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FATE OF NUTRIENTS DURING THE COMPOSTING OF YARD AND AGRICULTURAL WASTES

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Descriptors: Animal waste; denitrification; nitrogen; soil-water relationships; water quality management.

Problem and Research Objectives:

Nitrate, the end product of the aerobic decomposition of organic nitrogen, is easily transported through the soil and into the ground water, and therefore, poses a threat to ground water quality. This research addressed the following questions:

- How much, at what rate, and in what form is nitrogen lost during the composting process?
- Which modes of transport (dissolved or gaseous) are most important?
- What changes in the nitrogen budget are attributable to clear cutting alone and what are attributable to the composting process?
- What is the potential impact of nitrogen losses from the composting facility on ground water quality?

Principal Findings and Significance:

Results to date (continued in FY 1994):

The pH of the composting waste ranged from 8.0 to 9.0. Measurements of pH collected over the sampling time showed approximate ranges from 4.5 to 5.5 in the forested and cleared areas, which is typical of forest soils in this area. In the composting area, pH measurements steadily increased, with ranges of 6.0 to 7.5 in the soil adjacent to the windrow and 7.0 to 8.0 beneath the windrow. Measurements of electrical conductivity show this same effect, with measurements in the forested and cleared areas very similar, approximately 50 to 75 mS/cm, while measurements in the composting area were very elevated, approximately 1000 mS/cm beneath the windrow. These field parameters clearly indicate the movement of contaminants from the composting waste into the nearby soil.

Preliminary mass balance calculations indicated that the major nitrogen losses were in the form of dissolved nitrate and as gaseous N2O. One of the objectives of the continuation of this study was to determine the significance of gaseous ammonia losses relative to the other nitrogen losses.