

Controlling Nutrient Runoff From Golf Course Fairways Using Vegetative Filter Strips

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Objectives:

1. Investigate the influence of multiple vegetative filter strips for reduction of nutrient runoff.
2. Determine if irrigation and natural rainfall differ in propensity for nutrient runoff.
3. Study the impact of antecedent soil moisture and application timing prior to rainfall on nutrient runoff potential.
4. Investigate the potential use of the PRZM3 model for determining nitrogen fate under golf course conditions.

Start Date: 2000

Project Duration: 3 years

Total Funding: \$75,000

Maintaining golf course turf at acceptable levels requires relatively high inputs of plant nutrients and water. Golf course fairways often border lakes, ponds, and streams. The potential for nutrient contamination of surface water from these sites is a subject of increasing environmental concern.

Runoff occurs when precipitation rate exceeds soil infiltration rate. Compacted fine soils, common on golf course fairways, increase runoff potential by reducing infiltration rate. The resulting runoff may carry nutrients in solution or nutrients adsorbed to soil particles. The velocity of runoff also influences infiltration. As velocity slows, infiltration rate increases and physical filtering of chemicals and sediment in runoff increases.

The effect of multiple vegetative filter strips compared to a single vegetative filter to reduce runoff is being tested. In 2001 and 2002, studies will investigate runoff response to antecedent soil moisture and adjustments in time between fertilizer application and beginning of precipitation. Results of these studies may help build a predictive model for nutrient runoff on golf course fairways and support the effectiveness of filter strips.

Construction at the site is progressing. Projected target date for the completion of site construction is January 31, 2001. That provides sufficient time to test the irrigation system, collection equipment, and moisture sensing devices before the bermudagrass growing season begins in May 2001.



Runoff research conducted at Oklahoma State University continues to evaluate the effectiveness of grass buffer zones around ponds and creeks.

A time domain reflectometry (TDR 100) moisture sensing system was purchased from Campbell Scientific (funds provided by Oklahoma Agricultural Experiment Station) to monitor soil moisture content at the site.

TDR sensors will be connected to a multiplexer that will coordinate signals to a data logger at the research site. A computer in the turfgrass research center will poll the data logger continuously through a modem connected by underground cable.

Automatic runoff collection units were purchased from ISCO (funds provided by the Oklahoma Turfgrass Research Foundation) to collect runoff during periods of natural rainfall or rainfall simulation. Model 6700 samplers will pump water from calibrated flumes constructed by the Oklahoma State University Biosystems and Agricultural Engineering Department.

The samplers will collect water automatically in predetermined intervals. The flumes are calibrated to known water flow

rates. Sensors monitor the depth of water in the flumes and flow rate is calculated on that basis. When runoff occurs, the samplers are automatically activated by the sensors and collect up to 20 individual samples in five-minute intervals.

The flumes are continuously covered to prevent rainfall or irrigation entry. Water flows into the flumes through collection troughs at the base of each runoff plot.

Summary Points

- Construction at the site is progressing. Projected target date for the completion of site construction is January 31, 2001.
- A time domain reflectometry (TDR 100) moisture sensing system was purchased from Campbell Scientific (funds provided by Oklahoma Agricultural Experiment Station) to monitor soil moisture content at the site.
- Automatic runoff collection units were purchased to collect runoff during periods of natural or simulated rainfall.