# Evaluation of Best Management Practices to Protect Surface Water from Pesticides and Fertilizer Applied to Bermudagrass Fairways

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**Goals:**

- *Develop effective and practical management practices that protect surface water from runoff of pesticides and fertilizer applied to golf course fairways and other turf areas*

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This project represents a team effort of scientists in turfgrass science, soil fertility and chemistry, engineering, water quality, and statistics aimed at developing effective and practical management practices to protect surface water from the runoff of pesticides and fertilizer applied to golf course bermudagrass fairways.

In 1995, research was conducted to evaluate the influence of buffer-strip length, height, and verification on pesticide and nutrient runoff from bermudagrass turf. A manuscript describing the research was accepted by the Journal of Environmental Quality in November 1996.

In 1996, two experiments were conducted to further examine the effects of buffer-strip mowing height and buffer-strip length on pesticide and nutrient runoff from bermudagrass turf on a Kirkland silt loam (fine, mixed, thermic Udertic Paleustolls) on a 6% slope. In the mowing height experiment, treatments evaluated were buffer-strips (6-ft width x 16-ft length) mowed at 0.5, 1.5, and 3.0 inches.

In addition, a buffer-strip mowed at 1.5 inches was used as an untreated control to determine antecedent nutrient levels. In the length experiment, treatments evaluated were buffer-strips (6-ft width) measuring 0, 4, 8, and 16 ft in length and mowed at 1.5 inches. In both experiments, the area receiving pesticides and fertilizer (6-ft width x 16-ft length) was located upslope from the buffer and was mowed at 0.5 inches. Urea (applied in the mowing height experiment), sulfur-coated urea (SCU) (applied in the

buffer-strip length experiment), triple superphosphate, chlorpyrifos [granular (applied in the mowing height experiment) or wettable powder (applied in the length experiment)], and the dimethylamine salts of 2,4-D, mecoprop and dicamba were applied at recommended rates to each experiment. A portable rainfall simulator was used to apply a precipitation rate of 2.5 inches per hour for 75 minutes within 24 hours after chemical application.

Chlorpyrifos recoveries in the 1996 runoff samples were much lower than those found in 1995; consequently, chlorpyrifos data were not presented and the runoff samples will be reanalyzed using an enzyme-linked immunosorbant assay (ELISA) specific for detection of the insecticide.

In the mowing height experiment, the 3-inch buffer was most effective in delaying time to start of runoff and decreasing total runoff volume. Pesticide and nutrient losses to surface runoff were as great as 11% and 10%, respectively, from the 1.5-inch mowing height treatment. Overall, there appeared to be no advantage in mowing the buffer-strip at either 0.5 or 1.5 inches in terms of reducing pesticide and nutrient runoff. Although not statistically significant, the 3-inch buffer-strip mowing height was most effective in reducing pesticide nutrient runoff in July compared to the other treatments. However, in August, pesticide and nutrient recoveries in runoff water from the 3.0-inch buffer-strip treatment were equal to the other treatments. The positive effect of the 3-inch buffer was most likely overcome by higher soil moisture conditions and subsequent surface runoff of water in August compared to July.

Pesticide and nutrient loss to surface runoff was less than 7% in the buffer-strip length experiment. The differences in surface runoff losses between the two experiments were most likely due to differences in soil moisture caused by experiment location. The buffer-strip length study was positioned on the drier upslope from the mowing height study. Overall, data from this experiment reaffirmed that buffer-strips are effective in reducing pesticide and nutrient runoff. In addition, these data may be very useful for extrapolating effective buffer-strip lengths for testing on larger scale watersheds.

A reduction in nitrogen found in surface runoff occurred for SCU applied in the buffer-strip length study compared to urea applied in the buffer-strip mowing height study; however, these results may have been caused by differences in soil moisture between the experimental locations mentioned above.

Similar to 1995, results of the 1996 experiments confirm that use of buffer-strips, application of pesticides and fertilizers with lower water solubilities, and avoidance of pesticide and nutrient application when the soil is saturated all help to reduce chemical loss in surface runoff from turf.