

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

University of Florida

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Start Date: 1998
Number of Years: 3
Total Funding: \$75,000

Objectives:

1. *Identify by survey golfer 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.*

A series of pesticide dislodgeability studies were conducted to evaluate the risks associated with golfer exposure to pesticides. The work was performed by W. Raymond H. Snyder, as part of a Master of Science degree program, at the University of Florida. The pesticides 2,4-D and dicamba were applied as liquids to a *TIFGREEN* bermudagrass putting green with and without *Poa trivialis* overseeding, and to a *TIFDWARF* green. Isazofos, chlorpyrifos, and fenamiphos were spray-applied to the *TIFDWARF* green. Pesticides were dislodged with damp cheesecloth rubbed on the turf surface, damp cotton cloth or leather pressed on the surface, by putting a golf ball over the surface, by rolling golf grips on the surface, and in a short rough off to the side of the green by swinging a golf club through the grass and wiping the club surface with damp cheesecloth.

Generally, the amount of pesticide dislodged decreased with time after application, and was greatly reduced following irrigation. By combining the data, risk assessment calculations could be made for various scenarios. For example, exposure to chlorpyrifos on 18 greens one hour after application every day for a lifetime was calculated to provide a Hazard Quotient of 0.31. Hazard quotients (HQ) less than one indicate that the residues present are at concentrations below those that would cause effects in humans. A HQ greater than one does not necessarily infer the residue levels will cause adverse effects, but rather that the absence of adverse effects is less certain. A similar calculation for exposure after irrigation was 0.02. Chlorpyrifos has a rather high Reference Dose (i.e., acceptable amount of exposure) that reduces the HQ value. Calculations for the other pesticides, some of which have higher Reference Doses, will be reported next year.

A stabilized organic polymer (SOP) coated on sand for reducing pesticide leaching was field evaluated twice. Inclusion of the SOP-sand at the rate of 20 percent by volume in the lower 10 cm of the 30-cm USGA rootzone profile was very effective. Fenamiphos leaching was reduced up to 100 percent and fenamiphos metabolites up to 76 percent. [

Recreational Exposure of Golfers to Pesticides Applied to Golf Courses

University of Massachusetts

John Marshall Clark

Start Date: 1998
Number of Years: 1
Total Funding: \$25,000

Objectives:

1. *The role of vapor pressure and temperature will be evaluated in terms of developing a screening system for turfgrass pesticides.*
2. *Pesticides with possible safety concerns will be further evaluated in the context of best management practices, including the role of spray volume and adjuvants.*
3. *The role of thatch accumulation on the dissipation of volatile and dislodgeable residues will be assessed.*

Volatilization and dislodgeable foliar residues of turfgrass pesticides following application are major routes of exposure to golfers via inhalation and dermal penetration. Our past research has determined that pesticides with high vapor pressures and inherent high toxicities result in Inhalation Hazard Quotients (IHQs) greater than 1.0. From this determination, our research has progressed to examine methods of suppressing volatilization and dislodgeable residues in order to reduce potential golfer exposure. The adjuvant, Silwet L-77, was selected for its superior wetting, thatch penetrating, and volatilization suppressing properties (Policello et al., 1995). Three pesticides with relatively high vapor pressures were applied to small circular turfgrass plots with or without the adjuvant. Volatilization was measured with high volume air samplers and using the Theoretical Profile Shape (TPS) method. Dislodgeable residues samples were collected by wiping treated turf plots with dampened cheese cloth. The potential hazard associated with exposure to the volatile and dislodgeable residues was determined by IHQs and Dermal Hazard Quotient (DHQs) determination using the USEPA Hazard Quotient method (Murphy et al., 1996ab). [