitrogen and Corn Stover

Excerpts from a University of Illinois Bulletin

Stronger stalks are a desirable trait to help with standability of the crop. But the drawback is that these materials are more difficult to break down in time for the following growing season. Stalks, along with other crop residues, can interfere with planting in the spring. Large amounts of crop residue left on the soil surface can also delay planting or seed emergence by keeping soils cool and wet longer into the spring.

A practice that is increasingly being promoted is applying nitrogen, typically urea-ammonium nitrate (UAN) or ammonium sulfate (AMS), to increase microbial activity and induce residue decomposition. Microbial decomposition of corn stover is typically slow because the material has a high C:N ratio, The basic concept behind application of N to the residue is that by applying N, it is possible to reduce the C:N ratio and allow microbes to act on, or start eating, the material quicker.

"While this concept makes sense," said Fabian Fernandez of the University of Illinois, "research conducted at the University of Wisconsin showed no benefit for fall application of nitrogen to increase microbial decomposition of corn residue. They observed that applying N did not change the C:N ratio."

"I suspect there was no change in the C:N ratio because nitrogen can easily be washed off from the residue with rain," he said. "This is important when considering applicability of these results to Illinois. It is possible that cooler temperatures that occur earlier in the fall in Wisconsin may not reflect Illinois conditions. However, C:N ratio measurements are largely independ-

The No.1 way to increase nitrogen efficiency is to shift to a sidedress application," McGrath says. "

proving the availability of micronutrients and more.

But it's important to note that it can impact germination if applied directly to the seed. Keep at least 1 inch of soil between ATS and planted seed.

14 Don't apply nitrogen in the fall.

Fall-applied nitrogen rates need to be 3% to 10% higher than spring pre-plant applications to achieve comparable yields, according to Purdue University.

15 Apply nitrogen with fall strip-till.

Once again, it's key to note that what works on one farm may not work the same on another. For Oswald, his onfarm trials and strategic thinking have shown that he gets the most benefit from applying the bulk of his nitrogen with fall strip-till.

"In general, spring ammonia is hard to beat in my area for overall performance and efficiency," Oswald says. "However, soil and moisture conditions make spring applications risky because I can't predict if I'll be able to get in early enough to have a time buffer between ammonia application and when I want to plant on that strip.

"Often in the spring, if it's fit to apply ammonia, it's fit to plant. So, if the weather is suitable in the fall, I want to get my strips made and anhydrous ammonia on so that the strip is ready to plant when I am."

Oswald has tried both splitting applications between fall strip-till and sidedressing, and only doing sidedress. He didn't see any difference between 160 pounds of fall-applied anhydrous and splitting the application between fall strip-till and sidedress, so he applies in the fall.

"With my soils, putting down the bulk of fertilizer in the fall and a little with my planter also allows me to squeeze down my nitrogen rates," Oswald says.

Through this and many other onfarm trials, he's gradually worked his applied nitrogen down to around 100 to 130 pounds of nitrogen per acre in the fall after soils have cooled. He also puts down 10 to 15 pounds of a 28% liquid nitrogen and thiosulfate mix with the planter.

His yield goal is typically around 200 bushels.

16 Use cover crops to manage nitrogen.

"Cover crops can take up nitrogen and hold it, reducing losses to leaching," Mulvaney says. "Legume cover crops can also fix nitrogen."

One issue with cover crops is trying to use a set value for the amount of nitrogen they fix or hold.

"It always comes back to the soil. Soil impacts how much nitrogen fixation occurs because the more nitrogen a soil supplies, the less is fixed by the legume," Mulvaney explains.

Once again, no-tillers need to experiment on their farm with their rotation and soil to determine how cover crops will impact their applied nitrogen rates. In Branton's case, he's found that he can reduce applied nitrogen by about 50% in corn crops following a good clover crop.

"We've been working with cover crops for the last 12 to 15 years and I can't necessarily document it, but I'm sure they've improved soil health and fertility efficiency," he says.

17 Use your rotation to reduce nitrogen needs.

Cowlesville, N.Y., no-tiller Bob Kirsch avoids corn-on-corn and is adding cover crops to minimize applied nitrogen.

"Corn-on-corn requires a lot of nitrogen and makes for more residue," Kirsch explains. "I don't view corn as any more profitable than soybeans or alfalfa if you have to apply a bunch of nitrogen."

Until 2008, a 240-cow dairy provided most of his nitrogen inputs.

"Without the manure, I want to keep a rotation that minimizes the addition of nitrogen," Kirsch says. "I don't mind putting some on, but I don't want to put a lot on at a time, partly to avoid burning my beneficial organisms."

His rotation now is usually wheat, corn, soybeans, corn, soybeans and then alfalfa or grass hay. He's also experimenting with adding annual clover after wheat.

Alfalfa-grass hay fields that are rotated into row crops provide additional opportunities to cut rates.

"Coming out of alfalfa, I've not applied any nitrogen other than starter and done fine. After grass sod, I applied nothing and only lagged 10 to 15 bushels," he says.

Now when he plants back to corn following sod, he usually still cuts his rate by 50%. Corn following alfalfa gets no additional nitrogen.

