

US EPA ARCHIVE DOCUMENT

[12-1-88]

DATA EVALUATION RECORD

STUDY 8

CHEM 059101 Chlorpyrifos §163-2

FORMULATION--00--ACTIVE INGREDIENT and 12--EMULSIFIABLE CONCENTRATE (EC)

FICHE/MASTER ID 00155638

McCall, P.J., R.L. Swann, and W.R. Bauriedel. 1985. Volatility characteristics of chlorpyrifos from soil and corn. Unpublished study prepared by Dow Chemical U.S.A. 33 p.

FICHE/MASTER ID 40050402

McCall, P., R. Swann, and W. Bauriedel. 1986. Volatility characteristics of chlorpyrifos from soil and corn. Laboratory Project ID GH-C 1782: Supplemental Data [Comments by D. Fontaine]. Unpublished study prepared by Dow Chemical U.S.A. 6 p.

REVIEWED BY: L. Binari TITLE: Staff Scientist

EDITED BY: T. Colvin-Snyder /S/ TITLE: Staff Scientist

APPROVED BY: W. Spangler /S/ TITLE: Project Manager

ORG: Dynamac Corporation
Rockville, MD
TEL: 468-2500

APPROVED BY: P. Datta
TITLE: Chemist
ORG: EAB/HED/OPP
TEL: 557-9733

E. Datta (for)

SIGNATURE: *P. Datta*

CONCLUSIONS:

Mobility - Laboratory Volatility

The portion of this study investigating the volatilization of chlorpyrifos from soil is unacceptable because the soil was not sampled immediately after treatment to confirm the application rate, thus, the concentration of residues volatilized could not be determined. The portion of this study investigating the volatilization of chlorpyrifos from corn is scientifically sound and provides supplemental information towards the registration of chlorpyrifos. This study does not fulfill EPA Data Requirements for Registering Pesticides because: Experiment 1 - Volatility data were reported as the percent of applied chlorpyrifos, but not the actual amount remaining over time, volatility data were not expressed as ug/cm²/hour, air concentrations were not expressed as ug/m³.

or mg/m^3 , the test soils were not completely characterized, and the relative humidity was not reported; Experiment 2 volatility data were not expressed as $\text{ug}/\text{cm}^2/\text{hour}$ and air concentrations were not expressed as ug/m^3 or mg/m^3 .

SUMMARY OF DATA BY REVIEWER:

Experiment 1

[^{14}C]Chlorpyrifos residues volatilized with half-lives of >36, 29, and 32 hours from loam, sandy loam, and silty clay loam soils, respectively, treated with [^{14}C]chlorpyrifos at 6 ppm. At 36, 29, and 32 hours post-treatment, appx. 62, 89, and 62% of the applied radioactivity remained on the loam, sandy loam, and silty clay loam soils, respectively.

Experiment 2

[^{14}C]Chlorpyrifos residues volatilized with a half-life of <12 hours from the surface of corn leaves treated with formulated (4 lb/gal, EC) [^{14}C]chlorpyrifos at 1.12 kg/ha. At 96 hours posttreatment, >80% of the applied radioactivity had been volatilized, and appx. 1 and 11% of the applied was detected on the leaf surfaces and in the leaf tissues, respectively.

DISCUSSION:

Experiment 1

1. The soil was not sampled immediately after treatment to confirm the stated chlorpyrifos application rate.

The registrant responded as follows: "Soil volatility experiments were conducted by placing 55 g of soil with the moisture adjusted to 100% of 1/3 bar in the apparatus to a depth of 2.5 cm. Ninety microliters of the acetone solution containing the chemical (330 ug) was applied to the soil surface in 3-uL drops simulating a 1.12 kg/ha treatment.

The registrant has restated the amount and method of application of chlorpyrifos to the soil; however, this response does not adequately address the lack of immediate posttreatment sampling of the soil during the study.

