

LATE-SEASON FERTILIZATION EFFECTS ON NITRATE LEACHING

Kentucky bluegrass LAWNS

University of Connecticut, Storrs, CT 1996-1999
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INTRODUCTION: Late-season fertilization of lawns with N is a common practice in southern New England during late fall (October through November). Turf quality and rooting characteristics may benefit from this practice, but the potential for nitrate (NO_3) leaching at this time may be higher than if N-based fertilizers are applied before October.

OBJECTIVE: To determine the NO_3 -N concentrations and losses from turfgrass managed as lawn with a late-season application of various forms of N.

MATERIALS and METHODS: Zero-tension funnel lysimeters (250 mm diameter) were installed at 38-cm depths below non-disturbed soil profiles in plots of a mixed cool-season turf managed as a lawn. The primary turf species were Kentucky bluegrass (*Poa pratensis*), perennial ryegrass (*Lolium perenne*), and creeping red fescue (*Festuca rubra*). Plots were mowed to a height of 3.8 cm and clippings were not removed. The experiment was initiated in October 1996 and concluded in April 1999. Results reported represent average scores from seven (7) different golf courses in Connecticut.

Three different forms of nitrogen were applied:

| | |
|------------|-----------------------------------------------------------------------------|
| AN | ammonium nitrate (soluble) |
| SCU | sulfur-coated urea (slow-release) |
| ORG | Sustane Natural Fertilizer organic composted product, (slow-release) |
| NFC | non-fertilized control included |

Fertilizers at the rate of 49 kg N/ha were applied on: 28 Oct. 1996, 8 May 1997, 23 July 1997, 13 Nov. 1997. Percolate drained from the lysimeters into PVC collection wells. Samples were collected from the wells and analyzed for concentrations of NO_3 -N using a Cd-reduction method on a continuous-flow analyzer. Concentration data were statistically analyzed using a rank transformation approximation: data were ranked then subjected to analysis of variance. Mean ranks (which approximates the median) were separated using Tukey's test ($\alpha = 0.05$).

RESULTS (1998-99 results attached)

Percolate flow was correlated with rainfall and snowmelt. In 1997, no percolate was collected during the growing season and through December because of below-normal precipitation. Percolate flow resumed in January 1998.

1. Nitrate concentrations and losses were greater for AN than for SCU, ORG, or NFC (Fig. 1, 2). Greatest concentrations and losses of NO_3 -N occurred after the last N application in the late fall.
2. Peak NO_3 -N concentrations in the percolate were 15.7 mg/L for AN, 3.0 mg/L for SCU, 5.2 mg/L for ORG, and 1.3 mg/L for NFC (Fig. 3). Across 2 yr, median concentrations of NO_3 -N in the percolate were 2.32, 0.15, 0.075, and 0.025 mg/L for AN, SCU, ORG, and NFC, respectively.
3. After subtracting out losses associated with the NFC, NO_3 -N losses as a percentage of N applied across 2 years were 17.6% for AN, 2.0% for SCU, and 1.6% for ORG, Sustane (Fig. 4)

CONCLUSION: There is greater potential for nitrate (NO_3) loss to ground water with soluble N-based fertilizers than with slow-release Sustane organic fertilizers when applied in the late season to lawns in southern New England.

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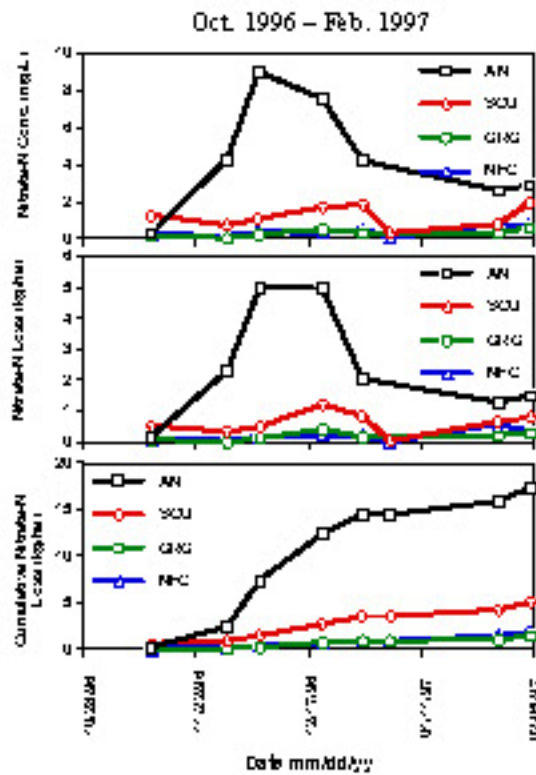


Fig. 1. Nitrate-N concentrations and losses from fertilized with 44 kg N/ha on 20 Oct. 1996. AN = ammonium nitrate, SCU = sulfur-coated urea, GFG = organic, NHC = non-fertilized control.

