DATA EVALUATION RECORD

STUDY 5

CHEM 069601 Pyrazon §162-2

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CONCLUSIONS:

Metabolism - Anaerobic Soil

1. This study may be used to fulfill data requirements.

2. Pyrazon degraded with calculated (by extrapolation) half-lives of 607 and 370 days in sandy loam and sandy clay loam soils, respectively, that were incubated anaerobically for 60 days in the dark at 25 C following 30 days of aerobic incubation. The only nonvolatile degradate in both soils was dephenylated pyrazon, which comprised a maximum of <10% of the applied at the final sampling interval. The rates of dephenylation and mineralization decreased considerably when anaerobic conditions were established.

3. This study is acceptable and fulfills EPA Data Requirements for Registering Pesticides by providing information on the metabolism of pyrazon in anaerobic sandy loam and sandy clay loam soils.

4. No additional information on the metabolism of pyrazon in anaerobic soil is needed at this time.

METHODOLOGY:

Sieved (2 mm) sandy loam soil from Dinuba, CA (54% sand, 32% silt, 14% clay, 0.50% organic matter, pH 7.7, CEC 14.40 meq/100 g) and sandy clay loam soil from Fuquay-Varina, NC (66.8% sand, 9.2% silt, 24.0% clay, 2.20% organic matter, pH 5.9, CEC 8.15 meq/100 g) soils were weighed (25 g) into glass dishes and treated at 3.95 ppm with an aqueous solution of pyradiazinone ring-labeled [^{14}C]pyrazon (radiochemical purity >99%, specific activity 96.559 mCi/mM, BASF). The soil was moistened to 75% of 0.33 bar and the dishes were placed in a glass "reactor" (Figure 3). The reactor was sealed, covered with aluminum foil, placed in a dark growth chamber, and incubated at 25 ± 1 C. At 1- to 3-week intervals, the reactor was purged with humidified air for 1.5 hours; the air was vented through a polyurethane plug and a tube of scintillation cocktail (Harvey) to capture volatiles. After 30 days of incubation, anaerobic conditions were established by purging the chamber with nitrogen; the purging continued using nitrogen gas instead of air. The soil moisture was adjusted at the time of purging. Soil samples were removed for analysis immediately posttreatment, at 17 days posttreatment, and at 1, 1.5, 2, and 3 months posttreatment.

The soil samples were immediately extracted three times with methanol. The methanol extracts were analyzed by one-dimensional TLC on silica gel plates developed in toluene:ethanol (75:25). The samples were cochromatographed with pyrazon and dephenylated pyrazon reference standards. The radioactive areas were located and quantified by radioscanning and identified by comparison to the R_f of the standards. The unextracted [^{14}C]residues in the soils were quantified by LSC following combustion.

The polyurethane plugs were extracted twice with methanol; the extracts were combined and analyzed using LSC. The scintillation cocktail was assayed directly using LSC.

DATA SUMMARY:

Pyradiazinone ring-labeled [^{14}C]pyrazon (radiochemical purity >99%), at 3.95 ppm, degraded with registrant-calculated half-lives of 607 and 370 days in sandy loam and sandy clay loam soils, respectively, that were incubated under anaerobic conditions (nitrogen atmosphere) in the dark at 25 ± 1 C and 75% of 0.33 bar for 60 days following 30-31 days of aerobic incubation. Dephenylated pyrazon was the only

nonvolatile degradate identified in the soils during the study. During the study, the material balances were ≥93.0% of the applied (Tables I-IV).

In the sandy loam soil, [^{14}C]pyrazon was approximately 100% of the applied radioactivity in duplicate samples immediately posttreatment, 87.0% at 30 days posttreatment when anaerobic conditions were established, and 88.7-90.4% after 60 days of anaerobic incubation (90 days posttreatment; Table X).

Dephenylated pyrazon,

the only degradate identified in the soil extracts, was a maximum of 4.8% of the applied at 90 days posttreatment. Unextracted [^{14}C]residues were 11.5-13.2% of the applied after 30 days of aerobic incubation, and decreased to 2.6-6.5% during the anaerobic incubation period (Table IV). $^{14}CO_2$ totaled 3.5% of the applied at 90 days posttreatment.

In the sandy clay loam soil, [^{14}C]pyrazon was 95.5-96.3% of the applied in duplicate samples immediately posttreatment, 88.7-94.2% at 30 days posttreatment when anaerobic conditions were established, and 80.6-82.4% after 61 days of anaerobic incubation (Table IX). Dephenylated pyrazon, the only degradate identified in the soil extracts, was a maximum of 8.3-9.3% of the applied at 91 days posttreatment. Unextracted [^{14}C]residues were a maximum 9.6% of the applied at 91 days posttreatment (Table IV). $^{14}CO_2$ totaled 1.2% of the applied at 91 days posttreatment.

COMMENTS:

1. In the sandy loam soil, the concentration of parent pyrazon declined to 87% of the applied after 30 days of aerobic incubation. When anaerobic conditions were established, the concentration of pyrazon increased to 92.3-95.5% of the applied. The study authors did not comment on this phenomenon; it is possible that the apparent increase was due to experimental error.

2. The statistical estimations of the anaerobic soil metabolism half-life of pyrazon reported in these experiments are of limited value because the calculations involve extrapolation considerably beyond the experimental time limits of the study. Data are often incapable of accurately predicting trends outside of their range because small differences are magnified and reactions which appear to be linear may, in fact, be curvilinear.

3. The polyurethane trap was reported to be an efficient trap for volatile organic compounds. The Harvey scintillation cocktail solution contained phenylethylamine to trap carbon dioxide.

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