2. No data on the trapping efficiency of the polyurethane foam plugs were provided. The study authors did state that a preliminary experiment was conducted in which chlorpyrifos was applied directly to a foam plug and air was passed through the plug for 2 days, and the test substance was retained on the foam plug.

The registrant stated that the trapping efficiency of the foam plugs is demonstrated by data from the portion of the study in which volatility was studied on corn, in which recoveries of the applied radioactivity were generally >90%.

The data from the volatility on corn experiment show that the majority of volatilized radioactivity is trapped by the polyurethane plugs. Total material balances ranged from 78.7-100%.

3. Volatility data were reported as percent radioactivity remaining in the soil over a time period (but not the measured amount), and were not expressed in the required units ($\text{ug}/\text{cm}^2/\text{hour}$).
4. Air concentrations were not expressed as ug/m^3 or mg/m^3 .
5. The CEC of the soils was not reported.
6. According to the USDA Soil Textural Classification System, the soil identified as a sandy clay loam is a silty clay loam. The correct classification is used in describing the soil throughout the evaluation of the study.
7. The relative humidity was not measured; however, soil samples were reportedly moistened (100% of .33 bar)

Experiment 2

1. Volatility data were not expressed as $\text{ug}/\text{cm}^2/\text{hour}$.

The registrant stated that the flux of the chemical into the air from corn was given in the initial report as 400, 60, and 30 g/ha/day for the first, second, and third days of the study, respectively; and that these values are equivalent to 2.6×10^{-6} , 0.39×10^{-6} , and 0.20×10^{-6} g/m^3 .

Volatility data were expressed as g/m^3 ; these values cannot be interpreted since they are not expressed in terms of the amount of chlorpyrifos volatilized per unit corn leaf area per unit time. In addition, the initial values reported in terms of g/ha/day are not acceptable because they were calculated from the percent of chlorpyrifos volatilized at the end of each day instead of being measured during the study.

2. Air concentrations were not expressed as ug/m^3 or mg/m^3 .
3. Material balances were incomplete at the 3-, 6-, and 9-hour sampling intervals.

MATERIALS AND METHODS

MATERIALS AND METHODS:

Experiment 1

Samples of moistened (100% of 0.33 bar) loam, sandy loam, and silty clay loam soils were placed in a volatility apparatus and surface treated with acetone solutions of 2,6-pyridine ring-labeled [^{14}C]chlorpyrifos (radiochemical purity 98.8%, specific activity 1.99 mCi/mmol, Dow Chemical Co.) at 6 ppm (1.12 kg/ha). The soil samples were maintained at 25°C, and water-saturated air was passed over the soil at an airflow rate 1.0 L/minute (1.0 km/hour wind speed). Volatilized compounds were trapped with polyurethane foam plugs ($\approx 0.032 \text{ g/cm}^3$ density).

Polyurethane foam plugs were periodically sampled and extracted with acetone. Radioactivity in the extract was quantified using LSC.

Experiment 2

Jacques JX-21 field corn plants (24 plants, ≈ 35 -cm tall) were contained in an enclosed glass environmental chamber, and an aqueous solution of 2,6-pyridine ring-labeled [^{14}C]chlorpyrifos (radiochemical purity >99%, specific activity 14.2 mCi/mmol, Dow Chemical Co.) formulated as Lorsban (4 lb/gal EC) was applied at 1.12 kg/ha to one leaf on each plant. The chamber was maintained at 30°C, with a relative humidity of 45-65%, and a photoperiod of 15 hours on:9 hours off (1000 W G.E. Duroglow lamp above the chamber). Air was passed through the chamber at a rate of 0.8 km/hour. Volatile compounds were trapped with polyurethane foam plugs. Foam plugs and treated leaves were sampled at 0, 3, 6, 9, 12, 24, 48, and 96 hour posttreatment.

Polyurethane foam plugs were extracted with acetone, and radioactivity in the extract was quantified using LSC. Leaf samples were washed with methanol, and [^{14}C]residues in the washes were quantified using LSC. [^{14}C]Residues remaining in the leaf tissues were quantified by LSC following combustion.

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