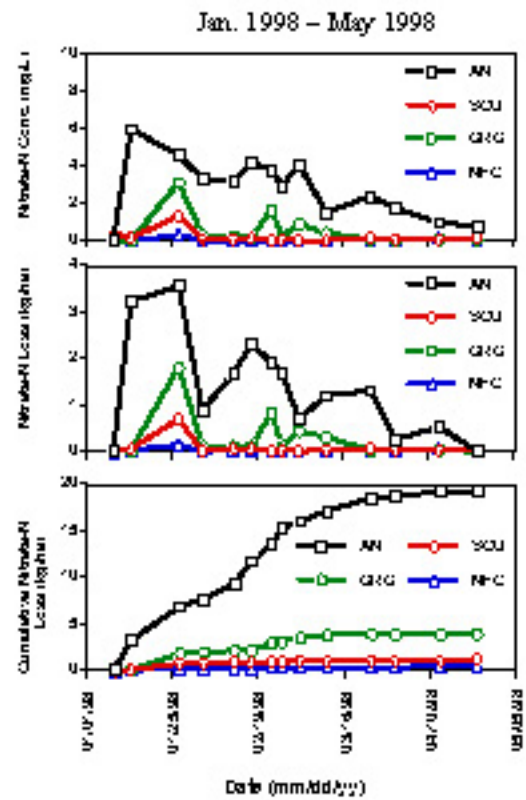
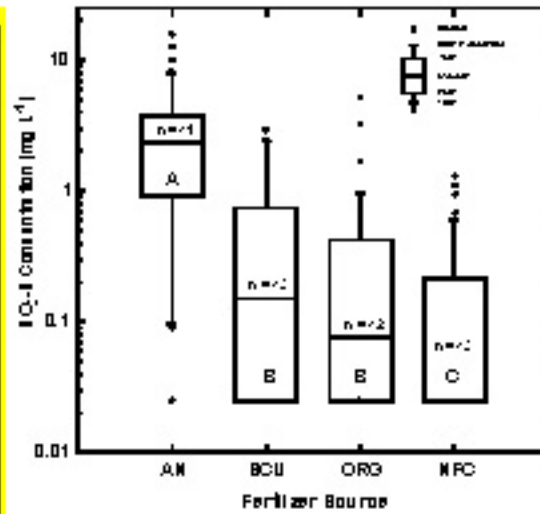
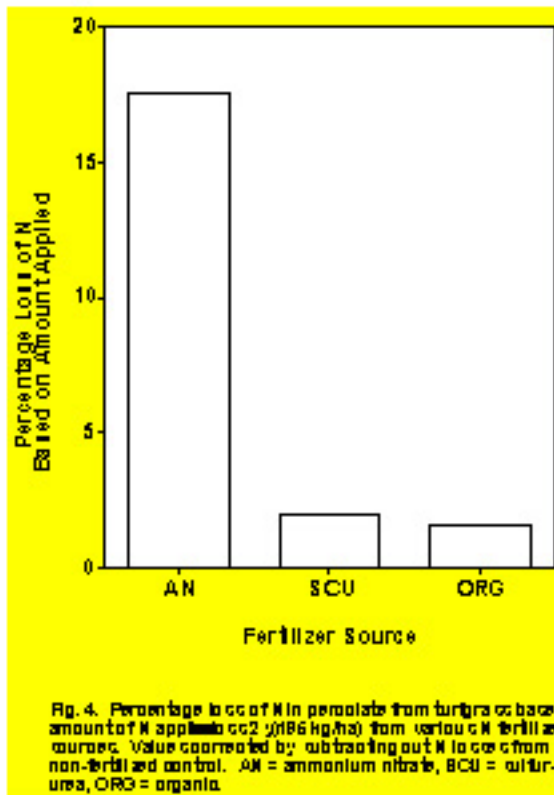


Fig. 2. Nitrate-N concentrations and losses from fertilized with 44 kg N/ha on 01 Nov. 1997. AN = ammonium nitrate, SCU = sulfur-coated urea, GFG = organic, NHC = non-fertilized control.



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University of Connecticut, Storrs, CT Department of Plant Science Nitrate-N concentration and losses by fertilizer source Jan. 1999 - April 1999

