

Does Extra Nitrogen Pay?

Researchers Find "When" And "Where" May Be More Important Than "How Much"

RACINE, Wisc. — Without nitrogen, life would not exist.

In the atmosphere, the odorless gas neutralizes oxygen's flammability. In fact, nitrogen accounts for 78 percent of each breath you take. It also is an essential building block of protein. Every cell in your body contains nitrogen.

In agriculture, researchers long ago recognized nitrogen's importance. They also learned that extra nitrogen boosts corn yields in particular.

Today, corn farmers aren't the only producers relying on more nitrogen. Grain, cotton and rice growers all find they can increase yields with more N.

However, much of this nitrogen never hits its target. In corn, more than half of applied N is generally lost through leaching, erosion, denitrification or volatilization.

At least part of this loss, researchers suspect, can be avoided. Farmers can do more to maximize nitrogen efficiency. And in many instances, they can get by with smaller doses.

Midwestern researchers often agree with that assessment. Says Dr. Jim Schepers, a USDA soil scientist in Lincoln, Neb., "Farmers are too optimistic about production, and that leads to over-fertilization. Even with irrigation, they over-estimate production by 20 to 25 percent."

It pays to use only enough of any nutrient to guarantee an economic return, say Schepers and other scientists. There's no such thing, they add, as a universal nitrogen recommendation for a particular crop.

Nitrogen needs
To determine the best rate, you

need to consider the environment.

Where a crop grows makes a difference in its nitrogen requirements. A specific field may hold a larger nitrogen stockpile than you suspect. The amount of available N also is influenced by the soil type, recent weather, the field's cropping history and even your regional location.

For example, researchers are finding that crop rotation with soybeans has a different effect on the N requirements of midwestern and southern corn.

In the South's sandy Coastal Plains soil, beans fix enough atmospheric N to leave 15 to 50 pounds per acre for other crops. By contrast, Midwest soybeans often consume more soil nitrogen than they fix.

"Compared to more northerly states, we have far less N in our soils, and that forces beans to fix their own supply," explains Dr. Patrick Hunt, a USDA soil scientist based in Florence, S.C. "In the Midwest, where there's generally more N in the root zone, plants rely on the soil for up to 70 percent of the requirement. They still fix some nitrogen, but not enough to make up for what's hauled off with seed."

"Southern farmers can't count on all that N staying with them because some of it leaches. But enough remains — especially after a healthy bean crop — to make a contribution."

If a southern farmer follows soybeans with a winter grain crop, the fixed nitrogen might take the place of a fall N application, says Florida researchers. "Corn planted the next spring, however, still may need a planting-time nitrogen application," reports Dr.



Maximizing the efficient use of nitrogen means paying close attention to the timing of application, placement of N and crop rotation.

David Wright, a Florida Extension agronomist.

Timing is a key

When you apply nitrogen can be as critical as how much you apply. Crops require larger nitrogen portions during certain key periods. By splitting applications, leaching or volatilization also is reduced.

In shooting for high wheat yields, farmers and crop scientists find best results when they apply

spring nitrogen in two or more trips.

Ed Oplinger, University of Wisconsin agronomist, schedules three applications in his plan for 100-bushel wheat yields. At planting, he puts down 25 to 33 percent of his total nitrogen. Then at the tillering and grain-filling stages, he top-dresses another 25 to 50 pounds.

Again, regional differences can influence timing. In Florida,

shorter growing seasons crowd wheat's nitrogen requirements into a briefer period. As Florida wheat yields move into the 90-bushel range, Wright needs only two applications — 25 pounds at planting with 75 to 100 pounds to follow in late January or early February.

On the other hand, corn has a longer growing cycle and requires three N treatments. Wright

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