

ENVIRONMENT

Title: Impact of Liquid Swine Manure Application on Surface and Ground Water Quality – **NPB# 98-244**

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Abstract

Field experiments were conducted to determine the effect of liquid swine manure application on crop yields and surface and groundwater quality by using a recommended rate of 168 kg-available N/ha (150 lb-N/ac), based on a yield goal of 9.8 Mg/ha (155 bu/ac), in a corn-soybean rotation, compared to a double application rate of 336 kg-available N/ha (300 lb-N/ac). In addition, long-term effects of late winter broadcast, and spring and fall inject methods of liquid swine manure application on nitrogen, phosphorus, and bacteria concentrations in surface runoff and shallow groundwater were also studied..

The results of this study showed that in 1997, winter broadcast and spring inject treatments for manure applications yielded significantly higher flow weighted average $\text{NO}_3\text{-N}$ concentrations in subsurface drainage water at the 336 kg-N/ha rate than at the 168 kg-N/ha, while the fall manure application treatments showed no significant differences between $\text{NO}_3\text{-N}$ concentrations in tile water. The fall slot inject plots yielded statistically similar $\text{NO}_3\text{-N}$ concentrations in tile water at both application rates. These $\text{NO}_3\text{-N}$ concentrations in drain water did not differ significantly from those produced by the commercial UAN treatment and are slightly lower than those produced by the standard fall manure inject treatments. The fall manure inject at a rate of 336 kg-N/ha treatment actually resulted in lower $\text{NO}_3\text{-N}$ concentrations than the fall manure inject at a rate of 168 kg-N/ha. No significant differences in $\text{PO}_4\text{-P}$ concentrations in subsurface drainage were found between treatments in 1997. Because phosphorus is relatively insoluble, it is not surprising that manure treatment did not significantly impact $\text{PO}_4\text{-P}$ levels in subsurface drainage. In 1998, $\text{NO}_3\text{-N}$ concentrations in subsurface drainage from manure plots were generally higher than the previous year. Total N mass losses followed the same pattern as average flow weighted $\text{NO}_3\text{-N}$ concentrations during 1998. Double N rate treatment values generally exceeded the corresponding single N rate treatment value. The winter manure broadcast 336 kg-N/ha treatment yielded the highest N losses, while the fall and spring manure inject 168 kg-N/ha treatments yielded the lowest N losses.

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