

An Assessment of the Risks Associated with Pesticides Volatilized and Dislodged from Golf Turf

George H. Snyder and John L. Cisar
University of Florida

Objectives:

1. Identify by survey golf practices and habits which lead to exposure from dislodged pesticides.
2. Quantify the amount of various pesticides dislodged, volatilized, and transferred during play.
3. Characterize the risk incurred by pesticide exposure while playing golf.

Start Date: 1998

Project Duration: 3 years

Total Funding: \$75,000

Pesticides will remain indispensable for golf course maintenance for some time in the future. However, public concern about pesticides and human health also will continue, and probably intensify. The principal modes of pesticide contact for golfers have not been identified, and the relative degree of contamination by various modes of contact have not been well quantified. Few studies have focused on dislodgeable residues and even fewer have carried the dislodgeability work on to consider the risks incurred by players.

This study is designed to identify the various exposure pathways of golfers and determine the amount of pesticides dislodged by the key pathways. A survey of golfer habits which heighten the potential risk of exposure to pesticides is being



At University of Florida, Dr. George Snyder uses a piece of cloth attached to a weight to sample dislodgeable pesticide residues from turfgrass.

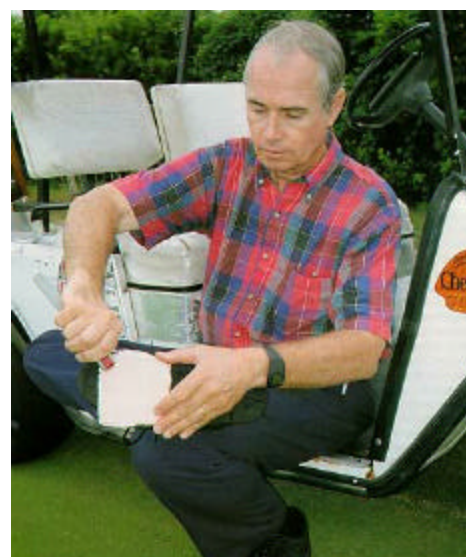
determined. Dislodgeability is being evaluated for “real life” contact parameters such as golf ball, club face, and various clothing materials that are identified as important pathways for pesticide exposure while playing golf.

An assessment of volatilization of ethoprop, chlorpyrifos, and isofenphos applied to golf course fairways was made June 5-7, 2000, at Banyon Golf Course in Palm Beach County. The concentration of ethoprop, chlorpyrifos, and isofenphos in air following application to a golf course fairway was determined. Appreciable air-borne pesticide residue was observed over a three-day measurement period.

The highest concentration was found for ethoprop (33 microgram m^{-3}). Chlorpyrifos had a maximum concentration of 4.0 microgram m^{-3} , and the maximum for isofenphos was 1.7 microgram m^{-3} , with all three maximum concentrations occurring on the day of application.

There was a general trend for decreasing concentrations of all three pesticides over time, but mid-day increases in concentration generally were evident. A risk analysis for chlorpyrifos indicated that golfer exposure to airborne residues of this pesticide posed no health risk.

A similar assessment using data from past-year experiments indicated little health risk for inhalation of fenamiphos or fonofos applied to golf turf. Nevertheless, the amount of each of the four pesticides that was lost by volatilization this year, or in a 1999 trial, greatly exceeded that lost by leaching or clipping removal in previous USGA-sponsored studies we have conducted.



Dr. George Snyder prepares a shoe to sample the dislodgeable pesticide residues from golf course turf-grasses.

The effect of a stabilized organic polymer (SOP) incorporated in a USGA green on leaching losses of fenamiphos and fenamiphos metabolite was investigated approximately two years after incorporation. Leaching of fenamiphos and its metabolites during the 91-day period after fenamiphos application was reduced 88 and 83%, respectively, by the polymer.

Summary Points

- The amount of the four pesticides that was lost by volatilization greatly exceeded that lost by leaching or clipping removal.
- There is a diurnal nature to volatilization losses. The losses are greatest during the mid-day hours.
- Products varied in their volatilization losses; however, they did not pose any health risks.
- Incorporating stabilized organic polymer (SOP) into the rootzone of a USGA green reduced leaching losses of fenamiphos and fenamiphos metabolite by 88 and 83%, respectively.