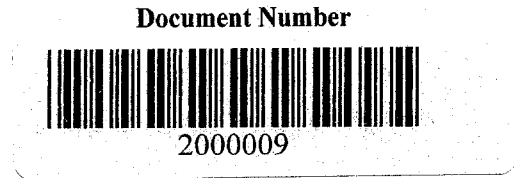


Data Evaluation Report on the laboratory volatility of Clomazone

PMRA Submission Number {.....}

EPA MRID Number 45199401

Data Requirement: PMRA Data Code:
EPA DP Barcode: D270047
OECD Data Point:
EPA Guideline: 163-2



Test material:

Common name: Clomazone

Chemical name

IUPAC: 2-(2-chlorobenzyl)-4,4-dimethyl-1,2-oxazolidin-3-one.

2-(2-chlorobenzyl)-4,4-dimethylisoxazolidin-3-one

CAS name: 2-[(2-chlorophenyl)methyl]-4,4-dimethyl-3-isoxazolidinone.

CAS No: 81777-89-1.

Synonyms: Command.

SMILES string:

Primary Reviewer: Joan Gaidos
Dynamac Corporation

Signature:
Date:

QC Reviewer: Kathleen Ferguson
Dynamac Corporation

Signature:
Date:

Secondary Reviewer: James Breithaupt
EPA

Signature:
Date:

James Breithaupt
10/8/02

Company Code:
Active Code:
Use Site Category:
EPA PC Code: 125401

CITATION: Keifer, D.W. 2000. Laboratory volatility of clomazone - Simulated flooded rice paddy vs. typical field conditions. Unpublished study performed by FMC Corporation, Princeton, NJ; and submitted by FMC, Agricultural Products Group, Princeton, NJ. Report number: P-3456. Project code: G164.802. Experiment initiated August 14, 1997, and completed August 26, 1997 (p. 1). Final amended report issued July 24, 2000.

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ABSTRACT

Mobility - Laboratory Volatility

The volatilization of clomazone [2-(2-chlorobenzyl)-4,4-dimethyl-1,2-oxazolidin-3-one; formulated as Command 3MC and 4EC], applied at 2.0 kg a.i./A, was studied under laboratory conditions using trays (surface area not specified) containing either water or soil. Clomazone was mixed with water (not characterized) or sprayed onto the surface of a loam soil (1.5% organic matter, pH 6.0, 9.35% soil moisture) from New Jersey. The trays were placed in individual belljars connected to a continuous airflow system (flow rate not specified) and maintained at 25°C. Volatiles were trapped using a polyethylene foam plug. Samples were collected over four 18-hour intervals (0-18, 24-42, 48-66, and 72-90 hours posttreatment). The foam plugs were extracted with methanol and analyzed using an enzyme-linked immunosorbent assay.

In all cases, clomazone was much less volatile from water than from soil, and the microencapsulated formulation was much less volatile than the emulsifiable concentrate. Maximum volatilization was measured at 0.155% of the applied/hour (0-18 hours posttreatment) from the soil treated with the emulsifiable concentrate, and minimum volatilization was 0.0002% of the applied/hour (24-42 hours) from the water treated with the microencapsulated formulation.

Volatilization of clomazone from **soil** treated with the EC formulation decreased from an average 0.155% of the applied/hour during 0-18 hours posttreatment to 0.011% during 72-90 hours. Volatilization from soil treated with the ME formulation was an average 0.0097% of the applied/hour at 0-18 hours posttreatment and 0.0036% at 72-90 hours. Compared to the EC formulation, microencapsulation reduced the volatility of clomazone from soil by a maximum 93.7% at 0-18 hours posttreatment.

Volatilization of clomazone from **water** treated with the EC formulation averaged 0.0050% of the applied/hour during 0-18 hours posttreatment and 0.0014% during 72-90 hours. Volatilization from water treated with the ME formulation averaged 0.0005% and 0.0003% of the applied/hour, respectively, during the same intervals. Compared to the EC formulation, microencapsulation reduced the volatility of clomazone from soil by a maximum 90.6% at 0-18 hours posttreatment.

Material balances were not reported; the concentration of clomazone was measured only in the air, not in the soil or water.

Study Acceptability: This study is classified as **supplemental, and cannot be upgraded to acceptable**. It does not fulfill the data requirements for a laboratory volatility study (§163-2) because the concentration of clomazone was measured only in the air. The application rate was not confirmed, and a material balance could not be determined for any sampling interval. Additionally, the test soils and test water were not adequately characterized; parameters affecting volatility such as surface area and air flow rate were not reported, the glassware was not washed to account for potentially-sorbed clomazone residues; and the analytical methods were not described. While FMC has clearly reduced the rate of volatility in the 3 ME formulation relative to the 4 EC formulation, the rates of volatility cannot be quantified based on this study because of

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the lack of material balance. To satisfy the 163-2 data requirement, the registrant should conduct another study with adequate material balance using two different systems. Clomazone (3 ME and 4 EC) should be applied to a layer of either Crowley or Calloway silt loam soil from Arkansas that is 1 cm deep, with and without a standing water layer of 3.5 inches. The 1 cm soil represents the generally-accepted depth of pesticide interaction in a rice field, and the 3.5 inch value represents the average depth of water applied when flushing a rice field. Flushing is typically used after clomazone application to achieve uniform seed germination and to prevent crusting. This water depth is also reflective of the average water volume in rice paddies upon flooding. These treatments represent application to flooded soil and dry-seeded rice, respectively.

