

# Calibration of Computer Model Scenarios for Pesticide and Nutrient Runoff and Leaching in Turfgrass Environments

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## Objectives:

1. Conduct field investigations for pesticide offsite movement such that the data can be used to calibrate regulatory computer model scenarios for turf.
2. To calibrate PRZM/EXAMS scenarios for turf such that the scenarios can be used in tier-2 exposure assessments for turf pesticides.
3. To modify the code of PRZM, as necessary, based upon the collected data to best represent the turf environment.

Start Date: 2000

Project Duration: 3 years

Total Funding: \$75,000

The objectives of this year's research were to 1) complete analysis of water samples from golf course green leachate and fairway runoff and 2) compare modified turf scenarios used by EPA to data collected from fairway runoff.

A fairway with two catch basins was instrumented in February, 2001, and two greens were instrumented in April, 2001 with ISCO 6700 autosamplers outfitted with bubble flow modules. Oxadiazon (Ronstar) and dithiopyr (Dimension) were applied to the fairway in the spring and fall of 2001, respectively.

Fungicides applied throughout the year on the greens selected for monitoring were chlorothalonil (Daconil), propaconazole (BannerMaxx), and flutolanil (Prostar). Soil samples were collected following applications of herbicides and fungicides



Automatic samplers are used to collect fairway runoff water during rainstorm events.



Analytical methods developed to detect pesticides included both gas and liquid chromatography.

at depths of 0-2 cm (thatch), 2-15 cm, and 15 - 30 cm and at set time intervals thereafter. Water samples were collected during runoff events from the fairway or leaching events from the tile drains of the greens.

Analytical methods were developed for the analysis in water, soil, and thatch of all chemicals as well as selected degradation products of dithiopyr, chlorothalonil and propaconazole. Both GC/MS with chemical ionization as well as LC/MS with atmospheric pressure chemical ionization were used to monitor both positive and negative ions simultaneously.

During 2001, 242 soil samples were collected from greens and the fairway, and 542 water samples were collected across approximately 12 natural rainfall events. Highest loadings and concentrations in runoff or leachate were found in events occurring soon after application.

Degradation products were most commonly detected and at the highest concentrations in leachate indicating that degrada-

tion of the parent chemical was occurring in the greens. Parent chemicals were often detected at lower concentrations and accounted for a small percentage of the applied mass of the applied material. Pesticides were most heavily concentrated in the thatch, and remained so even after heavy rainfall or green flushing events.

PRZM3 model scenarios developed in early 2002 incorporating a thatch layer reasonably predicted data collected from small plots the previous year and was an improvement over scenarios that did not incorporate a thatch layer.

## Summary Points

- Applied pesticides were most heavily concentrated in the thatch.
- Pesticide dissipation from thatch and soil was generally due to degradation.
- Highest concentrations of pesticides in water were detected in those first runoff or leaching events after application.
- PRZM3 scenarios using a thatch layer resulted in better predictions of runoff behavior than those without a thatch layer.