THE FATE OF PESTICIDES AND FERTILIZER IN A TURFGRASS ENVIRONMENT
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The purpose of this research project is to study the fate of pesticides and fertilizers applied to turfgrass in an environment which closely resembles golf course conditions. The goal is to obtain information on management practices that will result in healthy, high quality turfgrass while minimizing detrimental environmental impacts. The proposed integrated research project has been designed so that all combinations of all treatments can be statistically analyzed. By simultaneously looking at interactions between soils, turfgrasses, irrigation amounts, pesticides, and fertilizers, questions about "best management practices" for turfgrass growth and maintenance will be able to be answered.

The specific objectives of the project are: 1) compare the leaching characteristics of pesticides and fertilizers applied to two turfgrass treatments; 2) study the effects of the soil type and irrigation regime on the leaching of pesticides, nitrates, and phosphorus; 3) compare the leaching and volatilization characteristics of nitrates from different fertilizers; 4) measure the volatilization rate of pesticides from turfgrasses into the atmosphere as a function of time since application; and 5) monitor the effects of different irrigation regimes, fertilizers, and soil types on the quality of the turfgrass.

The site consists of 36 plots, each measuring 12' x 12'. The fairway area consists of 24 plots, 12 each of two different soil types that were located randomly in the fairway area. A lysimeter assembly, consisting of 5 metal cylinders, was placed in the center of each of the 36 plots. The lysimeter assembly and drain system was fabricated using only metal so that there is no potential for pesticide adsorption. All turfgrass-soil type combinations were subjected to two irrigation regimes: 100% crop evapotranspiration (ETc) and 130% ETc. Two different fertilizers were used on the plots. One-half of the plots were fertilized with a urea, the other half were fertilized with sulfur-coated urea. The green and fairway plots received 1 and 0.5 lb N per 1000 ft² per month.

Weekly samples were collected from the drains and from soil-water samplers in each of the 36 plots and analyzed to determine the concentrations of nitrate-N, phosphate-P, 2,4-D, and carbaryl. The volume of water draining from each plot was measured to enable a calculation of the mass of pesticides and nutrients leached. The volatilization of two pesticides, carbaryl, and 2,4-D from the turfgrass surface into the air was also determined using volatilization flux chambers.

The results of this study indicate that little leaching of nitrate-nitrogen (generally less than 1% of the amount applied) was measured. Leaching of 2,4-D was very low in soils that contained some clay to adsorb the pesticide; however, up to 7.5% leaching was measured in sand. Less than 0.1% of the carbaryl leached, regardless of soil type. Irrigation amount did not significantly affect the amount of leaching of any of the chemicals. Little volatilization of 2,4-D was measured (≤ 1%) from any of the plots, although the difference in the amount volatilized was significantly different between the two turfgrass species used. Little volatilization of carbaryl was measured (≤ 0.05%) from any of the plots; no significant differences between the treatments occurred. Neither fertilizer type nor irrigation amount caused any significant differences in the quality of the turfgrass as determined by bi-weekly turfgrass ratings.