Diurnal thermal regimes in plastic-covered soil beds and implications for pesticide fate/transport. (S01mansell145322-Oral)

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Abstract:

The temperature dependence of the fate/transport of pesticides in agricultural soils alters pesticide uptake by plant roots, persistence, degradation, and environmental impact due to contamination of groundwater. Temporal/spatial distributions of temperature in soil beds covered with white-on-black plastic film during spring tomato production in Bradenton, FL were used to locate thermal hot spots within mulched soil beds. This information was then used to infer the potential impacts of temperature upon pesticide fate and transport. Temperatures for beds with and without tomato plants were compared in order to isolate the temperature effects of plants. Temperature dependence occurs for processes of uptake by plant roots, volatilization, adsorption/desorption, microbial degradation, convection, and diffusion. Volatilization is one of the most temperature sensitive of these processes because temperature controls the vapor pressure. Both endothermic and exothermic adsorption processes occur for pesticides. Extremely low or high temperatures inhibit microbial degradation. Leaching appears to be least affected by soil temperature because this process is governed more by water solubility and octanol- water partitioning coefficients of chemicals.

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