Operational Comprehensive Fate and Transport Model for Turfgrass Pesticides

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Objectives:

1. Continue the ongoing development and testing of runoff and volatilization models for turfgrass pesticides.
2. Combine runoff and volatilization models into an operational fate and transport model for surface movement of turfgrass pesticides.
3. Initiate development and testing of models for estimating leaching of turfgrass pesticides to groundwater.
4. Add a leaching component to the surface transport model to produce a comprehensive fate and transport model for turfgrass pesticides.

Start Date: 2001
Project Duration: 2 years
Total Funding: $31,900

During the first nine months of this project we began work on combining two previously developed and tested models for pesticide behavior on turf. The volatilization model used in the research is an evaporation-based model based on the Penman evapotranspiration (ET) equation and required hourly weather data. Hourly weather data are impractical for an operational fate and transport model because most available weather records are limited to daily precipitation and temperature.

We computed pesticide volatilization using three ET models which function with daily weather data. Based on the results shown in the table, it appears that the Hargreaves-Samani ET model provides volatilization fluxes comparable to the Penman equation, and the volatilization model can be adapted to a daily time step with little loss in accuracy.

Developing and testing runoff and volatilization models is an important part of protecting golf course water features.

Summary Points

- Researchers computed pesticide volatilization using three ET models which function with daily weather data.
- Data suggests that the Hargreaves-Samani ET model provides volatilization fluxes similar to the Penman equation.

Volatilization (% of application)

Chemical	Measured	Hourly Model: Penman	Daily Models: Hamon	Daily Models: Hargreaves-Samani	Daily Models: Preistly-Taylor
Bendiocarb	1.63	1.74	1.16	1.66	1.31
Carbaryl	0.28	0.07	0.10	0.17	0.10
Chlorpyrifos	8.25	8.16	5.10	7.38	5.87
Diazinon	10.46	10.04	6.74	9.80	7.83
Ethoprop	15.15	21.82	15.78	22.91	18.56
Isazofos	10.32	10.33	5.82	8.78	6.90
Isofenphos	1.53	0.97	0.60	0.89	0.70
Trichlorfon	0.81	0.80	0.51	0.72	0.58
Mean	6.54	7.65	5.18	7.56	6.07
R^2		0.63	0.55	0.65	0.65