JAH

8-21-90

Shaughnessy No.: 125301

Date Out of EFGWB: AUG 21 1990

To: Mr. Phillip Hutton
Product Manager # 25
Registration Division (TS-767)

From: Paul Mastradone, Ph.D., Chief
Environmental Chemistry Review Section #1
Environmental Fate & Ground Water Branch/EFED (H7507C)

Thru: Henry Jacoby, Chief
Environmental Fate & Ground Water Branch/EFED (H7507C)

Attached, please find the EFGWB review of...

Reg./File #: 35977-4

Chemical Name: Fenoxycarb

Type Product: Insecticide

Product Name: LOGIC

Company Name: Maag Agrochemicals

Purpose: Review of studies for first food use

Action Code: 331 EFGWB #(s): ~~89074~~ 89-0474

Date Received: 1/12/90 Total Reviewing Time: 10 days

Deferrals to: ___ Ecological Effects Branch

___ Dietary Exposure Branch

___ Non-Dietary Exposure Branch

___ Toxicology Branch I

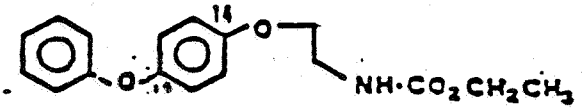
___ Toxicology Branch II

1

1.0 CHEMICAL:

chemical name: Ethyl (2-[4-phenoxyphenoxy]-ethyl) carbamate

common name: Fenoxycarb
trade name: Logic Fire Ant Bait
structure:



CAS #:
Shaughnessy #:125301

2.0 TEST MATERIAL: N/A

3.0 STUDY/ACTION TYPE: First food use

4.0 STUDY IDENTIFICATION:

Rosebury, Gerald. 1987. Administrative Documents for the Application for Amended Registration of LOGIC Fire Ant Bait (EPA Reg. No. 35977-4) to Permit Use in Pastures and Citrus Groves. sponsored and submitted by Maag Agrochemicals Vero Beach, Florida. Received by EPA on 1/12/89.

5.0 REVIEWED BY:

James A. Hetrick, Ph.D.
Chemist, ECRS # 1
EFGWB/EFED/OPP

Signature: James A. Hetrick
Date: 8/20/90

6.0 APPROVED BY:

Name: Paul Mastradone, Ph.D.
Section Chief, ECRS # 1
EFGWB/EFED/OPP

Signature: Paul J. Mastradone
Date:

7.0 CONCLUSIONS:

Please refer to previous submission concerning first food use for fenoxycarb. (Please find attached a copy of the study reviews).

8.0 RECOMMENDATIONS: See Section 7.0

9.0 BACKGROUND: N/A

10.0 DISCUSSION OF INDIVIDUAL TESTS OR STUDIES: N/A

11.0 COMPLETION OF ONE-LINER: N/A

12.0 CBI APPENDIX: N/A

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

March 2, 1990

MEMORANDUM

SUBJECT: FENOXYCARB FIRST FOOD-CROP USE PATTERN

TO: Mr. Phillip Hutton
Product Manager PM #17
Registration Division (H7505C)

THRU: Henry Jacoby, Branch Chief
Environmental Fate and Ground Water Branch
Environmental Fate and Effects Division (H7507C)

Paul J. Mastradone, Ph.D., Section Chief
Environmental Chemistry Review Section #1
EFGWB/EFED (H7507C)

FROM: James A. Hetrick, Ph.D., Chemist
Environmental Chemistry Review Section #1
EFGWB/EFED (H7507C)

Attached is the EFGWB Science Chapter for the first food-use proposal for fenoxycarb. Fenoxycarb, technically known as ethyl ([2-phenyoxyphenoxy) ethyl] carbamate, is a granular insecticide used to control fire ants in Southwest and Southcentral U.S.. The proposed application methods for fenoxycarb is either broadcast or mound/banding of the insecticide at a rate of 4 to 8 ug kg^{-1}.

The hydrolysis, aerobic soil metabolism, anaerobic metabolism, soil photolysis, and fish accumulation studies are acceptable to satistfy the Subdivision N guidelines. The field dissipation studies partially fulfill guidelines and, therefore, require additional experimentation. The aqueous photolysis, adsorption/desorption, and leaching studies provide only supplemental data for the Subdivision N guideline data requirements. The rotational confined crop study was not submitted for review because the registrant contends fenoxycarb is used in a nonfood terrestrial use pattern such as pastures. EFGWB, however, does not concur with the registrant because pastures and other turf areas are commonly cultivated for crop production. Therefore, the registrant is required to submit rotational confined crop study as part of the registration requirements.

Fenoxycarb may pose a non-point environmental and toxicological hazard because of the recommended broadcast application method. EFGWB is concerned that fenoxycarb is a non-target insecticide which may indiscriminately affect both terrestrial and aquatic arthropods other than fire ants. More importantly, parent fenoxycarb appears to adsorb onto soil colloids and, therefore, may bind onto mobile surface-water sediments causing transport to aquatic environments. Furthermore, available fenoxycarb appears to bioaccumulate (95X) in

CONCURRENCES								
SYMBOL		TS7507C	H7507C					
SURNAME	JAH	PM	Jacoby					
DATE	3/2/90	3/2/90	3/2/90					

EPA Form 1320-1 (12-70) OFFICIAL FILE COPY

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fresh water fish tissue with 95% depuration in 14 days. EFGWB concludes that fenoxycarb dissipation (via surface-water runoff) coupled with a non-specific mode of action on both terrestrial and nonterrestrial arthropods may cause an environmental hazard.

The status of two previously reviewed studies have changed for new registration standard. The aqueous photolysis study (Dieterle and Kaufman,00115232) was previously accepted; however, current EFGWB photolysis guideline policy requires use of a light source which closely simulates natural light. The Xenon lamp simulates sunlight because it has a continuous energy distribution over the 290 to 400 nm wavelenghts. Furthermore, the field dissipation study (Pryde and Atterli,00142607) was conducted on Swiss soils. This study was previously considered to be acceptable but is now considered supplemental because the experimental conditions do not simulate U.S. environmental conditions. Interpretation of the overall environmental fate data (particularly adsorption/desorption and leaching) was made more difficult because the soils used in these studies are of foreign origin and may not be representative of soils found in the U.S.. Furthermore, there was no consistency in the soil preparation (particularly, soil particle-size distribution) between experiments. EFGWB concludes, however, the deficiencies found in these experiments do not preclude a tentative environmental fate and ground water assessment for fenoxycarb.

The fate of fenoxycarb is apparently dependent upon microbially-mediated processes including biological oxidation and chemical transformations. Fenoxycarb dissipation, however, is dependent on the soil redox conditions. The fate of parent fenoxycarb under aerobic soil conditions is integrally linked to the soil carbon cycle through immobilization into a nonlabile soil organic fraction with subsequent biological oxidation to CO_2. Apparently, parent fenoxycarb is initially incorporated into a soil organic matter fraction (i.e., humic acid) which is moderately resistant to mineralization resulting in a degradative half-life of approximately 45 days. The fate of the recoverable parent fenoxycarb under a 12 month aerobic incubation indicates at least 56% was bound in the unextractable soil organic matter and 21% remained in the soil as acetonitrile extractable and water soluble compounds. The remaining 23% of parent fenoxycarb was respired as CO_2. The major degradates from aerobic metabolism were tentatively identified as Ro-16-8797 (ethyl [2(p-(p-hydroxyphenoxy) phenoxy)ethyl]carbamate) and Ro-17-3192, as well as numerous polar degradates that were not structurally identified.

