

Characterization of Leaching at the Coeur d'Alene Golf Course Floating Green

Washington State University

William J. Johnston

Start Date: 1998

Number of Years: 3

Total Funding: \$32,000

Objectives:

1. *Quantify water flow and movement of NO_3 and NH_4 through a large-scale sand-based putting green under actual golf course conditions.*
2. *Demonstrate the effect of nitrogen fertilization and application methods on sand-based putting greens to promote environmental safety and support the highest level of turfgrass quality.*
3. *Explore monitoring root growth and water movement utilizing computerized mesorhizotron technology newly developed at Washington State.*
4. *Monitor movement of nutrients (other than N) and pesticides.*
5. *Develop water movement models and calibration in sand-based greens.*

This research is being conducted on the floating, 14th green at the Coeur d'Alene Resort Golf Course, Coeur d'Alene, Idaho, which allows for direct observation by the public. The project aims to enhance lines of communication between the golf course industry and the public and provide scientific research for the development of BMPs regarding N management in the Pacific Northwest.

A trapezoidal flume attached to the main drain line located below the back green-side bunker is used for sampling leachate and flow analysis. Leachate samples are taken daily and stored within an ISCO 6700FR refrigerated sampler at 34°F to insure sample stability, transported to WSU, and frozen until analysis (Alpkem segmented flow analyzer).

A foliar fertilizer, 24-0-24, was applied at 0.1 lb N 1000 ft⁻² every 7 to 10 days during the growing season. The total N applied annually is 4.0 to 4.5 lb N 1000 ft⁻². For research purposes, N rate was increased to 0.3, 0.6, and 0.9 lb N 1000 ft⁻² (one application at each rate) to observe the leachability of higher rates of N. The foliar fertilizer was applied at the rate of 0.3 and 0.6 lb N 1000 ft⁻² on August 5th and September 4th 1998, respectively. Scott's 26-4-13 with minors was applied at 0.9 lb N 1000 ft⁻² on April 8th, 1999, following spring aerification.

Analysis for $\text{NO}_3\text{-N}$ and $\text{NH}_4\text{-N}$ in the leachate indicated low levels of N. On a daily basis $\text{NO}_3\text{-N}$ ranged from 0.11 to 5.18 ppm, well below the EPA limit of 10 ppm and $\text{NH}_4\text{-N}$ levels ranged from 0.01 to 1.19 ppm. Low levels of $\text{NO}_3\text{-N}$ may be attributed in part to frequent foliar N applications. Increased rates of 0.3, 0.6, and 0.9 lb N 1000 ft⁻² had no noticeable effect on either the $\text{NO}_3\text{-N}$ or $\text{NH}_4\text{-N}$ leachate concentrations.

The daily bentgrass clipping N ranged from 2.98 to 5.64% with a mean of 4.53%. Low leachate concentrations combined with high leaf tissue (clippings) N suggests efficient N uptake by the plant.

In November 1998, micro-lysimeters were installed at three separate green locations (high and low contour sites, and a high traffic site). Micro-lysimeter N-leachate concentrations showed no differences among locations and were numerically comparable to concentrations from the whole green.

Low N leachate, accompanied by high clipping N from frequent, light fertilizer applications, suggests a low potential for negative environmental impact. The study will further demonstrate the high level of effort being placed on insuring minimal negative impact by the golf course industry on the environment.