CROPS

Wetter springs change nitrogen application

By **TYLER HARRIS**

NITROGEN is undeniably important for agriculture, and the rising world population is dependent on agriculture. Peter Scharf, a University of Missouri professor of plant science, says without nitrogen fertilizer, 40% of the human population would not survive.

North Korea is an example. When the Soviet Union collapsed in the late 1980s and early 90s, Russia quit giving fertilizer to North Korea. Fertilizer use plummeted to a third of what it had been, and grain production followed, dropping to half of what it was. "They have had a lot of starvation in that country because they've lost their nitrogen fertilizer," Scharf says. "It's really a crucial, crucial element that everyone has nitrogen fertilizer to get food on the table."

More wet springs

Since 1980, the amount of acres in the Midwest with wet springs has increased. In 2013, the largest wet spring in history, most of Iowa, Illinois, Missouri, Indiana, and parts of eastern Kansas and Nebraska received 16 inches of rain or more from April to June, which indicates a high risk of nitrogen deficiency. Scharf estimates about 2 billion bushels of yield potential were lost from 2008 to 2011 as a result of nitrogen deficiency in wet years.

In 2008, a wet year, Scharf notes proper timing of applications made a world of difference. At MU Bradford Research Farm near Columbia, corn that received 110 pounds of nitrogen in a sidedress application at knee-high yielded 44 bushels an acre more than corn which received 180 pounds at planting. From 2007 to 2013, the farm gained a total of 260 bushels an acre more by sidedressing compared to preplant. "There have been a lot of bushels lost on farms, and it's time for us to do something better," he says. "And we are doing something better."

Key Points

- Wet springs in Midwest causing more farmers to apply nitrogen in-season.
- More technology available helps apply the right rate for better yield response.
- Applying the right rate at the right time also prevents environmental issues.

IN-SEASON APPLICATIONS: Wet weather in early spring has farmers applying nitrogen during the season. However, technology is helping them to get the right rate for better yields.

Corn has a greater ability to perform well with later applications than people think, and Scharf says more farmers are realizing this. In 2013, more farms than ever before in Iowa, Missouri, and Illinois applied in-season nitrogen, according to three surveys Scharf conducted this summer. On average, 35%, 45% and 50% of the corn producers were applying in-season nitrogen. Before this, he says, it hadn't reached 5%.

New technology

Soil organic matter releases widely varying amounts of nitrogen across fields, so soil nitrogen varies widely, and so do yield responses. More technology is available now to help manage this variability. This includes the use of nitrogen sensors mounted on applicators. Currently, these sensors are the most reliable way to tell how much nitrogen the soil is giving off. Crop sensors detect the color of the crop at the time of application. The computer in the cab of the tractor or applicator reads the sensors and calculates rates accordingly, before directing the controller to change the rate. Sensors can be used with any type of applicator on corn from 1 to 7 feet tall.

During studies in 55 locations in Missouri from 2004 to 2008, Scharf notes that on average, 14 pounds of nitrogen were saved per acre, and yields increased by 2 bushels per acre by using sensor-based application vs. using producer-chosen nitrogen rates. "We were identifying areas that didn't need as much," he says. "Most of the time when we cut back, we saved nitrogen without losing yield."

Reduced fuel costs

In recent years, natural gas prices have declined. Scharf says it started with a change in the Clean Water Act to exempt fracking, which resulted in more fracking and increases in natural gas yields. So, gas is cheaper and making fertilizer is less expensive. "It looks a lot more attractive now to make fertilizer in North America than it did 10 years ago," he says. "We're almost for certain going to have an increase in domestic [nitrogen] production."

Scharf thinks the biggest impact will be having more good-quality urea with increased domestic production like Koch Fertilizer's planned expansion in Enid, Okla. Urea imports doubled from 2001 to 2013. Imported urea is usually handled many times, leading to granule breakdown and many fine particles, making it difficult to spread with spinners. "With more domestic urea, in-season application with spinners becomes more feasible," Scharf says. "You can cover a lot of acres in a day, and it makes in-season nitrogen much more practical. Practical in-season nitrogen is really the answer to these wet years."

Environmental pressure

The industry is also facing more environmental pressure. With the algal blooms and low oxygen content in the Gulf of Mexico as a result of runoff of nitrogen and other nutrients, nutrient reduction strategies are being created for several Midwest states, including Missouri.

Practicing the "4 R's" — the right rate, right source, right time and right placement — can help prevent this runoff. This is another way in-season and variable-rate nitrogen application pay off. "The two biggest R's on both a production and environmental standpoint are the right timing and the right rate," Scharf says. "If you can hit the right timing and the right rate, you're going to do a great job of getting the nitrogen in the crop and keeping it out of the water, but it can be a challenge to hit the right timing and right rate."

Looking ahead

PETER Scharf's NVision decision support tool will hopefully be available in 2015 to help farmers hit the right rate. The tool works in two steps. First, producers will be able to purchase an aerial photo of their field through a fertilizer dealer or online. This photo translates into a map of yield loss due to nitrogen deficiency. From this, producers can decide whether they need additional nitrogen. If they do, the aerial photo can also be used to develop a variable-rate map.

Typically, the wettest parts of the field have lost the most nitrogen due to rain, will be the most deficient and will need the most additional nitrogen. With the wet spring of 2013, Scharf notes more farmers than ever applied nitrogen in season, but it's difficult to tell where it's needed and how much to apply. "NVision offers a lot of potential to identify which fields need more nitrogen, which fields don't, and the parts of a field where you need the most," he says.