TECHNOLOGY TO THE RESCUE

SLOW-RELEASE AND STABILIZING PRODUCTS RETAIN YOUR NITROGEN.

BY LARRY STALCUP

Nathan Gregory has steadily increased his corn yields since the 1980s. And the use of a nitrogen (N) stabilizer on urea can likely take some of the credit on his eastern Arkansas corn and soybean operation.

Gregory farms about 1,800 acres of corn and 2,000 acres of soybeans, which include beans double-cropped after wheat on land that has received more than its share of rainfall the past two years. Keeping N in the field and out of the bar ditch has been a challenge for him and many other growers.

N stabilizers and slow-release N products are helping growers prevent N losses that rob corn of valuable nutrients and potentially create environmental concerns.

Best practices today,(urease and nitrification inhibitors) minimize N's off-target movement by reducing volatilization and by maintaining N in the ammonium form, which is less mobile and more efficiently utilized by many crops.

Randy Killorn, Iowa State University (ISU) professor of agronomy, says he's seen positive rsults over six years studying urea coated with a controlled-release Environmentally Smart Nitrogen (ESN) from Agrium.

"We've seen some good response in yields, but not all of the time," says Killorn. "It should be of interest to growers, depending on the cost of the ESN product and the price of corn."

For Gregory, corn is usually grown after beans or wheat. His source is usually a liquid N at 32%. But he sometimes applies urea coated with Agrotain, an N stabilizer designed to prevent volatilization, when urea contacts moisture and soil compounds that release ammonia into the air.

"The process has likely helped me increase my yields because of better N management," says Gregory. "In the 1980s, we had yields in the 140-bu. range. We've seen that increase from 184 to 190 bu."

WHEN USING UREA, he applies it at about 200 lbs. N/acre for his corn. With the heavy spring rainfall and chance for leaching, he counts on the stabilizer to keep the N intact.

"We've had good luck with that program," he says. "When we apply the liquid 32, we knife it in when the corn is about a foot tall. Our corn seems to respond well to both programs."

Urea normally converts to ammonium-N shortly after it hits the soil, so N from urea can be lost to the atmosphere if fertilizer remains on the soil surface for extended periods during warm weather.

In ISU research, ESN and urea were hand-applied in late fall at rates of 0, 40, 80, 120, 150 and 180 lbs. N/acre. Urea-only treatments were applied in late April for comparison. The previous crop was soybeans both years.

"The crops were planted in May both years and were machine-harvested in October," says Killorn. "Yields were weighed in the field and adjusted to a moisture content of 15.5%."

The ESN treatments yielded 177 bu./acre, compared to 166 bu. for straight urea applied in the fall. Killorn says the spring urea treatments yielded 172 bu. "The difference in yield between fall ESN and spring urea treatments wasn't statistically significant, but the difference between these two treatments and the fall urea treatments was significant," he says.

Steve Ebelhar, University of Illinois (U of I) agronomist, says growers can expect to pay an additional 18-20¢/lb. of N for the ESN-coated urea. He says Agrotain would likely add 5-6¢/lb. of N.

He says growers should consider the different N technologies in some

N-SOURCE APPLICATION ON NO-TILL

N Source	CT Surface Applied			CT Incorporated			NT Surface		
	Opt. N (lb. N/a)	Yield @ opt (bu./a)	Nitrogen Use Efficiency (lb. N/bu.)	Opt. N (lb. N/a)	Yield @ opt (bu./a)	Nitrogen Use Efficiency (lb N/bu.)	Opt. N (lb. N/a)	Yield @ opt (bu./a)	Nitrogen Use Efficiency (lb N/bu.)
UAN Side Injected	n/a	n/a	n/a	n/a	n/a	n/a	238	193	1.23
Urea Broadcast	189	207	0.91	188	209	0.90	240	142	1.69
Urea+Agrotain	203	213	0.95	178	208	0.85	191	173	1.11
ESN Broadcast	178	200	0.89	180	214	0.84	240	197	1.22
SuperU Broadcast	209	216	0.97	184	212	0.87	199	160	1.24
UAN Dribble	201	202	1.00	220	210	1.05	213	160	1.33
UAN+Agrotain	226	214	1.05	196	206	0.95	228	171	1.33
UAN+AgrotainPlus	210	203	1.03	228	211	1.08	240	175	1.38
UAN+CaTs	188	200	0.94	207	207	1.00	240	160	1.50
UAN+AgrotainDF	n/a	n/a	n/a	n/a	n/a	n/a	240	179	1.34

In 10 different N-source applications on no-till corn in 2008, an ESN broadcast application produced a 197-bu. yield, compared to 193 bu. for a UAN side-injected application, a 179-bu. yield from a UAN+AgrotainDF application and 175 bu. for an UAN+AgrotainPlus application.

