Nitrate Leaching During Establishment Of a USGA Bentgrass Putting Green

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Introduction

The fate of fertilizers and pesticides applied to highly managed turfgrass is of concern. Nitrate (NO3) can be a public health concern if leached into ground water. It is important to understand if fertilizers applied to turf are leaching below the rootzone and into ground water supplies because of the public heath concerns related to NO3 in groundwater. Currently, the Environmental Protection Agency has set a limit of 10 parts per million of NO3 in ground water supplies.

Much effort has been spent over the last 15 years and data suggests that turfgrass is an excellent system to impede downward movement NO3. This is important considering the rates of fertilizers applied to turf range from approximately 43 to 258 lbs N per acre. Although the higher rates tend to be applied to putting greens grown on sandy soils, after establishment, the thatch layer provides a buffer to limit downward N movement. Therefore, even on putting surfaces grown on sandy soils with high water percolation rates, NO3 leaching has been shown to be minimal.

On newly established putting surfaces grown on sandy soils, thatch or organic matter is not present in quantities necessary to create the buffer as previously mentioned. At the same time, soluble fertilizers are applied frequently to compensate for the lack of deep roots to mine the soil for nutrients. In addition, water it applied multiple times during a day for growth and development of the seedling grasses. This scenario may present an opportunity for NO3 to leach.

The objective of this research project is to determine the potential for soluble fertilizers to leach through the profile of a USGA specification green with two different irrigation watering regimes during establishment of L-93 bentgrass seed.

Materials and Methods

Plots will be established on a USGA specification (88% sand:12% organic matter) putting green and seeded with L-93 bentgrass. Prior to establishment, two tension-based lysimeters were installed in each of six 10 by 10 ft plots. Irrigation will be supplied to each individual plot and separated with physical barriers that are inserted 12 inches into the profile.

Two irrigation treatments will be replicated three times; replace 80% of the calculated ET every two days minus rainfall inputs and irrigate daily with 20 minutes of water regardless of rainfall inputs. Fertilizers will be applied uniformly across all plots and will mimic typical grow-in recommendations made to golf course superintendents in Minnesota. Pesticides will be applied as need and plots will be mowed daily during the growing season at 0.188 inches with clippings removed.

Plots will be evaluated for turfgrass quality rated on a scale of 1-10 with 7 being minimal acceptance and percent ground cover during the grow-in. In addition, leachate-samples will be collected and analyzed for NO3, NO2, NH4 and total P using standard analytical procedures in the laboratory. Total volume of water that moves through the rootzone will also be determined using the lysimeters.

Results and Discussion

This experiment will commence in June, 2003 and will conclude in January, 2005.

(Editor's Note: Brian Horgan is an Assistant Professor in the Department of Horticultural Sciences at the University of Minnesota and Martin Burger and Rodney Ventura are USDA/ARS Soil Scientists located in St. Paul, MN.