



## Nitrogen Adjustment

These farmers switched to at-planting applications to help increase fertilizer efficiency and boost yields.

BY JOHN POCOCK | PHOTOS BY DAVE CHARRLIN

Illinois farmer Derric Eisenmann uses a seed/fertilizer tending and planting system to apply N. The cart carries a 2,800-gallon tank for 28% N, and two saddle tanks on the tractor hold a liquid starter blend.

**T**he race to apply anhydrous ammonia on as many acres as possible in the fall was once a standard operating procedure on the Brockelsby farm, near Taylorville, in east-central Illinois. However, an emphasis to build healthier soils, protect yield potential and increase return on investment caused this farm family to rethink fall-applied anhydrous.

“Fertilizer is expensive, and we wanted to find better ways to be more efficient with nitrogen [N] use,” says Scott Brockelsby, who helps his dad, Steve, uncle, Bruce, and cousin, Bryce, grow corn and soybeans on somewhat varying but generally highly productive soils. “We came

to a decision to put down half our N with the planter,” he adds. “We’re banding it 4 inches down and 4 inches away from the seedbed. After planting, we sidedress the rest of our N using a 60-foot bar, wavy coulters and knives that inject N into 20-inch corn rows.”

**N LOSS MEANS LOWER YIELDS.** Split-N applications help reduce the risk of preplant N losses, says Peter Scharf, University of Missouri Extension nutrient management specialist. “My best estimate is that U.S. farmers have lost 2 billion bushels in yields to N loss and N deficiency over the last six years,” he says. “This year, about half of the Corn Belt was affected by wet weather that caused N loss.”

A reliance solely on a preplant N application program has steadily become more of a gamble in the Corn Belt, Scharf adds.

“N loss really comes down to rainfall, and we’re getting wetter springs,” he points out. “Over the last 50 years, weather patterns in the Midwest have been increasing the risk that farmers will lose their preplant-applied N. Since 1955, the number of acres with more than 16 inches of

rain from April through June has nearly tripled.”

Preplant-only N applications can be very ▶

Scott Brockelsby, of Taylorville, Ill., applies half of his corn crop's nitrogen needs at planting by banding 28% N and an ammonium thiosulfate solution.





**Derric Eisenmann is seeing higher returns entering his seventh season of applying N at-planting and in-season.**

efficient some years but economically devastating in others when N loss from denitrification and leaching is excessive, Scharf adds. “There’s

no need to apply N in-season if you don’t lose any N during spring,” he says. “The problem is that with more spring rains, there is more chance you’ll lose it. On the flip side, one problem with in-season or split-N applications is that they can be slow.”

**PIT STOP MINDSET.** Good logistical planning and the right equipment can help prevent slowdowns when applying N and other nutrients with the planter, Brockelsby says. “If we’re not careful, banding can slow down planting a bit. We’ve overcome that challenge with the planter-tending system we have in place.”

They use a semitrailer that carries a 1,000-gallon tank to hold in-furrow starter; two 100-foot hose-reels; a 4,000-gallon tank for liquid N mixture; two inductors; 250 gallons of water to wash equipment, as needed; and a four-box seed-tending blower unit.

At planting, their banded fertilizer application typically consists of 120 units N, or 40 gallons per acre of 28%

## Split-N Applications in the South

In southern corn-growing states like Mississippi, split-nitrogen (N) applications are the norm rather than the exception, says Erick Larson, Mississippi State University state corn specialist. The standard recommendation is to apply N twice during spring: one at planting (or soon after) and another at the V6 growth stage. Some farmers, however, are adding a third application (see chart on page 24) just prior to tassel.

“Our wet and warm climate dictates we take measures to reduce N loss most springs,” Larson says. “We’ll have substantial N losses if we apply N during fall, and we generally have little, if any, N carryover from soybeans. So our total recommended N rates may also be higher than what northern states would be.”

In states with cooler temperatures and/or less rainfall amounts than in southeastern states, split-N applications may be unnecessary, Larson adds. “However, any time you split your N applications, you could enhance your efficacy.

N and 4 gallons per acre of an ammonium thiosulfate solution (12-0-0-26S), which is a blend of 28% N and sulfur. When the planter stops to fill seed, the fertilizer tanks are refilled, too.

“We take a pit stop mentality to tending and loading the planter to keep it rolling and covering acres,” Brockelsby says. “If needed, we can also put on less N at planting to reduce tank-fill time and speed things up.”