SOURCE: U OF ILLINOIS

cases. "If you're growing no-till corn, Agrotain seems to help a lot with surface-applied urea and UAN," he says. "Our studies show it certainly reduces the amount of N lost. ESN also gives good protection."

IN NO-TILL CORN, the new technologies showed strong results in 2008 studies statewide, says Ebelhar, who works mainly in southern Illinois.

For example, in 10 different N-source applications on no-till corn in 2008, an ESN broadcast application produced a 197-bu. yield, compared to 193 bu. for a UAN side-injected application, a 179-bu. yield from a UAN+AgrotainDF application and 175 bu. for a UAN+AgrotainPlus application, all significantly better than UAN surface-dribble applied that resulted in corn yield of 160 bu.

From 2006 to 2009, ESN broadcast on no-till led to a 142-bu. yield average. That compared to 140 bu. for UAN sidedressed, 132 bu. for urea+Agrotain and 130 bu. for corn broadcast with SuperU. All of these were significantly better than urea alone at 121 bu. (For a more detailed list of the of the U of I research results, go to *http://frec.cropsci.illinois.edu/2009/report2/*.)

"It appears that many of the N sources in this study may provide significant improvements in N-use efficiency," says Ebelhar. "These differences appear to be more important with no-till than conventional-till systems."

Several locations had higher-than-normal rainfall prior to N application, which caused problems with planting at optimal timing, he says. "At both locations, heavy urea losses occurred from the surface applications," says Ebelhar. "Products containing Agrotain tended to significantly reduce these N losses, presumably from volatilization.

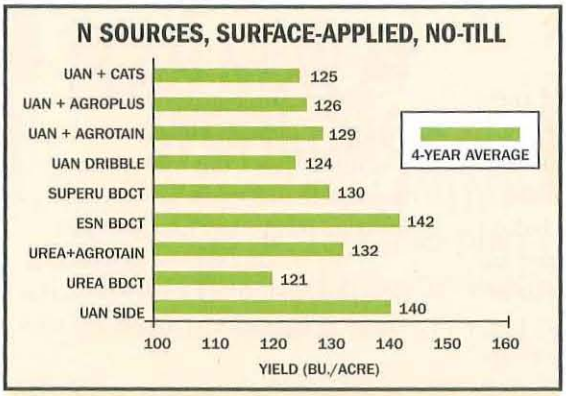
"Sidedressed injection of UAN or application of ESN also significantly reduced N losses and increased yields. UAN sources had less loss of N than urea."

Lyle Paul, U of I agronomist for northern regions, worked with Ebelhar on the N technologies research. "We've seen that Agrotain works well if N is applied during dry weather," he says. "If you get a half inch of rain, that will usually incorporate N into the soil."

Paul says that in DeKalb, IL, three-year N studies, ESN applied in the late fall yielded 217 bu. of corn, while spring-applied ESN yielded 230 bu. Straight urea yielded 221 bu. from the fall application and 229 bu. from a spring application. Corn receiving ammonium sulfate and ammonium sulfate and urea combination had similar corn yields. SuperU had 233-bu. yields from spring application and 223 from N applied in the fall.

Kentucky studies have shown 15-20-bu. increases in yields from Agrotain technology, he says.

There are several other N stabilizers on the market, including N Serve from Dow. Discuss the value of N stabilizers with your local for the best advice on your farm. CSD



▲ Environmentally Smart Nitrogen (brand name) broadcast on no-till ground led to a 142-bu. yield average in U of Illinois research from 2006 to 2009. That compared to 140 bu. for UAN sidedressed, 132 bu. for urea + Agrotain and 130 bu. for corn broadcast with SuperU. All of these were significantly better than urea alone at 121 bu. (See *http://frec.cropsci.illinois.edu/2009/report2/*.) These differences appear to be more important with no-till than conventional-till systems.