

Timing of nitrogen applications can enhance yields

DuPont Pioneer | Updated: 01/24/2014

Growers are doing a better job of managing nitrogen fertilizer applications. In recent years, the amount of fertilizer used has remained relatively constant while average yields have steadily increased. DuPont Pioneer experts suggest growers continue to look for ways to make the **application of nutrients** — particularly nitrogen — as efficient as possible. One strategy is to adopt split applications.

“Modern hybrids take up nitrogen later in the growing season,” says John Shanahan, DuPont Pioneer research scientist. “Data suggest applying nitrogen during the growing season, to coincide better with crop uptake of this nutrient, can result in higher yields.”

Growers know the pros and cons of fall nitrogen (N) application. While it may be necessary to apply fertilizer before winter, there are ways to minimize the potential for leaching and runoff. “Growers can mitigate losses from fall application by applying anhydrous ammonia after the soil temperature has dropped below 50 degrees — assuming it doesn’t warm up again for a lengthy period,” Shanahan says. “Also, N stabilizers can help keep nitrogen in the stable ammonium form.”

Some states even mandate withholding application until after a certain date and/or the use of a stabilizer.

Spring application of nitrogen leaves less time for leaching, but unpredictable weather can make it difficult for some growers to get into the field.

“Early planting trends can work against spring applications,” Shanahan says. “Many growers want to get seed in the ground as early as practical, and they don’t want to deal with fertilizer application if it may delay planting.”

Recent work by Tony Vyn at Purdue University demonstrates a substantial positive impact from applying nitrogen after planting. This is not surprising, as crops require the lion’s share of their nitrogen needs just before the reproductive stages.

“Growers must overcome some obstacles to make a second nitrogen application in season,” Shanahan says. “They need high-clearance equipment, which is expensive. They’re also at the mercy of weather: Can they get into the field in a timely manner to get the second application down?”

The industry is making strides to help growers find better ways of timing nitrogen applications. “It’s incumbent on our industry to help growers find practical solutions,” Shanahan asserts. “Crop sensors are one technology that adjusts side-dress N application rates for weather effects such as excessive rainfall.” The result can be increased yields, improved profits, and more efficient fertilizer use.

Because of the complex nature of soil and weather variability, growers face significant challenges in optimizing the amount of N to apply to each field, year and area within a field. This results in under-application of N in some years and fields, with resulting yield losses and over application of N in other years and field areas resulting in inefficient use of N resources.

For example, through analysis of data compiled from hundreds of N rate response studies conducted throughout the Corn Belt over several years designed to determine economic optimum N rate, Pioneer has determined growers are potentially losing on average around \$55/acre of revenue due to a combination of over- or under-application of N.

Pioneer is working to provide real-time information to help growers make better decisions on N applications, such as when and how to apply, what soils to apply and optimum application rates. Also, Pioneer is working internally and with collaborators to understand the mechanisms of in-season nitrogen application. The information and the process developed should help growers make better decisions, reduce risk and increase crop yields.

“Generally, it pays to avoid putting all your nitrogen down at once,” Shanahan says. “Today’s genetics show potential to deliver more bang for your buck through split applications.”