The fate of fenoxycarb under anaerobic soil conditions is less dependent upon a microbially-mediated degradative process and, therefore, fenoxycarb persists for long periods of time (i.e., $t_{1/2}$ = 165 days). The fate of parent fenoxycarb under a 60 day anaerobic incubation indicates 80% remained as unaltered parent fenoxycarb and only 11 % was bound in soil organic matter. Fenoxycarb was stable to hydrolysis and soil photolysis degradation further supporting the environmental fate assessment that dissipation is a microbially-mediated process using oxidative catabolic degradation.

The mobility of fenoxycarb and degradates, based on supplemental data, in terrestrial ecosystems appears to be controlled by a adsorption to either soil minerals or organic matter (e.g., K_d 18 to 70). The parent fenoxycarb will apparently desorb from soil colloid without a significant hysteresis effect when in equilibrium with distilled water or dilute salt solutions. Furthermore, soil-column leaching studies confirm the limited mobility of fenoxycarb because less than 1% of the parent compound moved below the soil application site.

In summary, fenoxycarb appears to dissipate in terrestrial ecosystems through a microbially-mediated process including chemical transformations with subsequent mineralization. However, under an anaerobic terrestrial environment fenoxycarb is very persistent and does not readily degrade. Parent fenoxycarb may bind to soil colloids and limit mobility. Hence, fenoxycarb and associated degradates do not appear to pose a problem for groundwater, except for areas of highest vulnerbility (including erodible and hydro-soils).

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

March 2, 1990

MAR - 2 1990

MEMORANDUM

SUBJECT: FENOXYCARB FIRST FOOD-CROP USE PATTERN

TO: Mr. Phillip Hutton
Product Manager PM #17
Registration Division (H7505C)

THRU: Henry Jacoby, Branch Chief
Environmental Fate and Ground Water Branch
Environmental Fate and Effects Division (H7507C)

Paul J. Mastradone, Ph.D., Section Chief
Environmental Chemistry Review Section #1
EFGWB/EFED (H7507C)

FROM: James A. Hetrick, Ph.D., Chemist
Environmental Chemistry Review Section #1
EFGWB/EFED (H7507C)

Attached is the EFGWB Science Chapter for the first food-use proposal for fenoxycarb. Fenoxycarb, technically known as ethyl ([2-phenyoxyphenoxy) ethyl] carbamate, is a granular insecticide used to control fire ants in Southwest and Southcentral U.S.. The proposed application methods for fenoxycarb is either broadcast or mound/banding of the insecticide at a rate of 4 to 8 ug kg^{-1}.

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6

may indiscriminately affect both terrestrial and aquatic arthropods other than fire ants. More importantly, parent fenoxycarb appears to adsorb onto soil colloids and, therefore, may bind onto mobile surface-water sediments causing transport to aquatic environments. Furthermore, available fenoxycarb appears to bioaccumulate (95X) in fresh water fish tissue with 95% depuration in 14 days. EFGWB concludes that fenoxycarb dissipation (via surface-water runoff) coupled with a non-specific mode of action on both terrestrial and nonterrestrial arthropods may cause an environmental hazard.

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The fate of fenoxycarb under anaerobic soil conditions is less dependent upon a microbially-mediated degradative process and, therefore, fenoxycarb persists for long periods of time (i.e., $t_{1/2}$ = 165 days). The fate of parent fenoxycarb under a 60 day anaerobic

incubation indicates 80% remained as unaltered parent fenoxycarb and only 11 % was bound in soil organic matter. Fenoxycarb was stable to hydrolysis and soil photolysis degradation further supporting the environmental fate assessment that dissipation is a microbially-mediated process using oxidative catabolic degradation.

The mobility of fenoxycarb and degradates, based on supplemental data, in terrestrial ecosystems appears to be controlled by a adsorption to either soil minerals or organic matter (e.g., K_d 18 to 70). The parent fenoxycarb will apparently desorb from soil colloid without a significant hysteresis effect when in equilibrium with distilled water or dilute salt solutions. Furthermore, soil-column leaching studies confirm the limited mobility of fenoxycarb because less than 1% of the parent compound moved below the soil application site.

In summary, fenoxycarb appears to dissipate in terrestrial ecosystems through a microbially-mediated process including chemical transformations with subsequent mineralization. However, under an anaerobic terrestrial environment fenoxycarb is very persistent and does not readily degrade. Parent fenoxycarb may bind to soil colloids and limit mobility. Hence, fenoxycarb and associated degradates do not appear to pose a problem for groundwater, except for areas of highest vulnerbility (including erodible and hydro-soils).

FENOXYCARB

First Food-Crop Use Pattern

Environmental Fate and Ground Water Branch

The mobility of fenoxycarb and degradates, based on supplemental data, in terrestrial ecosystems appears to be controlled by a adsorption to either soil minerals or organic matter (e.g., K_d 18 to 70). The parent fenoxycarb will apparently desorb from soil colloid without a significant hysteresis effect when in equilibrium with distilled water or dilute salt solutions. Furthermore, soil-column leaching studies confirm the immobile nature of fenoxycarb because less than 1% of the parent compound moved below the soil application site.

In summary, fenoxycarb appears to dissipate in terrestrial ecosystems through a microbially-mediated process including chemical transformations with subsequent mineralization. However, under an anaerobic terrestrial environment fenoxycarb is very persistent and does not readily degrade. Parent fenoxycarb apparently has a high adsorption coefficient which limits mobility. Hence, fenoxycarb and associated degradates do not appear to pose a problem for groundwater, except for areas the highest vulnerbility (including erodible and hydro-soils).

Fenoxycarb

Table of Contents

11

DATA EVALUATION RECORD

STUDY IDENTIFICATION:

Dieterle, P. and R. Kaufman. 1982. Hydrolysis Study With the Radiolabeled Ro 13-5223/024. Report No. 041/2922. Maag Agrochemicals. (MRID No. 00109328).

TYPE OF STUDY: Hydrolysis

REVIEWED BY:

James A. Hetrick, Ph.D., Chemist
Review Section 1, EFGWB/EFED

Signature: James A. Hetrick
Date: 3-2-90

APPROVED BY:

Paul J. Mastradone, Ph.D, Section Chief
Review Section 1, EFGWB/EFED

Signature: Paul J. Mastradone
Date: MAR - 2 1990

CONCLUSIONS:

EFGWB concludes that this study is scientifically valid and satisfies the data requirement for a hydrolysis study. The results of the study indicate that fenoxycarb is stable to hydrolysis in solutions buffered to pH 3, 7, and 9.

Based on the results of this study, EFGWB concludes that fenoxycarb will be stable to hydrolysis at pH levels found in the environment.

MATERIALS AND METHODS:

Radiolabeled ^{14}C-Fenoxycarb (specific activity 36.06 uCi/mg, radiochemical purity =>98%, chemical purity (GC) = >99%) was added to sterile buffered solutions (pH 3, 0.1 M phosphate; pH 7, 0.1 M phosphate) and pH 9, 0.2 borate) at 0.97 ug ml^{-1} concentration. The vessels were maintained at 35°C and 50°C in the dark. Samples were extracted with ethyl acetate after 0, 3, 4, 7, and 10 weeks (35°C) and 0, 2, 3, 5, and 7 weeks (50°C). Radioactivity in the aqueous and ethyl acetate fractions were quantitated by liquid scintillation counting (LSC). The nature of the radioactivity in each sample was investigated by high performance liquid chromatography (HPLC).

