OptiGro™ System Helps Maximize In-Season Nitrogen Use and Corn Yield

A Midwest Value-Added Reseller Conference Recap

Sponsored by John Deere Agri Services, Inc.

These comments were made during Beck Ag, Inc. AgTelePanels held in early February 2007. Value-added resellers from across the Midwest joined academic and industry experts to discuss how they can help growers maximize nitrogen use and optimize corn yields with the OptiGro system.

Expanding Corn Acreage

With cash corn prices at their highest levels in more than a decade, increasing demand from the rapidly expanding ethanol industry and strong livestock use, optimizing corn yield while effectively managing nitrogen (N) in-season is a priority among farmers. More corn acres, especially corn-on-corn acres, are anticipated this year to meet demand boost profits.

Corn-on-corn acres present a new challenge, say industry experts, because many growers do not know how to maximize N under such conditions. Much N is applied to the ground in the fall, but experts contend N must also be managed in season to optimize yields. Diseases and other pressures can increase under poor N management.

"Clearly the more you grow corn on corn, you don't have the benefits of a rotation effect with soybeans," says Dr. Tracy Blackmer, director of research, Iowa Soybean Association. For the last seven years, Blackmer's research has focused on optimizing N in corn to improve profits, meet USDA guidelines and address regulatory issues.

"I think as we start growing more corn-on-corn, we know we have a higher N requirement. We need to think about how we're managing residue," he says. "Are we tying up a lot of N early, or do we know how it's going to work in different parts of the field, or when N's going to be available or not in different areas?"

Dr. Jim Schepers, soil scientist for USDA's Agricultural Research Service based in Nebraska, believes in-season N management may offer solutions. "To meet our thirst for ethanol, remove residue for making ethanol itself or feed it to livestock, farmers need a system to figure out where problems are going to show up first."

Optimism for OptiGro System

In-season N management can be guided by a system like the John Deere Agri Services OptiGro™ system. The OptiGro system's monitoring and management approach combines high-resolution aerial imagery and spatial analysis for effective variable rate N programs that help optimize corn yield and maximize N management.

The OptiGro system is used during the growing season to help growers apply the right amount of N in the right place at the right time and adapt to current growing conditions. The system supports existing N management plans, complements any N application strategy in the fall or spring, and can help growers adhere to local N regulations and minimize leaching.

"N is the toughest thing to get a handle on, but it is the most important factor in managing corn," stresses Tom McGraw, owner, Midwest Independent Soil Samplers with retail customers in Minnesota, Nebraska, Iowa, and the Dakotas. "I see aerial imagery as, certainly, a tool to help us sort out everything that we're going to do."

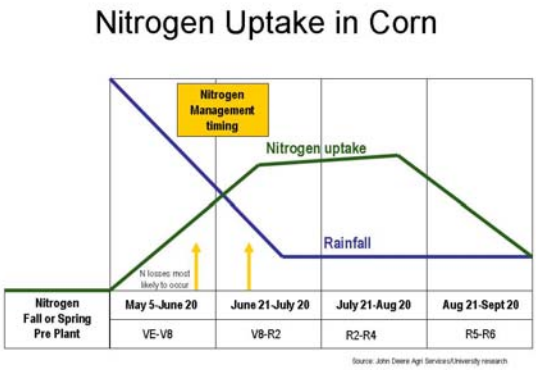
The OptiGro system begins with taking aerial digital images of fields and using the Global Positioning System (GPS) is used to match images

to specific field areas. Images are then processed and highlight areas of potential concern. An agronomic advisor analyzes the images and makes recommendations. Growers use variable rate technology to have products applied according to the recommendations so the correct amount is applied to optimize N use efficiency and yield.

Timing of N Applications

Fine-tuning N management is a decades-old challenge. "In the early 1990s, we started trying to use the corn crop as a bio indicator to tell us when we had enough N and where we should put additional N because of spatial variability in fields," says Schepers.

Today, he notes, research shows that corn benefits most when N availability is synchronized with the rapid uptake period from about the middle of June to the middle of July. "That's when you're most likely to see an N deficiency. And that's when you're building the factory, getting that plant size established, so that during the grain fill period, you've got a full-size factory that's working very fast," he says.



The green line shows from May through June, the N uptake rate rises. The plant takes up 5-6 pounds per day as it grows. By silking, the plant only takes up 3-4 pounds. Toward harvest, intake drops to zero. The blue line represents opportunity for water infiltration into the soil. Generally, plenty of rainfall occurs early in the year, and the plant doesn't need much water. Leaching can occur. As the plant moves to the 8- to 10-leaf stage, evaporation from the soil and plant is about equal to rainfall. Using rain to move fertilizer into the soil can still be accomplished effectively.

Research also indicates if you make applications earlier in the season, you need to get the N in the soil to be effective.

Bob Wieland, a corn, soybean and pumpkin producer from Laura, Ill., believes over-application is common. "We usually fall apply N, but we wait to put it on so we don't lose it. We try to make sure the temperature is correct, so it stays on," says Wieland. "Sometimes we feel that we've lost some of our N with fall anhydrous applications. We come back with 28 percent where visually we see we're short of N. It's hard to see that early, but you can tell when it's too late."

With N applications closer to tasseling time, Blackmer's studies show corn yield differences up to as large as 40 bushels per acre. But, he adds, no yield response is possible.

"We've been able to go in and correct a lot of yield deficiencies, or at least minimize the impact of weather, although there isn't always a strong response," Blackmer says. "Now, though, with the high price of corn, if you know you have a deficiency early (it may be worth it) to correct it."

Brad Peiffer, owner of NetMapping in northern Illinois, has been in the retail business for 17 years, and says later application is easier today. "With the introduction of controlled-release N products, we can cover more acres faster. We've been using high clearance machines later in the season or flying in with an airplane so we can take advantage of opportunities for later N applications," he says.

