

University of Kentucky UKnowledge

Soil Science News and Views

Plant and Soil Sciences

12-1987

Nutrient Losses From Conventional and No-Till Cornfields

Robert L. Blevins University of Kentucky

Wilbur Frye University of Kentucky

Click here to let us know how access to this document benefits you.

Follow this and additional works at: https://uknowledge.uky.edu/pss_views



Part of the Soil Science Commons

Repository Citation

Blevins, Robert L. and Frye, Wilbur, "Nutrient Losses From Conventional and No-Till Cornfields" (1987). Soil Science News and Views.

https://uknowledge.uky.edu/pss_views/42

This Report is brought to you for free and open access by the Plant and Soil Sciences at UKnowledge. It has been accepted for inclusion in Soil Science News and Views by an authorized administrator of UKnowledge. For more information, please contact UKnowledge@lsv.uky.edu.



Department of Agronomy

Soil Science News & Views



Vol. 8, No. 12, December 1987

Nutrient Losses From Conventional and No-Till Cornfields

R.L. Blevins and W.W. Frye

Farmers must be concerned about both the monetary loss and the threat of groundwater and surface water pollution associated with the loss of plant nutrients from their fields. There is also an increasing public concern about pollution and the role of agriculture in nonpoint-source pollution. Movement of water over the surface of the soil as well as through the soil profile increases the potential for loss of water-soluble nutrients, especially nitrates.

The tillage system affects the amount of water moving over the surface and through the soil. Plowing has the short-term effect of enhancing the rate of water moving into the soil. However, after several rains, the soil settles and a crust may form at the surface. Long-term studies of no-tillage and conventional tillage often show greater infiltration in the relatively undisturbed no-tillage soil.

Since fertilizer is usually applied on the surface of notillage soil, there is a threat of greater losses under notillage, especially if heavy rainfall occurs shortly after fertilizer application. Also, in no-tillage, non-mobile nutrients tend to remain near the soil surface where they are usually bound to soil clay and organic matter. On the otherhand, no-tillage and other conservation tillage practices reduce soil sediment and water runoff losses.

Studies at the Agronomy Research Farm at Lexington since 1984 on a Maury silt loam soil show that nitrate and soluble phosphorus concentrations in the runoff water were sometimes greater from no-tillage than from conventional tillage corn plots. However, the mean values (Table 1) of all events measured

The College of Agriculture is an Equal Opportunity Organization with respect to education and employment and authorization to provide research, education information and other services only to individuals and institutions that function without regard to race, color, national origin, sex, religion, age and handicap, Inquiries regarding compliance with Title VI and Title VI of the Civil Right Act of 1964, Title IX of the Educational Amendments, Section 504 of the Rehabilitation Act and other related matter should be directed to Equal Opportunity Office, College of Agriculture, University of Kentucky, Room S-105, Agricultural Science Building-North, Lexington, Kentucky 40546.

COOPERATIVE EXTENSION SERVICE U.S. DEPARTMENT OF AGRICULTURE UNIVERSITY OF KENTUCKY COLLEGE OF AGRICULTURE LEXINGTON, KENTUCKY 40546

AN EQUAL OPPORTUNITY EMPLOYER

BULK RATE
POSTAGE & FEES PAID
USDA
PERMIT No. G268

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, \$300

during this study were higher for the conventionally tilled treatments. The highest concentrations were measured in runoff that occurred shortly after fertilizer application.

Total runoff losses of nitrate and soluble phosphorus were very small on this well-drained limestone soil, representing less than 1% of the amount of fertilizer applied. Thus the economic loss directly related to surface runoff of nitrogen appears to be negligible. Concentrations of nitrate were higher than the critical level of 10 ppm N set by Environmental Protection Agency on a few rainfall events following fertilizer applications. However, the mean of 5 to 6 ppm N is well within safe levels for human or animal consumption. Furthermore, the nitrate level is likely to be diluted further before reaching a stream. Deep leaching losses may be a greater threat on the well-structured limestone soils than surface runoff and sediment losses. Since no-tillage decreases surface runoff and increases infiltration, the additional percolating water may result in more leaching of nitrate.

Table 1. Nitrate and soluble phosphorus losses from soil erosion plots at Lexington, Ky. (June 1984 to April 1987)

Mean Concentration			Total Losses	
Conventional	<u>No-tillage</u>		Conventional	<u>No-tillage</u>
ppm			1b/ac	
		Nitrate-N		
6.0	4.6		1.78	1.57
		Phosphorus		
0.74	0.68		0.42	0.23

Kernetth Wells
Extension Soils Specialist