REPORTED RESULTS:

The authors report that the material balance (radioactivity recovery) ranged from 101.0% to 105.8% of the initially applied radioactivity during the course of the study. Under all conditions, fenoxycarb accounted for 97% to 101% of the applied radioactivity and recovered after 70 days incubation. Less than 9% of the radioactivity present did not correspond to fenoxycarb. Unextractable (i.e., water

Introduction

Fenoxycarb, technically known as ethyl ([2-phenoxyphenoxy) ethyl] carbamate, is a granular insecticide used to control fire ants in the Southwest and Southcentral U.S.. The specific activity of fenoxycarb is directed toward simulating a juvenile hormone which induces ovidicidal effects, inhibits metamorphosis to the adult stage, and interferes with molting of instar larvae. The proposed application method for granular fenoxycarb is a broadcast application at the recommended rate of 4.0 to 8.0 g a.i./acre. In addition, another application method includes baiting fire ant into bands of fenoxycarb-treated soil.

soluble) radioactivity accounted for 0.1% to 0.4% of the applied radioactivity. Similar results were obtained with fenoxycarb in distilled water only. (Table 1). Based on the results of the study the authors concluded that fenoxycarb was stable to hydrolysis under the conditions of the study.

DISCUSSION:

EFGWB recognizes that acidic hydrolysis was conducted at a pH of 3. EFGWB accepts this experimental protocol; however, future hydrolysis experiments need to be conducted in only slightly-acidic solutions (i.e., pH 5) to simulate hydrolysis in natural waters.

Page 16 is not included in this copy.

Pages _____ through _____ are not included.

The material not included contains the following type of information:

____ Identity of product inert ingredients.

____ Identity of product impurities.

____ Description of the product manufacturing process.

____ Description of quality control procedures.

____ Identity of the source of product ingredients.

____ Sales or other commercial/financial information.

____ A draft product label.

____ The product confidential statement of formula.

____ Information about a pending registration action.

X ____ FIFRA registration data.

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The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.

DATA EVALUATION RECORD

STUDY IDENTIFICATION:

Dieterle, P. and R. Kaufman. 1982. Photolysis of ^{14}C-Ro 13-5223/024 in Solutions and On Soil Surfaces. Report No. 41/3061. Maag Agrochemicals. (MRID No. 00115232).

Rosebery, G. D. 1989. Additional Information Relating to the Fenoxycarb Aqueous Photolysis Study. Project ID: FXC 161-1 3-89. Maag Agrochemicals, Inc. (MRID No. 41020801).

TYPE OF STUDY: Aqueous photolysis

REVIEWED BY:

James A. Hetrick, Ph.D., Chemist
Review Section 1, EFGWB/EFED

Signature: James A. Hetrick
Date: 3-2-90

APPROVED BY:

Paul J. Mastradone, Ph.D., Section Chief
Review Section 1, EFGWB/EFED

Signature: Paul J Mastradone
Date: 3-2

CONCLUSIONS:

EFGWB concludes the study is scientifically valid. However, the study does not meet the Subdivision N data requirements because the light source (mercury-vapor light) does not simulate natural light. The mercury vapor-light source has a high cumulative energy at very discrete wavelengths when compared to natural light. Therefore, EFGWB concludes this study provides supplemental data for the aqueous photolysis data requirements.

The results of the study show that fenoxycarb had a photolytic half-live of approximately 6 hours in an unsensitized solution and a half-life of 5 hours in a sensitized solution. Formation of a complex mixture of polar compounds appear to be the major means of photodegradation of fenoxycarb in aqueous solution. Photolysis appears to cause cleavage of the diphenyl ether bond with the monophenyl moieties recombining or forming other numerous monophenyl derivatives.

MATERIALS AND METHODS:

Radiolabeled $_{14}$C-Fenoxycarb (specific activity = 36.06 uCi/mg, radiochemical purity = >98%, chemical purity = >99% (GC)) was used in this study.

The following solutions were prepared:

1. Unsensitized

A distilled water/acetonitrile (95:5) solution was fortified to 1 ppm with ^{14}C-fenoxycarb and irradiated with a high pressure mercury vapor lamp. The lamp was fitted into a glass photoreactor vessel equipped for passage of air for trapping volatile compounds into hexane and 1 N NaOH. Aliquots were taken after 0, 2.3, 3.5, 4.8, 6.3 and 24 hours irradiation and then extracted with ethyl acetate. The radioactivity in the trapping solutions, the aqueous and ethyl acetate phases was quantitated using LSC. The nature of the radioactivity extractable into the ethyl acetate was investigated by thin-layer chromatography (TLC).

2. Sensitized

A distilled water/acetonitrile/acetone (as sensitizer) (93:5:2) was fortified to 0.99 ppm with ^{14}C-fenoxycarb and irradiated in a similar reaction vessel for 12.1 hours. Extraction and analysis of the extracted radioactivity was conducted similar to that described above.

3. Unsensitized preparative

A distilled water/acetonitrile (3:1) solution was fortified with ^{14}C-fenoxycarb to 25 ug ml^{-1} and similarly irradiated. After 7.75 hours the solution was extracted with ethyl acetate. Extracted radioactivity was analyzed by TLC. Photo-products were separated from parent fenoxycarb by repetitive injection of the extracted radioactivity (re-dissolved into acetonitrile) by HPLC. Separated photodegradation products were analyzed by GC/MS.

4. Dark Controls

Aliquots of the unsensitized and sensitized ^{14}C-fenoxycarb solutions were incubated in the dark and sampled and extracted as described above.

Additional information provided:

In previous review, the registrant was requested to submit additional data on the photolysis study.

Additional information presented by the registrant indicate that the high pressure mercury vapor lamp used in conjunction with the DURAN glass provides energy at various discrete wavelengths over the same approximate range as natural sunlight. When filtered to remove irradiation below 290 nm, the lamp renders a fair simulation of natural sunlight. So equipped, the lamp produces an irradiance of 1460 W/m^2, approximately 6 times more intense than ground level solar irradiance (of 250 W/m^2) in the spectral region of interest (300-600

nm). Thus, 60 hours of continuous exposure to the UV lamp is equal to 30 day outdoor exposure (Based on 12 hours of effective sunlight per day). These values are confirmed by measurement of ground level sunlight in a plot of wheat plants near Zurich, Switzerland in 1981 and 1982. Here the average net values of ground level irradiance in May/June were 296 and 263 W/m^2 (Figures 1 and 2). The spectral transmission of the Duran glass jacket shows that the glass is transparent in the range of wavelengths above 290 nm (Figure 3).

REPORTED RESULTS:

The authors report that total recovery of applied radioactivity (material balance) was 89.5% and 95.4% for the unsensitized and acetone sensitized solutions, respectively. (Note: the text reports these values as 89.5% and 95.4%, respectively.). Fenoxycarb accounted for 14% of the applied radioactivity after 24 hours irradiation in the unsensitized solution and for 22% of the applied after 12.1 hours irradiation in the acetone sensitized solution. A complex mixture of polar degradation products (unextractable in the aqueous phase) accounted for 11.8% and 21.8% of the applied radioactivity in the sensitized and unsensitized solutions, respectively. Unidentified extractable but polar photoproducts I (with TLC R_f =0) accounted for 41% and 37% of the applied radioactivity in the unsensitized and sensitized solutions, respectively. Unidentified extractable photoproducts II (with TLC R_f >0) accounted for 12% of the applied radioactivity in the unsensitized solution. Total volatilized organic (or $^{14}CO_2$) accounted for 3.5% and 7.8% of the applied radioactivity in the unsensitized and sensitized solutions, respectively (Tables I and II). Also, the authors report that total recovery (material balance) for the dark controls was 99.9% and 104% of the total applied radioactivity to the sensitized and unsensitized solutions maintained in the dark. TLC analysis indicated that the radioactivity present was unaltered fenoxycarb.

