

Development and Testing of Indices and Models of Pesticide Volatilization from Turfgrass

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Objectives:

1. *Develop and test concise indicators of volatilization hazard that can be used by turf managers to determine the likely degree of health hazards associated with pesticide applications.*
2. *Develop and test alternative models of turfgrass pesticide volatilization.*

Two models were tested for their abilities to predict volatile pesticide fluxes from turf. The Pesticide Root Zone Model (PRZM), version 3 (Carsel *et al.*, 1998), which combines soil and foliage volatilization models with components for pesticide leaching and runoff. The Modified Two-Compartment Model (M2CM) was used by Weed *et al.* (1999) to estimate alachlor dissipation from soil covered by a corn stubble. However, the model would also appear to be a reasonable approximation to pesticide volatilization from turfgrass, with compartment one consisting of the grass and thatch and compartment two made up of the underlying soil. In this case it is assumed that volatilization from the soil is negligible.

Model predictions and field measurements of pesticide volatilization losses are compared in Table 2. Field measurements are data from 0.2-ha turf plot experiments at the University of Massachusetts, Amherst, MA. The M2CM obviously performed much better than PRZM. The PRZM deficiencies are particularly serious because the model may also be used to estimate runoff and leaching losses of pesticides. When applied to turf, the very high, and inaccurate volatilization from foliage removes pesticide from the turf system, limiting the chemical available for other loss mechanisms. As a result, PRZM may badly underestimate pesticide runoff and leaching.

Table 1. Comparison of Measured and Predicted Volatilization from Turf Plots for Eight Pesticides.

Chemical	Volatilization during the Week (%)		
	Measure d	PRZM	M2CM
Bendiocarb	1.6	83.7	1.1
Carbaryl	0.3	39.0	0.3
Chlorpyrifos	8.3	82.6	11.6
Diazinon	10.5	67.8	14.6
Ethoprop	15.2	80.4	17.2
Isazofos	10.3	77.5	18.2
Isofenphos	1.5	29.8	0.1
Trichlorfon	0.8	39.5	0.9