DATA EVALUATION RECORD

I. Study Type: Field Dissipation Study

II. Citation:

Mason, R, M.S. Weissler, and C.A. Butler. 1995. ICIA5504: Fate of Radiolabelled Material Applied in the Field to Bare Soil. Performed by Zeneca Agrochemicals (Zeneca Limited), Berkshire, U.K. Submitted by Zeneca Agricultural Products (Zeneca Inc.), Wilmington, Delaware. MRID 43678187.

III. Reviewer:

Name: James A. Hetrick, Ph.D. James A. Hetrick
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Organization: EFGWB/EFED/OPP 30 JUL 1996

IV. Approved by:

Name: Paul J. Mastradone, Ph.D. Paul J. Mastradone
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V. Conclusions:

The study provides upgradable supplemental data on the field dissipation of radiolabeled methyl(E)-2-{2-[6-(6-2-cyanophenoxy)pyrimidin-4-yloxy]pheny}-3-methoxyacrylate (ICIA5504) and its transformation products on bare ground plots in California. The data are deemed supplemental because the hydrology of the study site was not clearly described. The data can be upgraded with a complete explanation on the hydrology of the site. (Please see Section VIII for more details.)

Radiolabeled ICIA5504, applied at 0.5 lbs a.i/A, had an approximate 50% field dissipation time (DT_{50}) of 14 days. The first-order dissipation half-life of ICIA5504 ranged from 28 to 34 days. Transformation products of ICIA5504 were identified as 4-(2-cyanophenoxy)-6-hydroxypyrimidine (Compound 28) and 2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenyl}acetate (Compound 30). Compound 28 had a maximum concentration of 8% applied at 2 month posttreatment and then declined < 3% at 4 months posttreatment. Compound 30 had a maximum concentration of 5.3% at 1 month posttreatment and then declined to < 2% at 4 months posttreatment. Unidentified radiolabeled residues were detected (<5% of applied) in the 5 to 15 cm soil layer from immediately posttreatment to 120 days posttreatment.

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VI. Materials and Methods:

The study site was located at the Zeneca Ag Products Western Regional Technical Center in Tulane, CA. The study site was described as flat (no measurable slope) with a water table depth of 3 to 9 meters deep. The soil was described as a Visalia sandy loam (Aquic Haploxeroll)[3]. Physicochemical properties of the soil are shown in Table 1. The site received 25.64 inches of rainfall and irrigation from June 1,1994 to November 30, 1994. The site received approximately 11 cm/month of rainfall and precipitation. The registrant stated the site was not treated with ICIA5504 or related compounds for 4 years prior to the experiment.

Three small field plots (2.1 m X 0.9 m) were established on bare ground. Each field plot was subdivided into 1.6 cm^2 grid area. On June 28, 1994, each sampling grid area within a test plot was sprayed with labeled isotopically-diluted ICIA5504 (phenylacrylate labeled, SA=2379 Bq μg^{-1}; radiopurity= > 99%; pyrimidine labeled, SA=2436 Bq μg^{-1}, radiopurity=>99%; cyanophenyl labeled, SA=2567 Bq μg^{-1}, radiopurity=>99%) to yield a nominal application rate of 0.5 lbs a.i/A. Immediately posttreatment, each field plot was mist irrigated with 0.3 cm of water and then covered with a wire cage. Weeds on the test site were controlled with Gramoxone Extra (1% v/v) and Triton X-77.

Soil cores from each treated plot were taken with a zero contamination soil probe. Six surface soil samples (0-15 cm) were taken immediately after ICIA5504 application. At other sampling times, six soil cores from each treated plot were taken with a zero contamination soil probe to a depth of 46 cm. At the termination of the study (4 months posttreatment), two soil cores were taken to a depth of 107 cm from each test plot. Soil samples were immediately frozen at -17°C at Zeneca Ag Products Western Research Center and then shipped frozen to the Jealott's Hill Research Station in Berks, U.K. Soil samples were taken immediately posttreatment, 1, 3, 7, 14, 30, 60, and 120 days posttreatment.

Each soil core was divided into 0-5, 5-15, 15-30, 30-46 cm depth increments for chemical analysis.

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[3] The U.S.D.A soil taxonomic classification indicates the soil formed under an aquic regime. An aquic moisture regime indicates the soil has low chroma mottles within 1 meter of the soil surface. Low chroma mottles indicates an anaerobic soil environment exists because of a high water table.

