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Fluids Whip Granular In Nitrate-N Runoff Comparisons

Georgia study suggests that fluid fertilizers have less tendency of runoff when a heavy rainfall occurs.

Summary: *Significant losses of nitrate-N were measured when excess rainfall occurred following fertilization on a conventionally-tilled loamy sand Coastal Plain soil, even when granular fertilizer was incorporated into the surface 6 inches. However, urea-ammonium-nitrate (UAN) sidedressed as a band on the surface, at a greater N rate than the incorporated granular fertilizer, did not appear to increase NO_3-N runoff. One possible explanation is the growing corn crop rapidly absorbed the nitrogen (N) (especially the NO_3-N) applied at sidedress. However, a more feasible explanation is that fluid fertilizers that are rapidly absorbed in the soil have less of a tendency to run off when a heavy rainfall or irrigation occurs shortly after application. In such a condition, undissolved granules can be swept downhill with moving water. This is especially true when wheel tracks are made in the direction of the slope.*

Runoff of nitrate from cropland can enhance eutrophication of fresh waters and hypoxia in sea water. Factors cited that control runoff losses include:

- Soil characteristics
- Ground cover
- Residual fertility
- Slope and tillage
- Timing
- Quantity and method of application of fertilizers
- Intensity, quantity, and timing of rainfall.

In our search, no literature was found that indicates that fertilizer form (solid or fluid) is a factor in runoff. However, some low losses were found following the application of fluids in experiments conducted in small boxes of Coastal Plain soils. Therefore, we conducted this study partially to determine if there appeared to be any differences in the runoff from granular and fluid-N fertilizers.

FLUIDS MORE STABLE

Total nitrate-N losses in the six runoff events averaged 2.4 lbs/A/yr (1.6% of the 150 lbs/A of N applied). Greatest nitrate-N concentrations in runoff occurred the day following application of the granular di-ammonium phosphate fertilizer (Figure 1). No increase in nitrate-N concentrations or losses was found one day following sidedressing UAN on day 28. Considering the volume of runoff, 0.8 lbs/A of N (1.8% of N applied as granular) was lost in runoff one day following planting. The loss was 0.45 lbs/A of N on day 29, one day following sidedress dribble with fluid N. That loss was 0.5 percent of

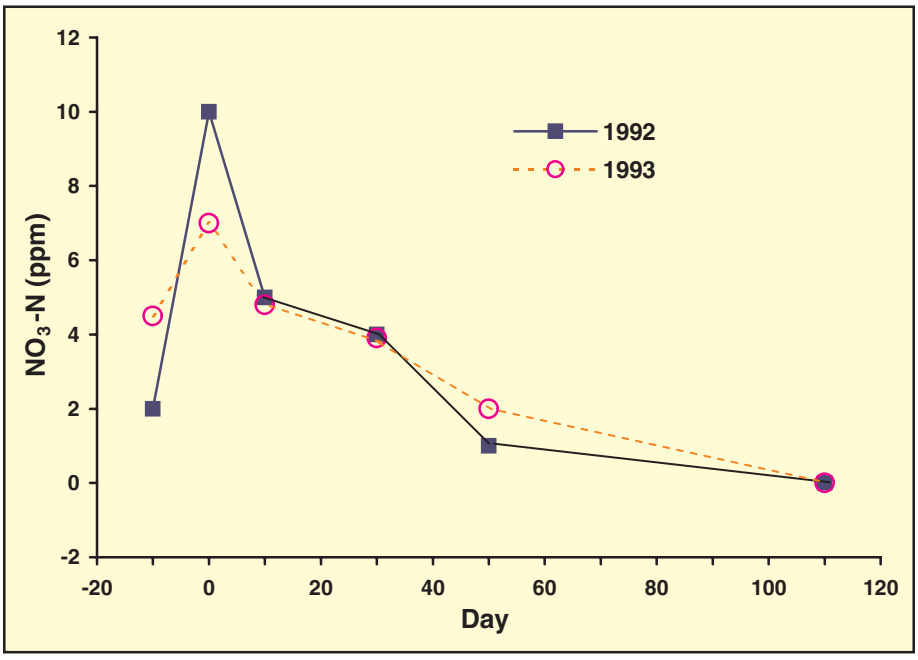

Figure 1. Nitrate-N concentration in runoff one day following each of six 2-inch rainfalls, 1992-1993.

the N applied as fluid N and 0.3 percent of the total N applied during the year.

Such results suggest that fluid fertilizers, which are rapidly absorbed in the soil, have less tendency to run off when heavy rainfall or irrigation occurs shortly after application In such a condition, undissolved granules can be swept downhill with moving water. This is especially true when wheel tracks are made in the direction of the slope.

METHODOLOGY

Soil. Study was conducted for two years on a Tifton loamy sand with a slope of 4.5 percent on meso-scale (0.15-acre) plots.

Irrigation. We simulated rain at one inch/hr for two hours, eight days prior and 1, 14, 29, 49, and 108 days following fertilization and planting of corn.

Fertilizer/placement. The day of planting, experimental sites received 45 lbs/A of N, 50 lbs/A of P, and 112 lbs/A of K as granulated fertilizer broadcast and incorporated to a depth of 6 inches. The N and P were applied as granular di-ammonium phosphate (18-46-0). An additional 105 lbs/A of N was surface dribbled as 30-0-0 UAN 28 days following planting.

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