# Pesticide Leaching From Simulated Golf Course Fairways

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***There is an urgent need to understand what, if any, contribution pesticides applied to turfgrass have on groundwater quality.***

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The US EPA recently surveyed public and private drinking wells for the presence of pesticides. A surprisingly large number of well samples had pesticide or pesticide metabolite residues above detectable limits. Therefore, there is an urgent need to understand what, if any, contribution pesticides applied to turfgrass have on groundwater quality.

Golf courses are considered by many as a large user of pesticide. Many golf courses are irrigated and have highly sand soils on part of the course. These three factors (high pesticide use, irrigation and sandy soils) are important in pesticide leaching. Thus, golf course pesticide use has been a target for concern on environmental issues. To date, there has only been a few studies conducted to examine the extent of pesticide leaching from turfgrass sites. Though the results appear to be encouraging, these studies were done only with a few pesticides and on a limited number of soils. Therefore, the purpose of this study was to examine the leaching of three pesticides from several soils as influenced by precipitation from simulated creeping bentgrass fairways.

The site for the study was the ARESTS Facility at the Cornell University Turfgrass Field Research Laboratory, Ithaca, NY. The existing Kentucky bluegrass turf was killed and creeping bentgrass was over seeded in May, 1991. The site contains three soil textures (sand, Arkport sandy loam and a Hudson silt loam). Precipitation was applied during the growing season to provide at least 1"/wk of rainfall or irrigation. Two precipitation regimes were followed based on historic weather data for Ithaca, NY: an average precipitation pattern of "moderate" rainfall/irrigation and "high" precipitation pattern to simulate unusually wet years which are very conducive for leaching. Mecoprop (MCPP a broadleaf herbicide) and triadimefon (Bayleton, fungicide) were applied on Sept. 24, 1991. Triadimefon was reapplied on October 11, 1991. Trichlorfon (Dylox, insecticide) was applied on July 3, 1992. Any irrigation/rainfall event that caused water to drain from the plots was monitored for total volume of leachate and a subsample analyzed for pesticide residues.

Mecoprop and trichlorfon are considered highly leachable pesticides, whereas, triadimefon has a moderate potential for leaching. As expected, as shown in Tables 1 and 2 and Figures 1-3, the highly mobile pesticides (trichlorfon and mecoprop) when applied on a highly leachable soil (sand) resulted in substantial pesticide leaching. However, the extent of mecoprop leaching was not expected. This site was only four months old and the sand plots were sparsely covered with bentgrass. Thus, caution should be exercised when applying pesticides with thin turf and sandy soils if the pesticide has properties conducive to leaching. Also, the extent of trichlorfon leaching in all three soils was unexpected. This experiment will be continued in 1993 with further evaluation of mecoprop leaching.

**Table 1. Percent of total applied mecoprop (MCPP) and triadimefon in leachate.**

| Pesticide | Precipitation | Soil | | |
|---|---|---|---|---|
| | | Sand | Sandy Loam | Silt Loam |
| | | % of applied pesticide | | |
| MCPP | Moderate | 34.85* | 1.69 | 1.01 |
| | High | 73.76* | 0.10 | 1.26 |
| Triadimefon | Moderate | 1.00 | 0.06 | 0.24 |
| | High | 2.44 | 0.01 | 0.28 |

* Sample analysis incomplete

**Table 2. Percent of total applied trichlorfon found in leachate.**

| Soil Type | Precipitation | |
|---|---|---|
| | Moderate | High |
| | % of applied trichlorfon in leachate | |
| Sand | 1.2 | 3.4 |
| Arkport sandy loam | 1.1 | 4.4 |
| Hudson silt loam | 0.6 | 3.3 |

