Effect of Clipping Management on Nutrient Runoff from Kentucky Bluegrass Turf

By Brian Horgan, Troy Carson, and Pam Rice
University of Minnesota

Introduction

Recently, the State of Minnesota passed a law restricting the use of phosphorus fertilizers applied to turfgrass throughout the state (SF 1555). Exceptions to this legislation include applying P at time of seeding or establishment, need of P based on soil testing, and/or if you are a golf course personnel that has completed a training session. As an extension turfgrass specialist, I would not recommend the use of P unless during establishment or if a soil deficiency is present. Therefore, this new legislation makes sense to me except I'm not sure that the expected results will be obtained.

The debate about restricting P use to turf centered on the actual fertilizer applied to turf. Although a scenario can be created in which the actual fertilizer prill may runoff, sound agronomic practices will minimize or even eliminate this potential. One such scenario could be: apply fertilizer to a sparse turf population grown on a highly compacted soil that is saturated which receives a large rainfall event immediately following fertilization. Many of us can think of areas on our properties where this could occur. However, experience has shown that professional turfgrass managers who subscribe to sound agronomic practices would not risk loosing product from a runoff event. Your scenario would probably be: obtain a soil test, aerify twice a year, apply fertilizer to maintain good density, and coordinate your fertilizer application so that it can be watered in with irrigation, not a large rainfall event.

Because data does not exist to prove the movement of fertilizers applied to dense turf sward, other nutrient sources must be examined. Mowing is a primary cultural practice that we can not do without. Often times, we recommend recycling clippings as a future source of nutrients. Looking back at the previously described scenario that could lead to runoff of fertilizer, could clippings also move off that site into surface water? On sloped surfaces that directly feed to surface water bodies, should clippings be recycled or removed to possibly prevent nutrient runoff and surface water contamination?

The objective of this research will be to evaluate the effect of clipping management on nutrient runoff from Kentucky bluegrass turf. The following experimental design and treatment list will be evaluated:

Materials and Methods

Proposed area for runoff plot construction is at the TROE Center on the St. Paul campus. This area will be irrigated and is currently space that has been allocated for turfgrass research.

- Construct 24 runoff plots (8 ft by 24 ft), separated by dividers to ensure that runoff is from a known area, with a uniform 6% slope, at both locations.

- To simulate homelawn conditions, the topsoil will be removed, the subsoil compacted and the areas will be sodded with a Kentucky bluegrass blend.

- This will allow 8 treatments to be imposed with three replications. The proposed treatment list includes:

1) Control - no fertilizer applied, clippings removed
2) Only nitrogen fertilizer applied, clippings removed
3) Full-rate phosphorus and nitrogen, clippings removed
4) Double-rate phosphorus and nitrogen, clippings removed
5) Control- no fertilizer applied, clippings returned with recycling mower
6) Only nitrogen fertilizer applied, clippings returned with recycling mower
7) Full-rate phosphorus and nitrogen, clippings returned with recycling mower
8) Double-rate phosphorus and nitrogen, clippings returned with recycling mower

**potassium will be applied to those fertilized plots according to soil test results*

- A rainfall simulator/irrigation system will be designed and installed to simulate rainfall events.

- A sampling mechanism will be installed at the base of each plot to measure volume of water running off each plot and collect a subsample for analysis.

- Hand held TDR probe will be used to measure volumetric water content within each plot.

Results and Discussion

This research will begin in September 2003 and conclude in December 2006. Plots will be constructed this summer and available to tour at Field Day on July 24, 2003.

(Editor's Note: Brian Horgan is an Assistant Professor and Troy Carson is an Assistant Scientist in the Department of Horticultural Sciences at the University of Minnesota and Pam Rice is a USDA/ARS Soil Scientists located in St. Paul, Minnesota.)