ABSTRACT

A STUDY OF THE SUBSURFACE MOVEMENT OF DIAZINON
USING LYSIMETERS WITHIN THE
SHALLOW VADOSE ZONE

by

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Horizontal lysimeter nests were installed on a prune orchard agricultural operation (Butte County, California) in order to quantify the movement of diazinon in the shallow vadose zone after an insecticide application in February 2001. The nests were comprised of three lysimeters installed at the depths of 0.15, 0.25, 0.5, or 0.75 m to elicit a soil water sample for the analysis of diazinon. Soil coring samples were also used to compare diazinon concentrations at the lysimeter depths at specific sampling dates. Samples were taken from March 2nd to April 13th during a period of no irrigation and limited rainfall. The soil core samples were sonicated using a Sonicator Ultrasonic Processor XL2020 and the diazinon from the soil water samples was extracted according to EPA Method 507.1, at which point the samples were analyzed on a Varian 3800 Gas
Chromatograph (GC) using a Hewlett-Packard HP-5 (crosslinked 5% PH ME siloxane) capillary column. The rate of loss of diazinon from specific depths was highest at the 0.15 m depth, probably due to high organic carbon and total N. The rate of loss of diazinon in the 0.25 and 0.5 m depth was very similar, speculated to be due to the similar organic carbon and total N within those depths. The linear regression models for diazinon at the 0.15 m ($p < 0.000, R^2 = 0.581$), 0.25 m ($p < 0.000, R^2 = 0.450$), and 0.5 m ($p < 0.000, R^2 = 0.464$) depths was significant with a moderate predictive fit. The 0.75 m depth’s estimate of diazinon’s degradation was not significant ($p < 0.922$) and $R^2 = 0.003$, probably due to the relative lack of data points ($n = 6$). The linear regression model independent of depth and lysimeter nest was significant ($p < 0.000, R^2 = 0.502$). The linear regression model developed predicts that diazinon leaching through the vadose zone is unlikely to pose a groundwater quality threat under similar conditions.