Analytical

Surface soil samples were sequentially extracted with methanol and methanol:water (75:25 v/v). All other soil samples were sequentially extracted with methanol, methanol:water (75:25 v/v) and acetonitrile.

Soluble radiolabeled residues were separated using normal and reverse phase 1-D TLC with a n-hexane:ethyl acetate:glacial acetic acid; methanol:water:glacial acetic acid; and chloroform:methanol :formic acid solvent systems. The specific activity and purity of ICIA5504 was determined by HPLC. Separated residues were identified by co-chromatography with known standards. The ^{14}C content in soil extracts was determined by LSC. The ^{14}C content in soil was determined by combustion-LSC. The limit of detection for LSC and combustion/LSC was < 0.8 Bq and 0.5% of applied radioactivity in a soil core (15 cm x 46 cm x 2.5 cm) , respectively.

Storage Stability

The soil samples were stored frozen for 3 to 10 weeks prior to chemical analysis.

VII. Study Author's Conclusions

A. The material balance of radioactive residues ranged from 35 to 108% in the ICIA5504 treated plots. (Reviewer Note: The registrant believes the low material balances can be explained by microbial mineralization of ICIA5504 to CO_2) (Table II).

B. Extractable ICIA5504 residues in surface soil decreased from 93% to 103% immediately posttreatment to <10% at 120 days posttreatment (Table II). Radiolabeled residues were accumulated (18 to 25% of applied) in the unextracted (bound) soil fraction at 4 months posttreatment.

C. Radiolabeled ICIA5504, at 0.5 lbs a.i/A, had an approximate 50% field dissipation time (DT_{50}) of 14 days (Figure 7). [Reviewer Note: The first-order degradation half-life of ICIA5504 ranged from 28 to 34 days].

D. The pattern of formation and decline of ICIA5504 transformation products are shown below.

> Compound 28- Compound 28 was detected in surface soil samples of the pyrimidine and cyanophenyl treatments. The maximum concentration of Compound 28 was 8% of applied at 2 month posttreatment and then declined < 3% at 4 months posttreatment (Table III).

Compound 30- Compound 30 was detected in the surface soil in all treatments. The concentration of Compound 30 was 5.3% at 1 to 2 months posttreatment and then declined to < 2% at 4 months posttreatment.

Compound 2- This compound was detected at low concentrations (<1%) at 2 and 4 months posttreatment.

Unidentified compounds in the TLC origin or chromatogram were detected in all treatments. The maximum concentration of unidentified transformation product(s) in all treatments was 10.4% of applied ICIA5504 and declined to 3.0% of applied at 120 days posttreatment.

E. Radiolabeled residues were predominately detected in the 0-5 cm surface soil (Table II). However, radiolabeled residues were detected (<5% of applied) in the 5 to 15 cm soil layer from immediately posttreatment to 120 days posttreatment. No radiolabeled residues were detected in the 15 to 107 cm soil layers.

VIII. Reviewer's Comments

A. Pan evaporation data were not provided for the study site. EFGWB notes the absence of pan evaporation or evapotranspiration (ET) data prevent a complete assessment of test site hydrology.

B. The soil on the test site was described as a Visalia sandy loam. (***Aquic*** Hapoxeroll). This classification indicates the soil has an aquic moisture regime. An aquic moisture regime indicates the soil is anaerobic, as representated by low chroma mottles in the soil profile, at some time during the year because of saturation with non-oxygenated water. EFGWB requests an explanation on the soil hydrology of the study site. (Please refer to Comment A.)

C. EFGWB notes the registrant submitted method validation studies for detection of ICIA5504 in soil and water. The analytical methods described in the study are presented in the MRID 43678188 and 43678192. These methods will be reviewed by BEAD/OPP/EPA.

D. EFGWB notes the registrant provide a 12 month storage stability study (MRID 43678183). The study supports the storage stability of 10 weeks.

E. The registrant described the dissipation rate as a DT50. EFGWB notes field dissipation is commonly described using a first-order degradation kinetic model. The first-order dissipation half-life of ICIA5504 ranged 28 to 34 days. EFGWB notes the first order half-life and DT50 of ICIA5504 are not equal. These data suggest the dissipation rate of ICIA5504 may be slower than indicated by the DT_{50}.

AZOXYSTROBIN

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