The planter is rigged to prepare a seedbed, apply nutrients and drop and cover seed in one pass. “With this system, we don’t have to worry about working the ground prior to planting,” says Brockelsby, who is a district sales manager for Pfister Seeds, a Precision Planting dealer and an area manager for Ag Spectrum Company. “When the ground is fit to plant, we plant. We’ve set up the planter with all precision placement attachments to deliver products efficiently and effectively.”

A similar seed/fertilizer tending and planting system helps to increase N application efficiency for Derric Eisenmann. “We apply 20 to 30 gallons per acre of 28% N with the planter in a 2-inch x 2-inch offset band, sometimes with a sulfur blend,” says the Rankin, Ill., farmer. Eisenmann varies N applications by soils, especially on sandier ground. “In addition, we apply an in-furrow starter, called CleanStart, by Ag Spectrum, and their micronutrient package, KickOff.”

Tank-fill logistics are the key to at-planting N-application efficiency, Eisenmann agrees. “What really helps is having a tricycle-configured pull cart that’s easy to back up,” he says. “The cart holds a 2,300-gallon tank for 28% N. Two saddle tanks on each side of the tractor hold another 900 gallons for the liquid starter blend.”

The large tanks allow the cart to cover 100 acres or more per fill, Eisenmann says. “When I stop to fill seed, I stop to fill fertilizer, so there’s no slowdown,” he says. ▶

In Mississippi, all our N is applied in the spring, most in split applications, with the bulk at V6, at the onset of a very rapid growth stage. We’re also using a lot of pretassel granular N applications in the South.”

Following are Larson’s top three N application tips:

- ▶ Split-apply N (especially in wet climates) to minimize the risk of loss through N denitrification and leaching. This strategy reduces unnecessary N exposure to potential loss.

- ▶ Target your N applications when the crop needs it most. For example, apply no more than 1/3 of your N near emergence and sidedress the majority of N just prior to rapid growth stages.

- ▶ Use appropriate application methods to minimize risk of fertilizer loss. This may include injecting UAN solution in the soil, using a urease inhibitor and timing your applications prudently to limit volatility losses of urea-based N sources.

—By John Poccock

“Our fill stop is like a NASCAR race stop. When I come in, lights flashing, the crew has everything ready and wastes no time getting me back out planting. The crew consists of a fertilizer and seed tender operator, and a driver that shuttles 28% N and seed from the farm to the tender operator.”

**ROI BOOST.** Eisenmann is in his sixth season following an Ag Spectrum soil-nutrient management program called Maximum Farming. The program includes at-planting N and micronutrient applications, in-season sidedress N applications and occasional foliar N treatments.

“The cost of this fertilizer system isn’t any cheaper than the conventional approach, but it is much more efficient,” Eisenmann says. “We’re applying everything when it’s most needed, and that’s giving us higher returns. We’re more efficient, and we’re getting better yields, so the economic return per input is higher.”

Brockelsby concurs. “Over the last four years, we’ve increased yield levels by an average of 10 to 15 bushels per acre across the farm with this system,” he says. “Our net farm profit is also greater. We have more yield, use less fertilizer overall and have greater soil health.”

In addition to the N they apply at planting, the Brockelsbys also sidedress 34 gallons per acre of 28% N and 20 gallons per acre of a 3-10-10 fertilizer solution after planting. “We follow up with an aerial-applied foliar fertilizer at brown-silk stage to help the plant direct its energy toward ear fill,” Brockelsby says. “Currently, we are also testing putting on foliar N and other nutrients at

V3 to V5, when we sidedress, to help the plant overcome later-season stresses.”

Total fertilizer expenditures are slightly less than what their conventional N fertilizer program would be for corn, Brockelsby points out. “There’s really not a lot of cost difference in our program now,” he says, “but we’ve gained much more in N efficiency, and from other nutrients, by putting them in the right place at the right time and in the right form.”

**MORE N, MORE MICRONUTRIENTS.** Farmers will be most efficient with their N applications if they can apply them when most needed, confirms Ignacio A. Ciampitti, Kansas State University crop production and cropping systems specialist. “Split applications allow you to better predict the amount of N the crop will need based on crop condition,” he says. “It allows you to apply at the right rate for the conditions in the field and not waste any or overapply N at a time when the plant isn’t taking up much N yet.”

In high-fertility environments, higher N uptake increases the uptake of micronutrients, such as zinc, iron, manganese and copper, in modern hybrids, according to a recent study Ciampitti completed with Tony Vyn while at Purdue University. “Higher yields aren’t only related to better N management but also to better management of the entire cropping system and balancing all nutrients, including micronutrients,” Ciampitti says. “Better overall nutrient management will assist in closing corn yield gaps at the on-farm level.” ●

## Corn Seasonal Nitrogen Uptake