Numerous photo-products were extracted in the preparative solutions and two were identified as isomers I and II of the known standard Ro 17-3194, a recombination product formed by the cleavage of fenoxycarb at the diphenyl ether bond (Table IV).

Based on the results, the authors concluded that photolysis of fenoxycarb first order kinetics and had half-lives of 5.7 and 5.0 hours in the unsensitized and acetone sensitized solutions, respectively. The authors noted that the data suggest that the diphenyl ether linkage can be cleaved photolytically and recombination (to form Ro 17-3194) or form numerous polar mono-phenyl derivatives

DISCUSSION:

In the initial review (dated 12-12-83) this study was accepted as satisfying the data requirement for the aqueous photolysis study.

Prior to the review of data for a New Chemical Registration Standard, EFGWB requested further clarification of the light source spectra and energy distribution. The registrant provided a study (Roseberry, 410208-01) showing the Hg-vapor light source was 6 times more intense than sunlight. Although, the registrant provided proof that the total light energy of the Hg-vapor light was adjusted to simulate sunlight. The distribution of energy from a Hg-vapor light occurs at very discrete wavelengths and, therefore, does not simulate sunlight.

Page_____ is not included in this copy.

Pages 21 through 23 are not included.

The material not included contains the following type of information:

____ Identity of product inert ingredients.

____ Identity of product impurities.

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X___ FIFRA registration data.

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DATA EVALUATION RECORD

STUDY IDENTIFICATION:

Dieterli, P. and H. Glaus. 1986. Photodegradation of ^{14}C-Ro 13-5223/024 on Soil Surfaces. (MRID No. 40519001)

TYPE OF STUDY: Soil Photolysis Study

REVIEWED BY:

Akiva D. Abramovitch, Ph.D., Chemist
Review Section 1, EFGWB, EFED

APPROVED BY:

Paul J. Mastradone, Ph.D., Section Chief
Review Section 1, EFGWB, EFED

COMPILED BY:

James A. Hetrick, Ph.D., Chemist
Review Section 1, EFGWB, EFED

Signature: James A. Hetrick
Date: 3-2-90

CONCLUSIONS:

This study is acceptable and satisfies the photodegradation on soil data requirement for fenoxycarb.

Photodegradation of fenoxycarb on soil under sunlight was insignificant. Exposure to sunlight does not appear contribute to degradation on fenoxycarb on soil. These results contradict the aqueous photolysis study which suggest fenoxycarb has a short half-life (e.g., 6 hours) in aqueous environments. Therefore, photolytic degradation in soil is apparently stabilized by colloid adsorption and incorporation into nonlabile soil organic matter.

MATERIALS AND METHODS:

Dieslsdorf soil was treated with ^{14}C-phenyl labeled fenoxycarb of 98% radiochemical purity and specific activity of 36.03 uCi mole^{-1}. The soil depth was 5 mm and the fortification level was 6.9 ug g^{-1}. The fortified soil (pH 6.9, humus 4.3%, clay 14.7%, silt 30.8% and sand 50.2%) was exposed to a xenon lamp apparatus equipped with a corning filter to simulate sunlight for a period of 30 days. The temperature was 40°C in the photolysis chamber. Identical samples were kept in darkness. Soil samples were extracted periodically with acetonitrile and then with methanol/1N HCl and analyzed by TLC. Analysis accounted for over 95% of the applied radiolabelled material throughout the study period.

REPORTED RESULTS:

Only traces of degradation products were observed in both exposed and non-exposed soil samples. No significant degradation can be attributed to light irradiation.

DISCUSSION:

Experimentation conducted at 40°C would not be acceptable whenever degradation occurs. The temperature should be controlled close to 25 +/- 1° C for future studies.

25

Page_____ is not included in this copy.

Pages 25 through 28 are not included.

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STUDY IDENTIFICATION:

Dieterle, P., et al. 1983. Laboratory Aerobic Soil Metabolism Studies With ^{14}C-Ro-13-5223/024 Report No. 141/3644. Maag Agrochemicals. (MRID No. 00131804).

TYPE OF STUDY: Aerobic Soil Metabolism

REVIEWED BY:

James Hetrick, Ph.D., Chemist
Review Section 1, EFGWB, EFED

Signature: James A. Hetrick
Date: 3-2-90

APPROVED BY:

Paul Mastradone, Ph.D., Section Chief
Review Section 1, EFGWB/EFED

Signature: Paul J. Mastradone
Date: MAR - 2 [illegible]

CONCLUSIONS:

This study is scientifically sound and satisfies the data requirement for the aerobic soil metabolism study. Although the study was conducted with Swiss soils, EFGWB accepts it as satisfying the data requirement.

Based on the results of the study, EFGWB concludes that fenoxycarb will degrade in the soil environment under aerobic soil conditions. Under aerobic conditions, the half-life of fenoxycarb ranged from 60 to 106 days (or 2 to 3.5 months). Mineralization to CO_2 and metabolite (including Ro-16-8797 (ethyl[2-(p-(p-hydroxyphenoxy) phenoxy) ethyl] carbamate) and Ro 17-3192) binding to soils appears to be the primary means of dissipation in the soil environment. In a companion study(Pyrde and Etterli, 00109331), fenoxycarb was stable in autoclaved soils incubated under aerobic conditions. Hence, EFGWB concludes that fenoxycarb degradation in aerobic soils is a microbially-mediated process including chemical incorporation into soil organic matter with subsequent biological oxidation to CO_2.

MATERIALS AND METHODS:

Chemical: Radiolabeled ^{14}C-fenoxycarb (ethyl(2-(p-phenoxyphenoxy-1,4-^{14}C)ethyl]carbamate), specific activity = 36.06 uCi/mg, radiochemical purity >98%, Unlabeled fenoxycarb.

Soils: Three Swiss soils (Commugny sandy loam, Dielsdorf sandy loam and Steinmaur loam). See Table 0 for soil characterizations.

Samples of the Swiss soils were fortified with 5 ppm ^{14}C-fenoxycarb/unlabeled fenoxycarb. Moisture content of the soils was 25% of the maximum water capacity. Soils samples were maintained at

22° C in incubation flasks equipped with a trapping tower containing a polyurethane plug and granular soda lime to trap volatile radioactivity and $^{14}CO_2$.

At 0, 1, 2, 7, 14, 21 days and 1, 2, 3, 4, 6, 9, 12 months of incubation, soil samples were taken. Samples were extracted with acetonitrile/buffer extraction solvent. The buffer solution was further partitioned with ethyl acetate. Trapping towers were analyzed at 2 week intervals. Any $^{14}CO_2$ sorbed to the granular soda lime was released by adding HCl and retrapping the radioactivity in scintillation cocktail.

Radioactivity in all aliquots was quantitated with LSC. Unextracted soil radioactivity was quantitated by soil combustion with LSC of the liberated $^{14}CO_2$. Extracted radioactivity of the samples at 2 and 3 months incubation was analyzed for identity of degradation products. Analysis was by TLC and HPLC with co-chromatography with known standards.

