# *Effect of Plot Size and Warm-season Grass Species on Turf Chemical Runoff*

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**Objectives:**

1. Develop and employ a standardized protocol to measure turf chemical runoff in different regions of the United States.
2. Determine the "scalability" of turf runoff events from field plot areas.
3. Determine if grass species impacts pesticide runoff for warm-season grasses.

**Start Date:** 2003
**Project Duration:** three years
**Total Funding**: $90,000

Predicting the environmental concentrations of pesticides used in urban settings requires knowledge of the factors affecting their transport. This on-going research is part of a larger effort designed to improve the understanding of turf hydrology and modeling of pesticide runoff from warm-season turf. Following a standardized field protocol, 2,4-D herbicide, flutolanil fungicide, and chlorpyrifos insecticide were co-applied to two grass species (bermudagrass and zoysiagrass) maintained as either golf course fairways or home lawns.

A conservative tracer (KBr) was separately applied immediately before each rainfall simulation began. The 3.65 meter x 9.14 meter plots had a slope of 3%.

*Simulated rainfall (3.5 cm/hour) was applied to the plots to generate runoff 24 hours after pesticide application.*

*Experiments are underway at Mississippi State University to measure runoff losses of 2,4-D herbicide, flutolonil fungicide, and chlorpyrifos insecticide.*

Simulated rainfall (3.5 cm/hour) was applied to the plots to generate runoff 24 hours after pesticide application. Runoff from the plots was collected at 5-minute intervals and analyzed by HPLC-UV. The limit of quantification for the pesticides was approximately 10 ppb.

To date, average runoff rates for the three pesticides in bermudagrass were 44% for 2, 4-D, 0.2% for chlorpyrifos and 8% for flutolanil. For zoysiagrass, 61% of 2,4-D, 0.2% chlorpyrifos and 7% flutolanil of the applied pesticides were lost in runoff. These results correlated well with the soil-water distribution coefficients that were determined for the Brooksville silty clay soil at the runoff site. The $K_{OC}$ values were 73ml/g for 2,4-D, 576 ml/g for flutolanil, and 3551 ml/g for chlorpyrifos.

Maximum observed concentrations in runoff for bermudagrass were 4470 ppb for 2, 4-D, 22 ppb for chlorpyrifos, 612 ppb for flutolanil and 36,974 ppb for bromide. Peak concentrations observed for zoysiagrass were 3316 ppb for 2, 4-D, 20 ppb for chlopyrifos, 404 ppb for flutolanil and 40,034 ppb for bromide. Formal statistical analysis of these data is on-going. Chemical analysis of samples collected from four medium-sized (6 x 24 meters) plots is also on-going.

## Summary Points

- To date, average runoff rates for the three pesticides in bermudagrass were 44% for 2, 4-D, 0.2% for chlorpyrifos and 8% for flutolanil.
- For zoysiagrass, 61% of 2,4-D, 0.2% chlorpyrifos and 7% flutolanil of the applied pesticides were lost in runoff.
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