Nitrogen Applications and Residue Decomposition[1/]

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Summary

Growers have questions about the need for and potential benefits from fall nitrogen (N) additions to increase residue decomposition rates. Potential advantages of more rapid decomposition include increased N release and possibly higher early season soil temperatures in no-till corn systems. In a 3-yr field experiment, ammonium sulfate (AS) and urea-ammonium nitrate solution (28% UAN) were applied to corn residues in November at 30 lb N/acre. Other N treatments included 100 lb N/acre as AS applied in the fall and spring and various combinations of spring and fall N to provide a total of 190 lb N/acre. Initial corn residue amounts ranged from 5600 to 7000 lb dry matter per acre. In 1999 and 2000, time and source of N application and residue chopping did not affect N mineralization, residue decomposition, or soil temperature. In 2001, residue decomposition measured in June was increased by fall N treatments, but did not affect N mineralization or soil temperature. Preplant soil nitrate and residue N content were lower in 2001 than in other years. In addition, the extent of residue decomposition from November to the following September was lowest in 2001. Collectively, these factors suggest that N applications in fall 2000 may have furnished N to stimulate residue decomposition in an otherwise N deficient environment.

Nitrogen rate affected yield in all years. Yield was also affected by N timing and N source treatments, suggesting N loss from fall treatments and ammonia volatilization from surface-applied UAN. About 60 to 70% of the residue decomposed during the November to September period, largely due to carbon losses. Decomposition was accompanied by changes in residue N content and a decrease in residue C/N ratio. From a production perspective, fall N applications to promote corn residue decomposition did not improve no-till corn yields and do not appear to be justified. Fall N did not consistently increase residue decomposition, and did not influence soil temperature or N mineralization. Fall N was also subject to over winter loss in some years. Ammonium sulfate was a more effective N source than UAN when surface applied in no-till systems.

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