REPORTED RESULTS:

The authors report that recovery of radioactivity in spiked control samples was 101.2%, of which 98.4% was extractable and 2.8% soil bound. Recovery of radioactivity at day 0 was 98.2%, 100.2% and 101.2% for the Commugny, Dielsdorf and Steinmaur soils, respectively. Recovery values decreased to 79.7%, 85.5% and 82.8% after 12 months incubation.

The authors report that in Commugny, Dielsdorf and Steinmaur soils the extracted radioactivity decreased from 95.75, 97.2% and 98.4% at day 0 to 12.8%, 23.7% and 16.3% after 12 months incubation. Total $^{14}CO_2$ during the 12 month incubation period was 26.5%, 21.9% and 23.3% for Commugny, Dielsdorf and Steinmaur soils, respectively. No other volatiles were found. The authors report that unextractable or bound residues increased with time of incubation. The amount of radioactivity remaining in soils (i.e., combusted) after 12 months incubation accounted for 42.3%, 43.2% and 46.3% of the applied radioactivity in the Commugny, Dielsdorf and Steinmaur soils, respectively (Tables I-III and Figures 4-6).

After 12 months incubation, extractable parent fenoxycarb accounted for 3%, 6%,and 14% of the applied radioactivity in the Commugny, Steinmaur and Dielsdorf soils, respectively. (At day 0, extractable parent fenoxycarb accounted for 93-98% of the applied radioactivity in the soils.) Extractable metabolite I (TLC R_f >0) and metabolite II (R_f=0) accounted for 1-8% of the applied radioactivity during the course of the study (Tables IV-VI).

HPLC analysis of the radioactivity extracted from soil incubated 2 and 3 months tentatively identified two degradation products, Ro-16-8797 (ethyl[2-(p-(p-hydroxyphenoxy)phenoxy)ethyl]carbamate) and Ro 17-3192, accounting for 1-3% of the applied radioactivity, as present

in the soils (Figure 7). Unidentified polar metabolites I and II (designated according to HPLC retention times), accounting for 1-7% of the applied radioactivity, were also found as shown Table VII.

Based on the results of the study, the authors report that half-lives of fenoxycarb were calculated to be 1.7, 2.3 and 2.5 months for Commugny, Steinmaur and Dielsdorf soils, respectively. The authors proposed that, along with the steady formation of CO_2, intermediate phenolic degradates of fenoxycarb were incorporated into the humic acid constituents of the soil. The authors proposed a degradation scheme with Ro 16-8797 and Ro 17-3192 as intermediates (Figure 7).

DISCUSSION:

The soils used in these studies are of Swiss origin; therefore, making an interpolation of fenoxycarb degradation in U.S soils difficult. Furthermore, there is no U.S.D.A. soil classification of the Swiss soils to permit interpolation of the soil properties to U. soils. Future experiments would be more useful if conducted in U.S soils.
The soils were sieved to a less than 1.6 mm particle-size distribution and, therefore, very coarse sand (>1 mm particle-size) was removed from the soil likely changing the soil physical and chemical properties. EFGWB accepts this experimental protocol; however, future experiments should be conducted on soils sieved to less than a 2.0 mm particle-size distribution.

The soils were exposed to acetone (45 ml acetone/ 850 grams of soil) prior to incubation for the aerobic metabolism studies. Since fenoxycarb degradation appear to be microbially-mediated, EFGWB has concern if this amount of acetone will affect on soil microbial activity.

Note: The registrant submitted a sterile soil metabolism study (Pryde and Etterli, 00109332) in which ^{14}C-fenoxycarb was incubated in Dielsdorf, Steinmaur, and Commugny soils for 28 days. The authors reported that fenoxycarb was stable in all soils. Only traces of degradation products were observed the soils.

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DATA EVALUATION RECORD

STUDY IDENTIFICATION:

Pryde, A., and M. Etterli. 1982. Laboratory Sterile Soil Metabolism with 14C-Ro 13-5223/024. Report No. 141/3644. Maag Agrochemicals. (MRID No. 00109330).

TYPE OF STUDY: Sterile Soil Metabolism

REVIEWED BY:

James Hetrick, Ph.D., Chemist
Review Section 1, EFGWB, EFED

Signature: James G. Hetrick
Date: 3-2-90

APPROVED BY:

Paul Mastradone, Ph.D., Section Chief
Review Section 1, EFGWB/EFED

Signature: Paul J. Mastradone
Date: MAR - 2

CONCLUSIONS:

This study is scientifically valid; however, the study is not required by the Subdivision N guidelines. Therefore, EFGWB concludes this study provides supplemental data for the aerobic metabolism study.

Based on the results of the study, EFGWB concludes that fenoxycarb is stable in sterile soil environments. Under sterile conditions, nearly 98% of the parent fenoxycarb was extracted from sterile soil incubated for 28 days. There were only trace quantities of nonextractable or soluble polar degradates found after the incubation period.

MATERIALS AND METHODS:

Chemical: ^{14}C-fenoxycarb (ethyl[2-(p-phenoxyphenoxy-1,4-^{14}C)ethyl]carbamate), specific activity = 36.06 uCi mg^{-1}, radiochemical purity >98%, unlabeled fenoxycarb.

Soils: Three Swiss soils (Commugny sandy loam, Dielsdorf sandy loam and Steinmaur loam). See Table 0 for soil characterizations.

The soils were sterilized by autoclaving (2X) at 125°C for 30 minutes. Samples of the Swiss soils were fortified with 5 ug g^{-1} ^{14}C-fenoxycarb/unlabeled fenoxycarb. Moisture content of the soils was 25% of the maximum water capacity. Soils samples were maintained at 22°C in stoppered incubation flasks. After 28 days of incubation, samples were extracted with acetonitrile/buffer extraction solvent. The buffer solution was further partitioned with ethyl acetate. Radioactivity in all aliquots was quantitated with LSC. Unextracted

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soil radioactivity was quantitated by soil combustion with LSC of the liberated $^{14}CO_2$. Extracted radioactivity of the samples were analyzed for identity of degradation products using TLC and HPLC with co-chromatography.

REPORTED RESULTS:

The authors report that recovery of radioactivity at day 0 was 105.7%, 105.1% and 103.0% for the Commugny, Dielsdorf and Steinmaur soils, respectively. Nearly 100% of the parent fenoxycarb was extracted by acetonitrile in the incubated sterile soil. The extractable ^{14}C-fenoxycarb was identified (ethyl acetate extractable) as the parent ^{14}C-parent fenoxycarb.

DISCUSSION:

The soils used in these studies are of Swiss origin; therefore, making an interplolation of fenoxycarb soil degradation in U.S. soils difficult to assess. Furthermore, there is no U.S.D.A. soil classification of the Swiss soils to permit interpolation of the soil properties to U.S. soils. Future experiments would more useful if conducted in U.S. soils.

The soils were sieved to a less than 1.6 mm particle-size distribution and, therefore, very-coarse sand was remove from the soil. EFGWB accepts this experimental protocol; however, future experiments should be conducted on soils sieved to less than 2.0 mm particle-size distribution.

EFGWB recognizes that autoclaving a soil can alter the soil physicochemical properties by promoting artificial weathering reactions.

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DATA EVALUATION RECORD

Dieterle, P. and R. Kaufman. 1982. Laboratory Anaerobic Soil Metabolism with ^{14}C-Ro 13-5223/024. Report no. 041/2841. Maag Agrochemicals. (MRID No. 00109330).

