

# Fall Applied Nitrogen On Cornfields Likely Still There

COLUMBIA, MO.

**M**issouri farmers who applied nitrogen to cornfields last fall need to know that heavy rains this spring do not necessarily mean high nitrogen fertilizer losses. A cool winter and below-average spring soil temperatures are limiting nitrogen loss, said University of Missouri Extension specialists.

"Soils are still too cold to have denitrification," said John Lory, MU Extension nutrient management specialist. "In Missouri soils, if nitrogen is not leaching, there is little chance for nitrogen loss right now."

Spring is normally when soils are most at risk for nitrogen loss due to rain and warming soils. But this year cool soils have slowed the usual pathways for nitrogen loss.

Anhydrous ammonia is the typical nitrogen fertilizer farmers apply during fall. When injected into cold soil, it is not prone to loss by leaching or denitrification. Leaching only happens after soil bacteria have converted the ammonium into nitrate, and the cold winter has slowed this process, said Peter Scharf, MU Extension nutrient management specialist.

"The soil bacteria get energy they need through the process; that's what they eat," he said. "But how fast that happens depends on soil temperature."

Lory said that farmers who waited until late November to apply nitrogen are probably still in good shape. Those who applied nitrogen in October or earlier may have lost some nitrogen due to leaching from these spring rains.

"If farmers waited until the average daily six-inch soil temperature was below 40 degrees, there is little chance for overwinter losses," Lory said.

"It's when soil temperatures are in the 60 to 70 degree range when rapid nitrogen loss happens," he said. "A late spring saturation event lasting three or four days is really when we see nitrogen loss from denitrification take off."

When soils are cooler than about 50 degrees, as they have been, the soil bacteria slow down, leaving most nitrogen in its ammonium form. "If you have water flushing through the soil, ammonium will stay in the soil," Scharf said. Nitrate, by contrast, moves easily with water because it is not attracted to the soil.

While Scharf cautions that the potential for nitrogen loss is region-specific, he said cool temperatures will help farmers everywhere. "Warm and wet conditions cause the most nitrogen loss," he said.

Because rainfall in northwestern Missouri has been moderate, nitrogen losses on poorly drained soils are likely not high, he said.

"By April 1, about 60 percent of ammonium in the soil would already be converted to nitrate in normal years," he said. "This year, maybe only 40 percent has converted because of the cool weather."

Nitrogen applied in fall to well-drained soils is still vulnerable to future rains, said Scharf. Farms in northeastern Missouri are at greater risk of losing fall-applied nitrogen due to heavier rainfall. However, many soils in northeastern Missouri have a high clay content and tend to be poorly drained. Clay limits water movement and lessens the risk of leaching from heavy rains, Scharf said.

"The question is whether this slow movement of water and nitrogen is enough to cause serious nitrogen loss," he said. "I suspect it's not, even though it's wet." Δ