"Between the residual nitrogen and additional nitrogen from soybeans, I usually put on 30 pounds of nitrogen per acre instead of 60 pounds," Kirsch says. "Some people get used to putting on a certain rate, but that's the wrong way to look at it. Determining the right nitrogen rate is always a work in progress."

18 Balance soils.

Kirsch also follows a fertility program from Growers Mineral Solution.

"Part of the program is to watch and maintain the calcium-magnesium ratios at an 8:1 balance — 80% calcium and 10% magnesium — which makes for more efficient nitrogen use," Kirsch explains.

Mulvaney notes that pH is another important factor to watch and that it's the most useful information no-tillers will get out of a soil test. Nutrients are generally more readily available in somewhat acidic to neutral soils.

19 Look into sensing technology.

"Variable-rate nitrogen applications using sensors can cut nitrogen rates across the field by an average of 28% to 30%," McGrath says.

But there are some trade-offs. For the sensors to work, the corn has to be in the V4 to V6 growth stages, cutting down on the amount of time no-tillers have to get their applications made.

"The risk is less for no-tillers because they have better soil structure and can get in the field sooner after a rain event," McGrath says.

Residue can throw a wrench in the system for no-tillers, though. When using sensors, nitrogen has to be dribbled on, which allows residue to potentially tie up part of the applied nitrogen.

"You can probably get about 5% to 10% better nitrogen efficiency by knifing in nitrogen vs. dribbling it on, but you gain roughly 30% efficiency due to the precision application, so it still nets out to a 20% advantage using the precision surface application," McGrath estimates.

20 Consider economic benefit and risk of nitrogen applications.

Ansonia, Ohio, no-tiller Bill Coppess and his son, Jeff, use the Ohio State University Economic-Based Nitrogen Calculator to help determine their nitrogen rates.

"When nitrogen started going sky-high, we didn't want to be overapplying it," Coppess says. "The calculator takes into account the cost of nitrogen, the price of corn and other factors to determine the economic threshold for nitrogen application."

The program has no-tillers input previous crops, type of nitrogen used, cost of nitrogen and the price of corn. With those values, it gives producers a lowest recommended rate, a maximum return to nitrogen rate, highest recommended nitrogen rate, as well as agronomic risk associated with each rate.

The risk is stated as probability of meeting 95% of maximum yield for each recommendation.

"We were putting on around 1 pound of nitrogen per bushel of corn produced, but with the calculator, we've found it's economical to cut back to about 0.8 pounds of nitrogen per bushel," Coppess says. "We haven't seen any yield loss."

Our thanks to No-Till Farmer for allowing us to reprint this article. More information can be found at

www.no-tillfarmer.com

or follow on Twitter @NoTillFarmr

Bob Kirsch tries to maintain an 8:1 calcium to magnesium ratio to make sure nitrogen is available to growing plants.

ent of temperature; thus, the fact that C:N ratios were not changed in the study would indicate that these results are applicable to Illinois conditions."

University of Wisconsin researchers also observed no difference in soil temperature due to treatment during the following spring. They also observed that applying nitrogen in the fall did not increase nitrogen availability through mineralization for the following crop compared to the untreated check.

They concluded that applying nitrogen in the fall to aid the breakdown of corn stover was not justified because it did not contribute to residue breakdown and resulted in nitrogen loss,

Some people may argue that applying a small amount of AMS for residue breakdown in the fall is not much different than applying an equivalent amount of nitrogen with diammonium phosphate (DAP) in terms of potential for nitrogen loss.

"While this is conceptually true, an important point to keep in mind to help us understand the difference is that of cost-benefit relationship," Fernandez said. "In the case of DAP, the benefit of applying phosphorus in the fall outweighs the risk of N loss from that fertilizer."

In the case of AMS applications to breakdown residue, there is no benefit in terms of residue management and only a risk for nitrogen loss, he added.

"Nitrogen loss is not only undesirable due to environmental degradation, but it reduces profitability," he said.

For more information on nitrogen applications, read the Sept. 8 edition of The Bulletin at bulletin.ipm.illinois.edu.

Technical & Advisory Committee Meeting

The next regularly scheduled meeting is :

Tuesday, November 15th
6:30 PM
USDA Service Center
2316 N Section St
Sullivan, IN

Events and Important Dates

- **Monday October 31st**
  Was the final planting date for wheat for crop insurance
- **Monday-Tuesday, November 14th-15th**
  Indiana Garden Club Tri-Refresher Course - *McCormick's Creek State Park*
- **Wednesday, November 16th**
  Monroe Co SWCD Cover Crop - NoTill / StripTill Workshop - *Elletsville, IN*
- **Thursday, November 17th**
  Sullivan PARP Credit Workshop - *Sullivan 4-H Fairgrounds*
- **Friday, November 18th**
  Sycamore Trails RC&D Project & Programs Celebration Banquet - *Terre Haute, IN*
- **Tuesday, November 22nd**
  Dubois Co. SWCD Cover Crop Field Day - *Huntingburg, IN*
- **Wednesday, December 5th**
  Last day to turn in County Committee Ballots at FSA offices.
- **Thursday, December 6th**
  Clay, Greene, Sullivan & Vigo SWCD PARP Workshop
  Spring Management Tools & Techniques for Cover Crops - *Vigo County Fairgrounds*

West Central Indiana Watershed Alliance

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