Growing Importance of Imagery

Using aerial imagery helps identify needs. "It provides the ability to look at an entire field and see areas or patterns where you may have N stress," confirms Blackmer. "We see a big opportunity for using (imagery) tools to improve N management."

Red lines on the image show where soybeans did not do well with a high pH. The same field a year later shows different N rates in that field. Blackmer says some of their surveys have shown that 84 percent of growers that evaluate their N management end up making changes based on what they see in such images.

"Probably the biggest use in season we've had the last couple of years is application error," he continues. "You find several rows that didn't get fertilizer or fertilizer applied unevenly. If we detect that soon enough to correct it, that gives people value.

"Remote sensing works very well at detecting N stress," he continues. "The more you use the plant to tell you whether it's getting enough N is of immense value. It's hard to predict ahead of time the right amount of N. The more you can use imagery to identify where you may have a problem, the easier it's going to be to correct that."

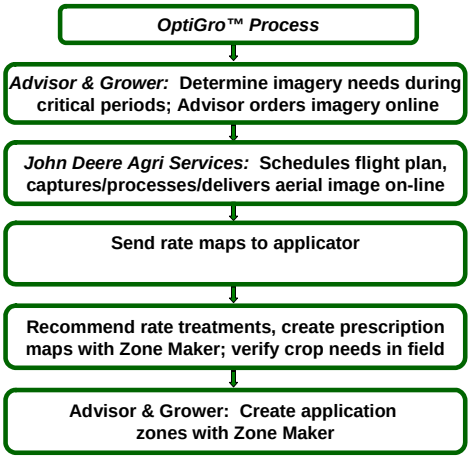
"In the past, you put plenty of N out and usually got a return on your investment. I think we can use (imagery) to optimize yields and still not throw money away putting on too much N," says Wieland. "I think we're going to see the day that we plant the seed corn to the soil type, we apply N to the soil type and we fertilize to the soil type. I look forward to the time that we, through GPS or remote sensing, can optimize on those."

Down to the Details

The level of detail provided with the OptiGro system is one of the primary ways to optimize N applications. McGraw notes that detail within one meter is not the same level of detail retailers or growers are seeing with yield monitors or maps.

"You can see this kind of detail and make judgments that help your customers," he says. "The imagery by itself will tell you many things, but it's not going to tell you everything. It takes feet on the ground to analyze it. Imagery tells you where to look. There's an opportunity to raise your customers' profits."

"We're able to provide more value, rather than just go out there, lay it all down, and in July, decide 'we get what we get' at the end of the year. We can manage the crop all year. It's a value-added benefit," says Peiffer.



The OptiGro system follows a number of steps to provide retailers and growers with an effective level of detail.

Progressive Growers Give it a Go

Many growers already see the benefits of the OptiGro system. They are also considering long-term value of the service. "This gives me the opportunity to look at data over a three- or four-year period and try and maximize what is the best for the soil type I have. If you're going to stay in business, you've got to manage input costs, and maximize profits where you can," says Wieland. "I definitely see that it's going to add to the bottom line. It's going to help me manage my N inputs all season."

Jim Grief, a corn and soybean grower from Monticello, Iowa, says it helps him identify areas where he has N stress.

"We have areas of lighter, sandier soil, and typically N leaches away from these areas," he says. "N has gotten so high priced, you just can't afford to (apply it the same way) anymore. We are putting on a third to half of N at planting time and coming back and sidedressing the rest. This program is going to possibly redistribute where we put a little bit of that N so we optimize yield and maximize that nitrogen investment."

Grief also anticipates N management will figure prominently in federal farm programs. "This is all part of the Conservation Security Program (CSP). Retailers need to look hard at that because it may be a requirement actually to participate in the program to be eligible," he says. "I think it's something retailers need to keep up on."

"The biggest comment we get from all the growers we work with is that when you work on improving N management, at the end of the season, they wish they would have known earlier so they could go out and do something about it," says Blackmer.

Retailer Recommendations

McGraw has advice for retailers that try the system. "We all know it will take more management from a retailer or farmer level to do a two- or three-pass N program. That's why we went to a one-pass program. It was easy to put it all on at one time," he says. "But there are opportunities in adding value, adding information for farmers so retailers can make money from the services provided. There's no question, the maps show there is opportunity for the OptiGro system with feet on the ground and good people."

Retailers Must Plan Equipment Needs Prior to the Corn Season

- Make sure equipment is ready to go *(both custom application equipment and grower equipment)*
- Pre-test application equipment to make sure it is capable of variable rate application *(run a test drop)*
- When applying N late in the season, use a drop nozzle to minimize volatility
- Apply with good chance of rainfall to work into soil profile
- Plan ahead to ensure availability of high-clearance spray equipment

By following the tips above, retailers can find success in helping growers manage in-season N applications in the most effective way possible.

McGraw's company started with crop monitoring. "If I'd had this kind of imagery, I'd have gotten twice as many acres done. You know where you're going in the field and what to look for. You can zoom in with a handheld computer in the field and you can stand right on top of what you see on the maps," he says.

"Retailers can get into the program little by little, with data collection or feet in the field. There are possibilities if you want to get involved," he says, adding retailers can identify those anxious for technology and then focus on growers that watch the early adapters. "We all know who the guys are that love technology and want to see what the next thing could possibly bring for them."

Beck Ag, Inc. offers producers opportunities to learn about products, innovative technologies and business practices from their peers through interactive telephone conversations. www.beckag.com

For more information about the OptiGro system, visit www.JohnDeereAgriServices.com or contact the company at AgriServices@JohnDeere.com or 800-393-8971.