TYPE OF STUDY: Anaerobic soil metabolism

REVIEWED BY:

James A. Hetrick, Ph.D., Chemist
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Signature: James A. Hetrick
Date: 3-2-90

APPROVED BY:

Paul J. Mastradone, Ph.D., Section Chief
Review Section 1, EFGWB, EFED

Signature: Paul J Mastradone
Date: MAR - 2

CONCLUSIONS:

EFGWB concludes that this study is scientifically valid and satisfies the data requirement for an anaerobic soil metabolism study. This study indicates parent fenoxycarb is persistant under anaerobic soil conditions. When compared to aerobic metabolism (Dieterle et al., 0131804), the degradation rate of fenoxycarb under anaerobic soil conditions appears to be slower ($t_{1/2}$=165 days). This is apparently due to reduced microbial activity. There appears to be a reduced rate of fenoxycarb incorporation into nonlabile soil organic matter with subsequent biological oxidation to CO_2. In contrast, fenoxycarb degradation half-life in aerobic soils is approximately 40 days because of microbially-mediated processes (including incorporation into soil organic matter with subsequent biological oxidation to CO_2). Parent fenoxycarb does not degrade in sterile soil (Pryde and Etterli, 00109331) further suggesting fenoxycarb degradation is microbially-mediated process. Hence, fenoxycarb is apparently stablized under anaerobic soil condition due to physical adsorption to the soil matrix.

MATERIALS AND METHODS:

Three Swiss soils: Commugny, Dielsdorf, and Steinmaur (Table 0 for characteristics) were fortified with 5 ppm ^{14}C-fenoxycarb/unlabeled fenoxycarb and aged aerobically for 30 days prior to the initiation of anaerobic conditions. Conditions of the ageing period are identical to that described for the aerobic soil metabolism study described previously. After ageing, anaerobic conditions were established by waterlogging the soil and repeated evacuations and admissions of nitrogen gas.

The soil sample vessels were stoppered and incubated at 22° C in the dark for 29 and 60 days for the Commugny and Dielsdorf soils and for 30 and 60 days for the Steinmaur soil. Any radiolabeled volatile

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compounds were trapped by bubbling through hexane (organics) and carbosorb (CO_2) in a stream of gas. At the end of the anaerobic incubation period, the soil/water fraction was centrifuged. An aliquot of the water was taken for radioactivity quantitation by LSC. The soil was extracted with buffered acetonitrile which was subsequently extracted with ethyl acetate. The radioactivity in the ethyl acetate fraction was analyzed by TLC. The radioactivity in all extraction fractions was quantitated by LSC.

The soil was further extracted by soxhlet extraction with acetonitrile and methanol to remove any additional extractable radioactive residues.

REPORTED RESULTS:

The authors report that the recovery of radioactivity in spiked control samples was 101.2%. The overall recovery of radioactivity from the soil incubated under anaerobic conditions ranged from 96.4% to 98.2% of the applied radioactivity. No volatile organics and only negligible amounts of $^{14}CO_2$ (less than 0.1% of the applied radioactivity) were found. The extractable radioactivity ranged from 67.6% to 89.5% (including that extracted by soxhlet extraction) of the applied radioactivity pending on soil type and length of incubation. Soil bound radioactivity (via combustion) accounted for 8.3%-17.8% and 10.4% to 29.0% of the applied radioactivity 29 or 30 and 60 days after incubation under anaerobic conditions (Table I).

The majority of the extracted radioactivity was unchanged fenoxycarb which accounted for 66% to 85% and 54% to 76% of the applied radioactivity after 29 or 30 and 60 days incubation under anaerobic conditions. Up to four unidentified metabolites were also found and accounted for 2% to 10% of the applied radioactivity) were found. Soxhlet extraction extracted an additional 5.6% to 13.6% of the applied radioactivity. Fenoxycarb accounted for the majority of this soxhlet extracted radioactivity (Table II).

The authors concluded that, in comparison to the aerobic soil metabolism study,under anaerobic conditions there was an inhibition of CO_2 formation and a higher amount of extractable (unbound) radioactivity under anaerobic conditions (Table III).

Based on the results of the study, the authors concluded that fenoxycarb is more slowly degraded in soil under anaerobic conditions than under aerobic conditions.

DISCUSSION:

The soils used in these studies are of Swiss origin; therefore, making interpolation for fenoxycarb degradation in U.S soils difficult to assess. Furthermore, there is no U.S.D.A. soil

classification of the Swiss soils to permit comparison with U.S. soils. Future experiments would be more useful if conducted in U.S. soils.

The soils were sieved to a less than 1.6 mm particle-size distribution; therefore, very-coarse sand was remove from the soil likely changing soil physical properties. EFGWB accepts this experimental protocol; however, future experiments should be conducted on soils sieved to less than 2.0 mm particle-size distribution.

The soils were exposed to acetone (45 ml acetone/ 850 grams of soil) prior to incubation for the anaerobic metabolism studies. EFGWB is concerned about the affect this amount of acetone has on soil microbial activity.

Although this study is accepatable and fulfills current EPA guidelines for the anaerobic soil metabolism study, there was no measurement of the soil redox potential during soil incubation and therefore no index of electron activity or reducing conditions. The equilibrated soil redox conditions was probably greater than a pe + pH of 7 since there was no methane production. EFGWB suggest that future studies incorporate some measure of the soil redox potential in order to provide an index of anaerobicity.

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DATA EVALUATION RECORD

STUDY IDENTIFICATION:

Pyrde, A. and M. Etterli. 1982. Laboratory Leaching with ^{14}C-Ro 13-5223/024. Report No. 041/2830. Maag Agrochemicals. (MRID No. 00109333).

TYPE OF STUDY: Mobility-Column Leaching

REVIEWED BY:

James Hetrick, Ph.D., Chemist
Review Section 1, EFGWB, EFED

Signature: James C. Hetrick
Date: 3-2-90

APPROVED BY:

Paul J. Mastradone, Ph.D., Section Chief
Review Section 1, EFGWB, EFED

Signature: Paul J Mastradone
Date: MAR - 2 1990

CONCLUSIONS:

General: This study is scientifically sound but is considered to be supplemental. The soils used in these studies were insufficiently compared to U.S soils. Furthermore, the soils used in these studies were sieved through a 0.8 mm sieve and, therefore, coarse and very coarse sand fractions were removed from the soil (USDA textural classification). Finely-sieved soil may impede pesticide mobility by decreasing the soil pore volume and increasing the effective soil colloid adsorption surface-area. In addition, distilled water was used as an eluent instead of a 0.1 M $CaCl_2$ solution. Eluent low in Ca^{+2} may cause dispersion of the soil particles (expansion of the soil colloid diffuse double layer) with subsequent constriction to water movement. Hence, EFGWB concludes that leaching data produced by these experimental procedures may underestimate fenoxycarb movement in soil.

Unaged Soil: The unaged leaching study is scientifically valid; however, the study is considered supplemental for the data requirements. Only two soils types are represented in the unaged leaching studies. More importantly, the unaged leaching study used only 40% (393 ml) of the required eluent to leach a 30 cm packed soil column. In addition, distilled water was used as an eluent instead of 0.1 M $CaCl_2$ solution.

Aged Soil: The aged-leaching study supplements the Subdivision N data requirements. Only one soil was used in this study and it was of foreign origin. As noted in the general discussion of the soil used in the aged-leaching studies were poorly compared to U.S. soils. Additionally, the soil in the aged-leaching study was eluted with distilled water instead of 0.01 M $CaCl_2$ solution.