MATERIALS AND METHODS

The rate of volatilization of clomazone (formulated as Command 3MC and 4EC; test substance not further characterized), applied at 2 kg a.i./ha to trays of water or loam soil, was studied under laboratory conditions.

A loam soil (45% sand, 35% silt, 20% clay, 1.5% organic matter, pH 6.0, not further characterized) from Bordentown, New Jersey was sieved (14-mesh), mixed, and lightly pressed into trays (p. 6; labeled as Pyrex dishes in Figure 1, p. 11, but not further described). It was reported that 3 kg of moist soil were used in the trays, but it was not clear if this referred to each tray or was a total of the four trays that were prepared. Clomazone was applied to the surface of the soil at 2.0 kg a.i./ha using an overhead track sprayer. The moisture content of the soil at the start of the study was 9.35%.

Water (uncharacterized) was added to additional trays, treated with clomazone at 2.0 kg a.i./ha, and mixed. The trays were brought to a final volume of 2500 mL with water. There was no soil in these samples.

Two trays of soil and two of water were prepared for each of the two formulations. There were no controls. Each tray was placed in an individual belljar, and the belljar was sealed and connected to a volatile trapping apparatus (Figure 1, p. 11). Humidified room air was continually forced (flow rate not specified) through the belljar, then through one polyurethane foam plug. Air flow through the chamber continued even when volatile samples were not being collected (ie., the foam plugs were not in place). The system was maintained at 25°C, and the study author assumed that the humidified airflow would minimize drying of the soil (p. 5).

Volatiles were collected during four 18-hour intervals, specifically at 0-18, 24-42, 48-66, and 72-90 hours posttreatment (p. 7). The polyurethane foam plugs were extracted once with methanol (p. 5). The extract was diluted with water (1:1, v:v) and analyzed using an enzyme-linked immunosorbent assay (not further described; pp. 5, 6). Clomazone residues were not measured in the soil, water or on the sides of the test apparatus at any sampling interval.

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RESULTS/DISCUSSION

The volatilization of clomazone (formulated as Command 3MC and 4EC), applied at 2.0 kg a.i./A, was studied under laboratory conditions in trays containing either soil or water. In all cases, clomazone was less volatile from water than from soil, and the microencapsulated formulation was less volatile than the emulsifiable concentrate. Maximum volatilization was measured at 0.155% of the applied/hour from the 0-18 hour soil treated with the emulsifiable concentrate.

Volatilization of clomazone from **soil** treated with the EC formulation averaged 0.155% of the applied/hour during 0-18 hours posttreatment, 0.036% during 24-42 hours, 0.038% during 48-66 hours, and 0.011% during 72-90 hours (Table 1, p. 10). Volatilization from soil treated with the ME formulation averaged 0.0097%, 0.0029%, 0.0070% and 0.0036% of the applied/hour, respectively, during the same intervals. Compared to the EC formulation, microencapsulation reduced the volatility of clomazone from soil by a maximum 93.7% at 0-18 hours posttreatment, decreasing to 67.0% at 72-90 hours (Table 2, p. 10).

Volatilization of clomazone from **water** treated with the EC formulation averaged 0.0050% of the applied/hour during 0-18 hours posttreatment, 0.0019% during 24-42 hours, 0.0030% during 48-66 hours, and 0.0014% during 72-90 hours (Table 1, p. 10). Volatilization from water treated with the ME formulation averaged 0.0005%, 0.0002%, 0.0009% and 0.0003% of the applied/hour, respectively, during the same intervals. Compared to the EC formulation, microencapsulation reduced the volatility of clomazone from soil by a maximum 90.6% at 0-18 hours posttreatment, decreasing to 69.0% at 44-66 hours (reviewer-calculated based on ratios presented in Table 1, p. 10).

Clomazone was not measured in the soil or water, and the test apparatus was not rinsed; therefore a total material balance could not be determined. The measured concentration of clomazone in the air was normalized against the concentration of clomazone applied to the sample (Table 1, p. 10). The values presented by the study author are averages of the two replicates; individual sample data and raw data were not included.

REVIEWER'S COMMENTS

1. The samples were analyzed only for volatilized clomazone. The treated soil and water were never analyzed. The sample flasks were not rinsed, so that residues that may have volatilized and condensed onto the glass were not quantified. As a result, the application rate was not confirmed and a material balance could not be determined at any sampling interval. It was not demonstrated that the rate of application to the different treatments were comparable.
2. The immunoassay process used to analyze the samples was not described in this report. The study author cites two previous reports (*Darger, R.V, J.M. Tymonko, and P. VanDerWerf. 1991. Clomazone measurement by enzyme-linked immunosorbent assay. Journal of Agricultural and Food Chemistry 39: 813-819; and Keifer, D.W. 1995. Laboratory volatility*

Page _____ is not included in this copy.

Pages 5 through 14 are not included in this copy.

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