Nitrates in Soil Water in the Corn-Rye Cropping Sequence

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Application of nitrogen fertilizers to already nitrogen rich corn fields could lead to nitrate pollution of groundwater. An experiment was conducted at South Deerfield to study the effect of nitrogen fertilizer residue and also nitrate-N concentration in groundwater following a rye cover crop.

Ammonium nitrate at the rate of 0, 50, 100, 150 kg/ha was applied to field corn, half at planting and the remainder as a side dress when corn was approximately 12" tall. After corn harvest, the plots were divided into two equal halves. Rye was sown in one half and the other was left fallow. Suction lysimeters were placed in each plot at a depth of 2 feet.

Silage yields were not significant among different rates of nitrogen (Table 1). A possible reason could be high availabilty of soil nitrogen from mineralized soil organic matter. The corn was planted late into a warm soil when available mineralized soil nitrogen would be greatest. Rye dry-matter accumulation in the following spring also did not show any significant differences among the treatments except the zero N yielded less (Table 1).

The water samples collected in the fall season showed significant differences in nitrate N concentrations with cover crop and without cover crop, and also at different rates of nitrogen (Figure 1). Nitrate N concentrations in water samples were higher wherever there was no cover crop and/or higher rate of nitrogen fertilizer. These results indicate a cover crop following corn would utilize some of the residual soil nitrogen, and this could reduce potential groundwater contamination.

Table 1. Silage yield and rye dry-matter accumulation in corn-rye cropping sequence

Nitrogen rate	Corn silage# t/ac	Rye dry-matter lbs/ac
0	20.74	3404.6
50	20.10	5589.6
100	20.98	5181.4
150	19.64	6279.6
trend	n.s	quadratic

adjusted for early (immature) harvest date.

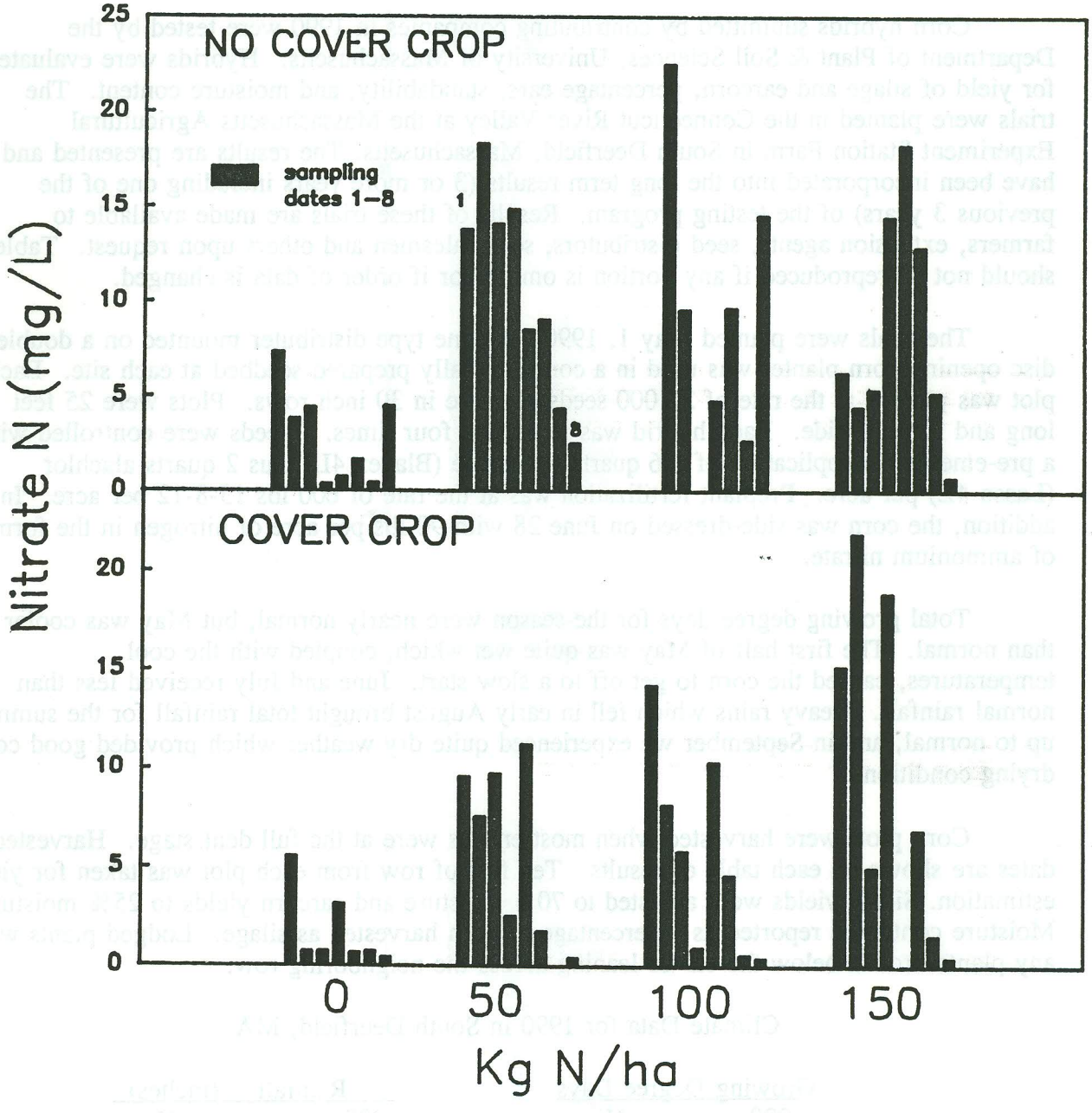

Figure 1. Concentration of Nitrate N (mg/L) in water samples under cover crop and no cover crop system after corn (Sept.13 to Nov.28)