Based on supplemental data provided in these studies, EFGWB concludes that fenoxycarb does not appear to be mobile under the conditions of the study conditions. Results of the aged-leaching study indicate that less than 3 % of the parent ^{14}C fenoxycarb moved beyond the 0-5 cm pesticide application zone. The aged-leaching study indicates that ^{14}C from radiolabelled fenoxycarb was predominately found in the eluent and soil column as unaltered parent fenoxycarb with trace quantities of unidentified degradates. Similarly, the unaged leaching studies (based on supplemental results) suggest that less than 1% of the parent fenoxycarb moved below the 0-5 cm pesticide application site.

MATERIALS AND METHODS:

Samples of two Swiss soils, Steinmaur and Wallis soils (see Table 0 for characteristics) sieved to 800 um were added as a slurry to 5 cm diameter glass columns to a height of 30 cm. Excess water was allowed to drain from the column. Soil columns were fortified with ^{14}C-fenoxycarb (radiolabeled in the 1,4 carbon positions of the dioxyphenyl ring, specific activity = 36.06 uCi/mg, radiochemical purity = >98%, chemical purity =>99%) equivalent to 0.876 kg/ha and immediately eluted with 393 ml of water (simulating a 20 cm rainfall) over a period of two days.

For aged residues, a sample of Steinmaur soil was fortified with ^{14}C-fenoxycarb to 5 ppm and aged under aerobic conditions for 30 days. After incubation, a soil sample was placed on a soil column similarly prepared as described above and eluted with 0.52 ha-cm (10.2 ml) of water for 40 days for total of 408 ml of water applied.

After elution of the water, the soil was extracted from the columns and sectioned into six 5 cm segments. The top 0-5 cm segment of soil was extracted using buffered acetonitrile solution then soxhlet extracted using acetonitrile. Radioactivity in the extraction phases (organic and aqueous) was quantitated by LSC. Tentative identification of extracted radioactivity was conducted with TLC. Soil bound (non-extracted) radioactivity was determined by combustion of soil sample and quantitating the CO_2 released.

REPORTED RESULTS:

The authors report that, for the unaged soil, recovery (material balance) ranged from 102.0% to 111.7% in the Steinmaur soil and from 114.6% to 118.5% in the Wallis soil. For the aged soil, recovery ranged from 93.7% to 100.1% of the column applied radioactivity in the Steinmaur soils.

The authors report that, in both the aged and unaged soil columns, all eluates and soil segments other than the top (0 to 5 cm) segment contained only traces (<1%) of the applied radioactivity for both Steinmaur and Wallis soils. In the aged residue soil column, 93.6%

of the applied radioactivity was located in the top 0 to 5 cm of the soil column (i.e., at the point of application) (Tables 1 and 2).

The majority of the soil extractable radioactive residues was present as unchanged Ro 13-5223. Fenoxycarb accounted for 50.1% and 80.6% of the applied radioactivity and extracted from the 0-5 cm column segment of the unaged Steinmaur and Wallis soils, respectively, and 56.8% of the applied radioactivity in the aged Steinmaur soil. Several unidentified degradation products were observed in trace amounts (Figures 1, 2, and 3).

Based on the results of the study, the authors concluded that both aged and unaged residues are strongly bound to typical loam and sandy loam soils and showed little or no tendency to leach.

DISCUSSION:

The soils used in these studies are of Swiss origin; therefore, making interpolation of fenoxycarb mobility in U.S. soils difficult to assess. Furthermore, there is no U.S.D.A. soil classification of the Swiss soils to permit interpolation of the soil properties to U.S. soils. Future experiments would be more useful if conducted in U.S. soils.

The soils were sieved to less than a 0.8 mm particle-size distribution and, therefore, the sand fractions were removed from the soil. EFGWB recognizes finely-sieved soil increases pesticide adsorption and eliminates any soil structural affect on soil pore-size distribution. Hence, EFGWB concludes the leaching data may underestimate the potential for fenoxycarb leaching. In future experiments, the soil should be sieved to < 2 mm to avoid altering the soil physicochemical properties.

The leachate samples contained straw-colored material lending evidence to movement of organic materials. The leachates, however, contained less than 1% of the parent fenoxycarb applied to the soil column leaching cylinder. EFGWB concludes that fenoxycarb and degradates do not appear to be integrally associated with the soluble soil organic matter fraction.

The eluant did not contain Ca^{+2} to promote flocculation of soil particles. EFGWB recognizes the column leaching studies may underestimate fenoxycarb leaching potential due to soil particle dispersion. Future leaching experiments should use an eluant with at least a 0.01 M Ca^{+2} concentration.

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DATA EVALUATION RECORD

STUDY IDENTIFICATION:

Pyrde, A. and M. Etterli. 1982. Freundlich Adsorption and Desorption constants for ^{14}C-Ro 13-5223/024 in Four Soils. Report No. 041.2674. Maag Agrochemicals. (MRID No. 00109333).

TYPE OF STUDY: Leaching - Adsorption/desorption

REVIEWED BY:

James Hetrick, Ph.D., Chemist
Review Section 1, EFGWB, EFED

Signature: James G. Hetrick
Date: 3-2-90

APPROVED BY:

Paul J. Mastradone, Ph.D., Section Chief
Review Section 1, EFGWB, EFED

Signature: Paul J. Mastradone
Date: MAR - 2 ...

CONCLUSIONS:

This study is considered supplemental and does not fulfill the data requirement for adsorption/desorption studies. The soils used in these studies were finely-sieved (< 0.5 mm); therefore, the adsorption surface area (based on soil mass) of the soil will be higher than soil sieved through a 2 mm sieve (See discussion section). In addition, the distilled water rather than a 0.01 M Ca^{+2} solution as the equilibration matrix.

Based on supplemental data, parent fenoxycarb has a moderate to strong soil binding affinity (Kd 17 to 77) to soil particles rendering it immobile in the soil. Similarly, the column leaching studies (Pyrde and Etterli, 00109331) indicates that parent fenoxycarb and degradates did not leach beyond the pesticide application site.

MATERIALS AND METHODS:

Stock solutions of ^{14}C-fenoxycarb (specific activity= 36.06 uCi/mg, radiochemical purity =>98%, chemical purity =>99%) were prepared in distilled water at 0.099,0.29, 1.19 and 1.3 ppm. Aliquots of the stock solutions were added to triplicate samples of four Swiss soils (Dielsdorf, Steinmaur, Commugny and Wallis soils,Table 0 for characteristics) and shaken for 24 hours at 20°C. Solutions were then centrifuged and aliquots of the supernatant were taken. Radioactivity in the supernatant was quantitated by LSC. Desorption constants were determined by re-suspending the centrifuged soil in distilled water or saturated calcium sulfate solution. Freundlich adsorption (and desorption) coefficients were calculated based on the amount of radioactivity adsorbed to the soil particles.

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REPORTED RESULTS:

The authors reported Freundlich adsorption constants of 49, 77 and 77 for the heavier Dielsdorf, Steinmaur and Commugny soils and 18 for the lighter Wallis soil. Desorption values for the distilled water were 73, 98, and 125 for the Dielsdorf, Steinmaur and Commugny soils, respectively, and 24 for the Wallis soil. The desorption values for the saturated calcium sulfate solution were somewhat less (Tables 1-9).

The authors reported that fenoxycarb has moderate adsorption to lighter soils (Wallis, organic matter content = 1.4%, adsorption K value of 17) and strong adsorption to heavier soils (Dielsdorf, Steinmaur and Commugny soils where organic matter = >2%, adsorption K values ranging from 49 to 77).

The authors concluded that fenoxycarb would be strongly adsorbed to most agricultural soils.

