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## Pesticide and Nutrient Fate

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The concern over the environmental impact of applications of pesticides and fertilizers to golf course turfgrass has been growing steadily. The information on the fate of pesticides and nutrients applied to turfgrass, however, is encouraging but somewhat limited. The downside of previous studies is that they were conducted under a limited set of conditions (i.e., climates, soils, irrigation, pesticides, turfgrass species, etc.), leaving much room for speculation.

The purpose of these research projects is to evaluate the mobility, persistence, and ultimate fate of parent compounds and transformation products of commonly applied pesticides and nutrients. These studies will cover a wide range of golf course management factors, climates, and sampling methods which include: a) putting green soil mixtures (sand, sand/peat) and fairway soil textural classes (sand, loam, clay loam); b) thatch development; c) soil profile sampling depths; d) turfgrass species maintained under golf course conditions; and e) irrigation regimes.

Research projects (studies) specific to pesticides will produce results concerning: a) degradation rates for commonly used pesticides in several important turfgrass environments; b) conditions which enhance microbial degradation and which, in turn, decrease pesticide loads; c) adsorption coefficients for organic and inorganic materials as a function of residence time in the turfgrass environment; and d) a mass balance assessment of the fate of applied pesticides that takes into account the initial distribution among different turfgrass components (i.e., canopy, thatch, roots), drift, volatilization, soil, water, runoff, and leachate.

Nitrogen fertilizer studies will produce information on: a) the importance of factors which influence volatilization, denitrification, mobilization, immobilization, adsorption, plant uptake, and fixation, as well as b) the loss by surface runoff and leaching. Similar experiments are being conducted to determine the fate of phosphorous in the turfgrass environment.

### Cornell University

#### *Mass Balance Assessment of Pesticides and Nutrients Applied to Golf Turf*

The objective of this project is to more fully

understand the fate of pesticides and fertilizers applied to golf turf evaluated over a wide range of conditions.

Evaluated in this study were applications of mecoprop (applied in September, 1991) and triadimefon (applied in September and October, 1991) to a simulated creeping bentgrass fairway. A urea/methylene urea fertilizer containing phosphorus was also applied (1 lb N/1000sq. ft.) in September and October, 1991. These experiments are being conducted at the ARESTS facility (Automated Rainfall Exclusion System for Turfgrass Studies) which is composed of 27 draining lysimeters (12 ft. x 12 ft.), a rainout shelter, and irrigation and drainage collection systems. Factors evaluated were three soil textures (acid sand, sandy loam and silt loam) and two simulated growing season precipitation patterns (average and wetter-than-normal). In this case, rainfall patterns for 1950 and 1917 were used.

Measurements taken thus far include: clipping harvests on 12, 16, 18, 20, 23, 25, 27, 30 of September, and 2, 4, 7, 11, 16, 18 and 23 of October, 1991; and leachate from all or part of the lysimeters on 18, 19, 26, 30 of September and 2, 4, 5, 8, 10, 11, 12, 15, 20 of October, 1991. The leachate samples are being analyzed for the concentration of nitrate, ammonium, phosphate, mecoprop and triadimefon.

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### Michigan State University

#### *Groundwater Contamination Potential of Pesticides and Fertilizers Used on the Golf Course*

This project is designed to examine the leaching potential of nitrogen, phosphorus, and pesticides under realistic field conditions.

Four lysimeters (devices for the collection of soil water) have been installed at the Hancock Turfgrass Research Center on the Michigan State University Campus. These lysimeters are 10.8 ft.<sup>2</sup> in surface area and are 4 ft. deep. The soil within the lysimeters are intact cores that were not disturbed during the construction of the lysimeter. We believe that the data from these lysimeters will reflect conditions that occur naturally in the field, and that the data will give a clear picture of the