Sidedressing Nitrogen in Corn Makes Sense

It is not only friendly to the environment but also improves return on investment and crop yields.

To be effective, nitrogen (N) fluids must be applied in the right amount, at the right time and at the right location for the corn plant. It is vital that crops get the most out of the N applied if yields and profits are to be maximized for producers.

N efficiency is influenced not only by when, where, how, and in what form fluid N is applied, but also by soil and climatic conditions.

Banding N under the soil surface and within the root zone increases plant food availability and potential efficiency. Subsurface application of N on corn allows growers to apply UAN (28 or 32%) at any time—from crop emergence up to five-leaf growth stage—in order to give plants N precisely *when* and *where* they need it.

Placement counts

University of Illinois trials have shown the positive effect root zone banding liquid N has on return on investment (ROI). From 1995 to 1998, agronomists compared three forms of N application to see their effect on corn grain yield.

Surface band. Surface banded UAN showed more than a 10 percent yield increase and a 38 percent increase in ROT when compared to broadcast UAN.

Root zone banding. When UAN was injected into the root zone, there was a *35* percent yield gain and a more than 150 percent increase in ROT when compared to broadcast UAN.

Monitoring N runoff

At Iowa State University, Dr. Alfred Blackmer, a research agronomist with the Department of Agronomy, is conducting trials on subsurface application of UAN in corn after soybeans.

"Usually, nitrogen is applied in an ammonium form in the fall," Dr. Blackmer says. "As soon as it is converted to nitrate, it can be lost when there is excess water in the soils. If nitrogen is applied in the fall, and there is a lot of rain in the spring, the nitrogen can be lost before the plant takes it up. Plants do not have adequate nitrogen before this, so it hurts productivity."

"Water runoff varies from field to field and year to year," Dr. Blackrner adds. "Some growers are losing 50 to 75 percent of their fall nitrogen that they apply some of the time."

In addition to hurting productivity, Dr. Blackmer also knows such N runoff can be detrimental to the environment. Thus he has been cooperating with state and federal officials who monitor N in the rivers near his trial sites.

Timing the answer

"We have to find solutions to runoff," Dr. Blackmer says, "and delaying applications until the crops need it is one. Sidedressing allows for the most efficient use of nitrogen by plants."

In the early stages of plant growth, only small amounts of N may be required. When N is injected into the root zone at that time, it works to promote early plant growth and affects the final size of the plants and their yields.

According to research at the Kansas State University Agricultural Experiment Station Cooperative Extension service, there is improvement in yields and nitrogen efficiency with a subsurface application of UAN, especially in years when there is more rainfall than normal.

Iowa State University's Department of Agronomy further confirms the benefits of root zone banding in the spring. According to their research, this delayed application avoids potential losses and increases N use by the plants. In dry conditions, sidedressing can be an answer as well. During these conditions, subsurface-applied N won't have the necessary moisture to move it into the subsoil. By placing the N in the root zone, the fertilizer is still effective even if there is little rainfall or the surface soil dries.

By the time corn is 15 to 18 inches high, single-pass sidedressing of UAN should have been completed. N deficiency stress to the plant after this time of the growth cycle may reduce the number of rows on corn ears, and possibly limit yield potential. A spring application will help maintain available soil N levels during the rapid vegetative growth phase of the corn plant.

Selecting right equipment

The disadvantage of spring application is labor availability and a narrower window of time. However, according to Cary Sizelove, CNH, Goodfield, Illinois, with the new coulter injection technology available, N application can now be done at a higher speed than previously— even in the spring.

Says David Long, CNH, Goodfield: "When sidedressing with a liquid injection applicator, it is very important to have a high-quality injection coulter. Small ripples in the coulter open a narrow slot for the injection nozzle to shoot liquid N into the soil to the full coulter depth, where it can be captured by roots and not tied up by carbon-rich surface residues. You want a coulter injector unit that has the proper strength and structure to keep the injection nozzle targeted on the coulter

slot at a consistent depth under all operating conditions."

Summing up

Targeting applications makes good economic sense when compared with broadcast application. When broadcasting, the fertilizer is not incorporated into the soil, thus it can be lost to runoff and erosion. It can also be harmful to plants and their growth if direct leaf contact is prevalent.

Sidedressing, on the other hand, improves plant food availability and N uptake, eliminates N tie-up in surface residues, and reduces water runoff and associated contamination. Placing UAN in the root zone where plants can feed on it throughout their life cycle can boost yields and profit potential.

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