

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.

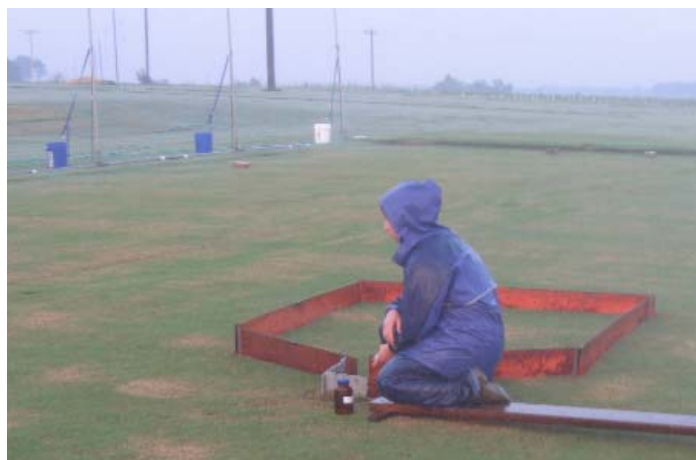
Following a standardized field protocol, 2, 4-D herbicide, flutolanil fungicide, and chlorpyrifos insecticide were co-applied to twelve 360 ft² plots consisting of two grass species ('Mississippi Pride' bermudagrass and 'Meyer' zoysiagrass) maintained at two mowing heights (0.6 or 2.0 inches). The pesticides were also applied to four 1,600 ft² plots and four 5,000 ft² plots consisting of 'Mississippi Pride' bermudagrass maintained at the above two mowing heights. Micro-plots (40 ft²) were also installed in each of the

5,000 ft² plots.

Simulated rainfall (3.5 cm/h) 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. All runoff samples were analyzed by HPLC, but data processing necessary to statistically compare the four plot sizes is on-going.

Preliminary statistical results comparing the small and medium-sized plots indicate that the percentage of applied 2,4-D herbicide measured in runoff was affected by mowing height, but not plot size. Flutolanil fungicide runoff was not affected by either mowing height or plot size. The percentage of chlorpyrifos insecticide in runoff was affected by mowing height but not plot size.

When comparing results from the small plots only, the cumulative volumes of runoff water and rising and steady-state slopes of the hydrographs did not differ between the two grass



Results to date suggest that pesticide properties (e.g., sorption into leaf cuticle or thatch) rather than hydrological differences between these grass treatments may be more important when determining pesticide runoff losses.

species or mowing heights. Thus, pesticide properties (e.g., sorption into leaf cuticle or thatch) rather than hydrological differences between these grass treatments may be more important when determining pesticide runoff losses although this may change after final analysis of study is complete.

Summary Points

- The effect of plot size on the amount of pesticide in surface runoff from bermudagrass is being determined using four plot sizes ranging from 40 to 5,000 ft². Preliminary results from two plot sizes (360 and 1,600 ft²) suggest that plot size does not significantly affect the percentage of applied pesticide in runoff.
- Small-plot (360 ft²) studies investigating the effects of two mowing heights and two warm-season grass species on pesticide runoff suggest that the relative importance of these factors depends upon the physicochemical properties of the pesticide in question.
- The wide range of pesticides used in these studies should aid in the refinement of simulation models used to predict pesticide runoff from warm-season turf.



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