

US EPA ARCHIVE DOCUMENT

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DATA EVALUATION RECORD

STUDY 1

CHEM 112602 Cimectacarb §163-2

FORMULATION--00--ACTIVE INGREDIENT

STUDY ID 41869541
Spare, W.C. 1991. The volatilization of CGA-163935 from Bermuda turf (a Laboratory study). Laboratory Project ID: Agrisearch Project No. 12181; Ciba-Geigy Protocol No. 158-90. Unpublished study performed by Agrisearch Incorporated, Frederick, MD, and submitted by Ciba-Geigy Corporation, Greensboro, NC.

DIRECT REVIEW TIME = 10

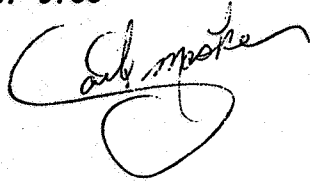
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CONCLUSIONS:

Mobility - Laboratory Volatility

1. This study can be used to fulfill data requirements.
2. Cimectacarb volatilized only slightly (<1% of the applied) from turf during 15 days of incubation at 15-25 C under continuous air flow (300 or 500 mL/minute) (See Table IV). The mean daily air concentration of cimectacarb ranged from 8.9 to 21.9 ug/m³, and volatility rates ranged from 1.6 x 10⁻³ to 3.2 x 10⁻³ ug/cm²/hour (See Table A).

3. This study is acceptable and fulfills EPA Data Requirements for Registering Pesticides by providing information on the laboratory volatility of ring-labeled [¹⁴C]cimectacarb.
4. No additional information on the volatility of cimectacarb on turf under laboratory conditions is required at this time.

METHODOLOGY:

Plugs of actively growing Bermuda Grass turf, trimmed to 2 inches in height, were placed on the surface of sand soil (96% sand, 0% silt, 4% clay, 3.4% organic matter, pH 6.7, CEC 4.7 meq/100 g; 4-inch depth) within four clear butyrate plastic cylinders (8-inch height, 5.5-inch id). The cylinders were fitted with an air inlet near the soil surface and an outlet near the cylinder top (Figure 2). Ring-labeled [1,2,6-¹⁴C]cimectacarb (formulated as the 2E of CGA-163935; radiochemical purity >99%, specific activity 39.0 uCi/mg, Ciba-Geigy), at approximately 2.68 lb ai/A, was applied to the turf by spotting the formulation directly onto the grass blades and in the internodal spaces using 2-5 uL volumes to "simulate spray droplets". The test cylinders were sealed using silicone sealant and a clear polycarbonate top, and were attached to a continuous air-flow apparatus. Humidified air was drawn (300 or 500 mL/minute) through the cylinders, then sequentially through one polyurethane foam plug, two 1 N potassium hydroxide trapping solutions, and a second polyurethane foam plug (Figure 2). The cylinders were maintained in a growth chamber at 15 ± 1 C for an 8-hour dark period and 25 ± 1 C for a 16-hour light cycle (using both incandescent and fluorescent illumination) for 15 days; humidity was maintained at 100% during the study. The foam plugs and trapping solutions were collected for analysis at 1, 2, 3, 4, 6, 8, 10, 12, and 15 days posttreatment, and were replaced with fresh materials.

The polyurethane foam plugs were extracted with methanol:water:formic acid (90:10:2, v:v:v) by sonication for 15 minutes, followed by shaking on a reciprocal shaker for 30 minutes. The plugs were then equilibrated at "room temperature" for 2 hours, and duplicate aliquots of the extracts were analyzed by LSC. Additional aliquots of the extracts from the day-1 sampling interval, which contained the highest concentration of residues, were analyzed using two-dimensional TLC and HPLC. The TLC analyses were done using silica gel plates developed with toluene:acetone:90% formic acid (75:25:1, v:v:v) and chloroform:methanol:90% formic acid:water (75:20:4:2, v:v:v:v); [¹⁴C]residues on the plates were visualized by autoradiography. HPLC was conducted using a Zorbax ODS reverse-phase column, a mobile phase gradient using methanol:water:acetic acid:phosphoric acid (45:55:3:1, v:v:v:v) and acetonitrile:0.01% aqueous phosphoric acid (50:50, v:v); detection was by radioactivity and UV (280 nm).

2. The end-point of 15 days for the experiment was selected "because the grass was growing and may reach the top of the cylinder and because mineralization of the test substance was expected. Metabolism and mineralization of the test substance by fungi, other microbes and plants collectively would confound and interfere with the determination of chemical volatility."
3. For seven days prior to treatment, the grass turf was acclimated to the laboratory growth chamber. The grass was watered from the bottom of the cylinders.
4. It was unclear whether reference standards were cochromatographed with the samples analyzed by TLC.
5. Foam plugs were spiked with a reference standard of CGA-163935 and extracted to confirm satisfactory recovery values (Table VII).

To measure CO₂ evolution, the potassium hydroxide trapping solutions were precipitated with saturated aqueous barium chloride; the samples were refrigerated overnight, centrifuged, and analyzed by LSC.

Turf (grass and thatch) was cut from the soil using scissors, homogenized by hand, and cut into "fine pieces". Soils were sliced into 0- to 2- and 2- to 4-inch sections, placed into plastic bags, and homogenized by hand. Triplicate samples of turf and soil were analyzed by LSC following combustion. The growth cylinders were rinsed with methanol:water:formic acid (90:10:2, v:v:v), and the rinsate was analyzed by LSC.

The detection limit for the foam plug extracts and the potassium hydroxide solutions was 0.00074 ppm. The detection limit for soil and turf samples was 0.002 ppm.

DATA SUMMARY:

Ring-labeled [1,2,6-¹⁴C]cimectacarb (radiochemical purity >99%), applied to turf at approximately 2.68 lb ai/A, volatilized only slightly from Bermuda Grass turf plugs that were incubated in clear plastic cylinders for 15 days. During the incubation, the turf was maintained in a 16-hour light (25 ± 1 C):8-hour dark (15 ± 1 C) cycle, and humidified air was drawn continuously through the cylinders at 300 or 500 mL/minute. After 15 days of incubation, 0.4-0.7% of the applied radioactivity had volatilized as [¹⁴C]cimectacarb and an additional 6.1-11.0% had volatilized as ¹⁴CO₂; the rate of air flow through the sample cylinders had no significant effect on volatilization (Table IV, Figure 3). After 15 days of incubation, the turf contained 85.5-111.5% of the applied radioactivity, the soil (detected only in the 0- to 2-inch depth) contained 0.3-1.0%, and the cylinder rinsates contained 0.3-0.4%; material balances were ≥98.3% of the applied (Table IV). No degradates other than ¹⁴CO₂ were detected in the volatiles, soil, or turf.

The maximum daily air concentration of cimectacarb ranged from 13.9-21.9 ug/m³ for the 300 mL/minute air flow rate and 8.9-16.3 ug/m³ for the 500 mL/minute air flow rate. The maximum volatility rates ranged from 1.6 x 10⁻³ to 3.2 x 10⁻³ ug/cm²/hour (Table A).

COMMENTS:

1. The vapor pressure of cimectacarb was reported to be 1.6 x 10⁻³ Pa at 20 C or 2.16 x 10⁻³ Pa at 25 C. The water solubility of cimectacarb at 25 C was reported to be 10.2 g/L at pH 5.5 and 21.1 g/L at pH 8.2.

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