

# 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

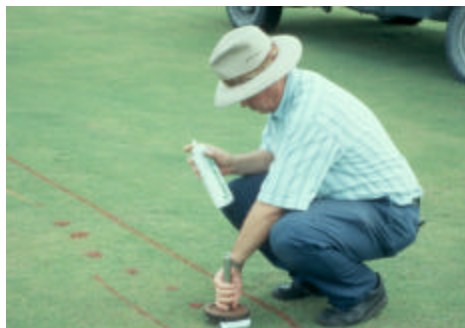
**Project Duration:** 5 years

**Total Funding:** \$125,000

An assessment was made of the risks to golfers from exposure to an insecticide (chlorpyrifos) and a nematicide (fenamiphos) as a result of the combination of doses received from inhalation of volatilized pesticide and from pesticide applied to the turf that is dislodged and transferred to a golfer's skin.

The estimate of the dosage received by golfers is based on experiments conducted on pesticide volatilization and dislodgability. It was found that most of the estimated dose of the insecticide received by golfers came by way of inhalation, whereas most of the dose received from the nematicide came by way of dislodged pesticide. Although it was estimated that some dosage of both pesticides would be received by golfers, even if a golfer played on 18 greens within one hour after application of the insecticide every day for 70 years the health risk would be negligible, based on United States Environmental Protection data used to assess such risks.

For the nematicide exposure, however, the risk would be appreciable for the previous-



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

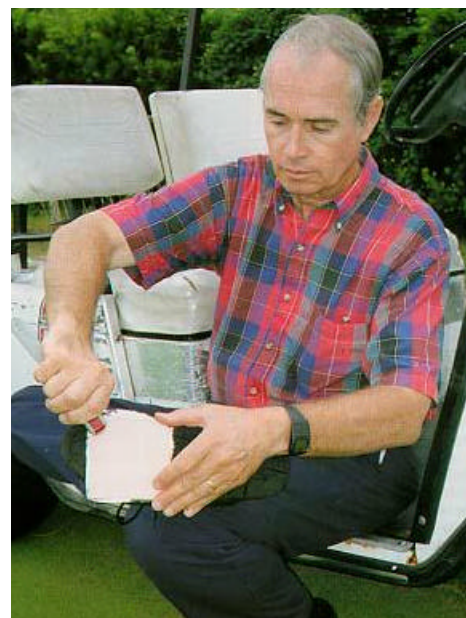
ly-stated unlikely playing scenario, but if the golfer played the day immediately following nematicide application every day for 70 years, there would be negligible risk from the pesticide exposure. Since the nematicide can be applied legally only twice per year, it is extremely unlikely that a golfer would encounter the pesticide that frequently.

In making risk assessments of golfer exposure to dislodged pesticides, assumptions have been made about the exposure pathways, i.e., how golfers come into contact with turf that has been sprayed with pesticides. Consequently, a survey was conducted to quantify observable golfer habits that could lead to direct or indirect contact with pesticides applied to the turf.

Play by nearly 400 golfers spread over three golf courses was observed to determine the frequency of such habits. Ten practices that could lead to pesticide exposure were observed in the fairway and green collars, and twelve were observed on the greens. However, only two of the practices on the fairway/collars and four on the greens were observed for over 10% of the players.

In the fairway/collar area, 22.3% of the players placed a club on the turf and later retrieved it. They could have contacted pesticide applied to the turfgrass indirectly if pesticide were transferred to the club grip, and then to the players' hand. Twelve percent of the players touched the club face, usually in returning the club to the bag after making a shot. Again, this practice could result in indirect contact with pesticide.

On greens, players touched the golf ball an average of 1.25 times per player. A club was placed on the turf surface and



Dr. George Snyder prepares a shoe to sample the dislodgable pesticide residues from golf course turfgrasses.

retrieved 34.6% of the time. A ball marker was used by 23.3% of the players, and 19.3% retrieved the pin from the turf surface. Knowing the frequency of the practices that can lead to pesticide exposure will be useful for making risk assessments.

## Summary Points

- Most of the estimated dose of the insecticide received by golfers came by way of inhalation, whereas most of the dose received from the nematicide came by way of dislodged pesticide.
- Ten practices that could lead to pesticide exposure were observed in the fairway and green collars, and twelve were observed on the greens. However, only two of the practices on the fairway/collars and four on the greens were observed for over 10% of the players.
- Knowing the frequency of the practices that can lead to pesticide exposure will be useful for making risk assessments.