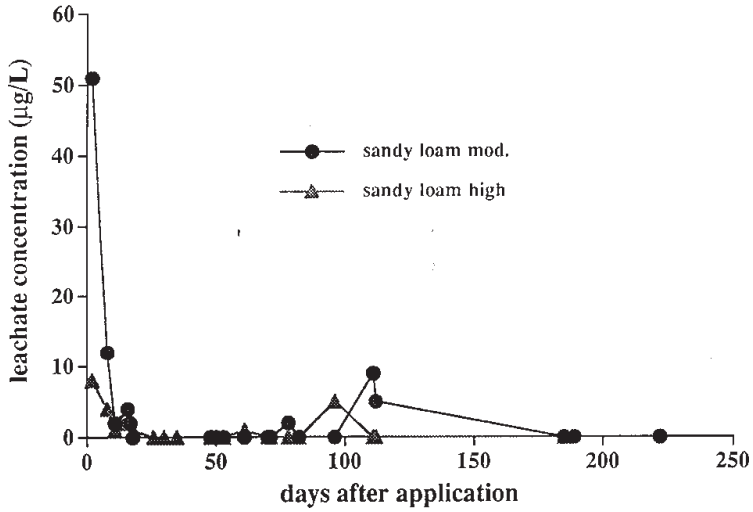


**Figure 1**

*The concentration of mecoprop in the leachate from **Arkport sandy loam** using moderate and high precipitation patterns.*

*Each point is the average of four replicates.*

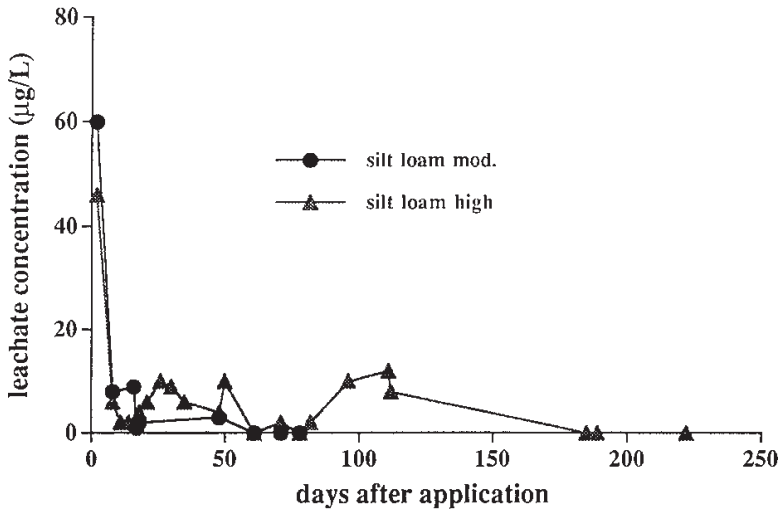


**Figure 2**

*The concentration of mecoprop in the leachate from **Hudson silt loam** following moderate and high precipitation patterns.*

*Each point is the average of four replicates.*

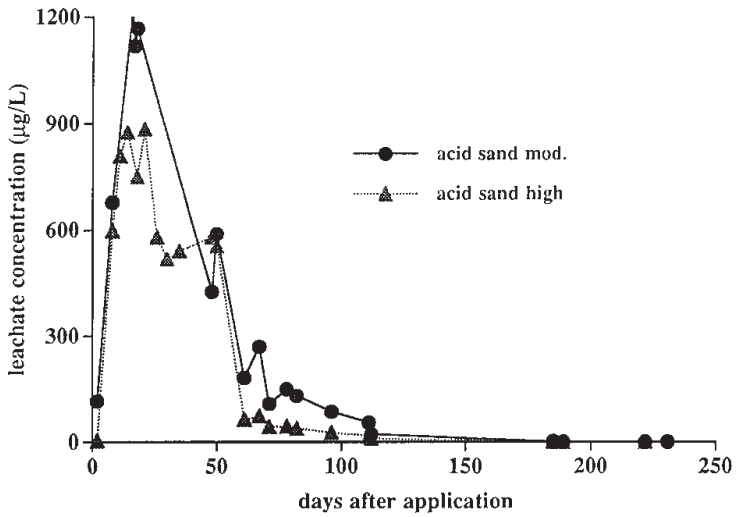


**Figure 3**

*The concentration of mecoprop in the leachate from **acid sand** following moderate and high precipitation patterns.*

*Each point is the average of four replicates.*