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

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Objectives:

1. Quantify water flow and movement of nitrate and ammomium through a large-scale sand-based putting green under actual golf course conditions.
2. Demonstrate the effects of nitrogen fertilization and application methods on sand-based putting greens to promote environmental safety and support the highest level of turfgrass quality.
3. Monitor movement of nutrients (other than nitrogen) and pesticidies.
4. Develop water movement models and calibration in sand-based greens.

Start Date: 1998
Project Duration: 3 years
Total Funding: $32,000

The high sand content of golf greens creates a rootzone potentially prone to nitrogen (N) leaching. Research is being conducted on the floating green at the Coeur d'Alene (Idaho) Resort Golf Course, the green is essentially a large sand-based lysimeter.

Leachate flow, daily NO_3-N and NH_4-N concentrations, clipping dry weight, and clipping percent N are being monitored. Leachate samples are also collected monthly during the growing season (1999 and 2000) with suction microlysimeters installed in the green at high and low contour sites, and in a high traffic area.

Research objectives were to: 1) monitor leachate flow and quantify N concentration and amount in leachate, 2) determine if microlysimeter concentrations were correlated with those obtained from the whole-green system, and 3) determine if nitrogen application regimes on sand-based putting greens promote environmental safety while maintaining turfgrass quality. The project's overall goal is to provide scientific research for the development of BMPs regarding turfgrass management.

During 1998-1999, average NO_3-N and NH^4-N in the leachate were 0.9 (range 0.0 to 2.7 ppm) and 0.1 ppm (range 0 to 0.6 ppm), respectively. During the growing season the green is foliar fertilized at 0.1 lb. N/ 1000 ft^2 every seven to 10 days.

Additional applications of N (0.3 and 0.6 lb.N /1000 ft^2 applied in August and September, 1998, and 0.9 and 0.7 lb. N/ 1000 ft^2 applied in April and September, 1999, briefly increased leachate NO_3-N concentration and total amount of N leached following each application. However, NO_3-N never exceeded 1.9 ppm during a 60-day post-application period.

Highest amount of N leaching occurred, late fall and early spring, when flow was high and grass growth was minimal. Low NO_3-N and NH_4-N leachate concentrations combined with high clippings N (average N in clippings was 4.5%) suggest efficient N uptake by the plant.

Total recovered N was 67.3% (leachate, 13.2%; and clippings, 54.1%). Non-recovered N could be present in unavailable forms in both the soil and thatch with some potential loss to volatilization; however, it is believed not to be an environmental concern.

Microlysimeter NO_3-N concentrations were correlated with whole-green results during 1999, which indicates micro-
lysimeters have the potential to be used on golf courses to monitor N concentration in leachate. However, concentration differed by microlysimeter location on the green, which indicates exact placement of microlysimeters on golf greens is a consideration. Low leachate N concentrations and efficient plant uptake of N suggests low potential for negative environmental impact.

Graduate student, Christopher Kleene, removes samples taken from the auto-sampler housed within the floating green at Coeur d' Alene Resort Golf Course.

Summary Points

- Recovered 13% of applied nitrogen in leachate and 54% in clippings.
- Non-recovered N could be present in unavailable forms in both the soil and thatch with some potential volatilization loss, but it is not believed to be an environmental concern.
- Low NO_3-N and NH_4-N leachate concentrations combined with high leaf tissue N suggests efficient N uptake by the plant and a low potential for negative environmental impact.