DISCUSSION:

The soils were sieved to a less than 0.5 mm particle-size distribution and, therefore, the coarse sand fractions were removed from the soil. EFGWB recognises finely-sieved soil increases pesticide adsorption by concentrating the soil exchange capacity and increased surface area (based on a soil mass). Hence, EFGWB concludes the adsorption/desorption data may overestimate the potential for fenoxycarb binding to soil. In future experiments, the soil should be sieved to < 2 mm to avoid altering the soil physicochemical properties.

The use of distilled water as an equilibration matrix prevents control of the "soil solution" ionic strength; therefore, the ionic strength of the equilibration matrix is controlled by mineral dissolution kinetics and cation exchange mechanisms. The lack of control on the soil solution ionic strength may prevent pesticide-colloid equilibration due to alteration of ion activities.

DATA EVALUATION RECORD

STUDY IDENTIFICATION:

Pyrde, A. and M. Etterli., 1982. Freundlich Adsorption and Desorption constants for ^{14}C-Ro 13-5223/024 in Four Soils. Report No. 041.2674. Maag Agrochemicals. (MRID No. 00109333).

TYPE OF STUDY: Leaching - Adsorption/desorption

REVIEWED BY:

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Signature: James G. Hetrick
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Review Section 1, EFGWB, EFED

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CONCLUSIONS:

This study is considered supplemental and does not fulfill the data requirement for adsorption/desorption studies. The soils used in these studies were finely-sieved (< 0.5 mm); therefore, the adsorption surface area (based on soil mass) of the soil will be higher than soil sieved through a 2 mm sieve (See discussion section). In addition, the distilled water rather than a 0.01 M Ca^{+2} solution as the equilibration matrix.

Based on supplemental data, parent fenoxycarb has a moderate to strong soil binding affinity (Kd 17 to 77) to soil particles rendering it immobile in the soil. Similarly, the column leaching studies (Pyrde and Etterli, 00109331) indicates that parent fenoxycarb and degradates did not leach beyond the pesticide application site.

MATERIALS AND METHODS:

Stock solutions of ^{14}C-fenoxycarb (specific activity= 36.06 uCi/mg, radiochemical purity =>98%, chemical purity =>99%) were prepared in distilled water at 0.099,0.29, 1.19 and 1.3 ppm. Aliquots of the stock solutions were added to triplicate samples of four Swiss soils (Dielsdorf, Steinmaur, Commugny and Wallis soils,Table 0 for characteristics) and shaken for 24 hours at 20°C. Solutions were then centrifuged and aliquots of the supernatant were taken. Radioactivity in the supernatant was quantitated by LSC. Desorption constants were determined by re-suspending the centrifuged soil in distilled water or saturated calcium sulfate solution. Freundlich adsorption (and desorption) coefficients were calculated based on the amount of radioactivity adsorbed to the soil particles.

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____ Description of the product manufacturing process.

____ Description of quality control procedures.

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____ A draft product label.

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REPORTED RESULTS:

The authors reported Freundlich adsorption constants of 49, 77 and 77 for the heavier Dielsdorf, Steinmaur and Commugny soils and 18 for the lighter Wallis soil. Desorption values for the distilled water were 73, 98, and 125 for the Dielsdorf, Steinmaur and Commugny soils, respectively, and 24 for the Wallis soil. The desorption values for the saturated calcium sulfate solution were somewhat less (Tables 1-9).

The authors reported that fenoxycarb has moderate adsorption to lighter soils (Wallis, organic matter content = 1.4%, adsorption K value of 17) and strong adsorption to heavier soils (Dielsdorf, Steinmaur and Commugny soils where organic matter = >2%, adsorption K values ranging from 49 to 77).

The authors concluded that fenoxycarb would be strongly adsorbed to most agricultural soils.

DISCUSSION:

The soils were sieved to a less than 0.5 mm particle-size distribution and, therefore, the coarse sand fractions were removed from the soil. EFGWB recognizes finely-sieved soil increases pesticide adsorption by concentrating the soil exchange capacity and increased surface area (based on a soil mass). Hence, EFGWB concludes the adsorption/desorption data may overestimate the potential for fenoxycarb binding to soil. In future experiments, the soil should be sieved to < 2 mm to avoid altering the soil physicochemical properties.

The use of distilled water as an equilibration matrix prevents control of the "soil solution" ionic strength; therefore, the ionic strength of the equilibration matrix is controlled by mineral dissolution kinetics and cation exchange mechanisms. The lack of control on the soil solution ionic strength may prevent pesticide-colloid equilibration due to alteration of ion activities.

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DATA EVALUATION RECORD

STUDY IDENTIFICATION:

Flyer, J. 1982. Field Dissipation Study of Ro 13-5223 When Applied to Pasture Grass as a Fire Ant Bait. Report No. US82.AL.1. Maag Agrochemicals. Accession No. 071847. [Note: This study was submitted as Report No. US82-AL.2a (Corrected Version) in the submission with Accession No. 071853]. (MRID No. 00128534).

TYPE OF STUDY: Field dissipation-soil

REVIEWED BY:

James A. Hetrick, Ph.D., Chemist
Review Section 1, EFGWB, EFED

Signature: James A. Hetrick
Date: 3-2-90

APPROVED BY:

Paul J. Mastradone, Ph.D., Section Chief
Review Section 1, EFGWB, EFED

Signature: Paul J Mastradone
Date: -2

CONCLUSIONS:

This study and the companion study (Flyer, 00115234) partially fulfills the Subdivision N guidelines. These studies only partially fulfill the data requirements because: they were conducted at one site in Florida and there was no field replication of soil samples. In order to fulfill the field dissipation data requirements another study needs to be conducted at another site typical of the pesticide-use area. The ^{14}C-fenoxycarb field dissipation study conducted in Switzerland (reviewed 11/30/84), cannot be used to satisfy the data requirement because field dissipation studies must be conducted in the United States. Therefore, the field dissipation data requirement requires an additional study that must be conducted in U.S. soil. It is suggested the study be designed in accordance with the field dissipation SEP with particular attention to soil sampling schemes and plot designs (See discussion section).

EFGWB concludes fenoxycarb applied at 20X (0.224 lbs/A) the recommended rate had a dissipation half-life of less than 14 days. In a companion study (Flyer,00128534), fenoxycarb applied a normal-use rates (0.010 lbs/A) had a dissipation half-life of 7 days. Furthermore in this study, no parent fenoxycarb leached deeper than 5 cm during a 28 day incubation period.

MATERIALS AND METHODS:

Ten replicated plots of sandy soil (Table 00 for characteristics) with Bahia grass in Vero Beach, Florida, were treated with 251 g ai/ha, or approximately 20X the expected use rate of fenoxycarb

(formulated with 0.88% fenoxycarb [redacted] via broadcast application. Soil core samples are taken to depth of 30 cm at 2 hours, 1, 2, 7, 14, and 28 days after application. Soil cores were extruded and separated into 7.5 cm segments and allowed to dry overnight. After drying, the soil was sieved through 4 mm sieve and the composite sample stored in the freezer until analysis. All samples were analyzed within 7 days of sampling.

The soil samples were extracted by homogenizing in acetone. The extract was cleaned up by solvent partitioning with water then hexane followed by column chromatography with elution using 10% ethyl acetate in hexane. After clean up the sample was redissolved in acetonitrile and analyzed by reverse phase HPLC.

REPORTED RESULTS:

The author reported that, for the analytical method used, the mean recovery was 97% at 0.08 ug g^{-1} fortification. Detection limit of the method was 0.03 ug g^{-1} for soil (Table 2).

Detectable residues were found only in the soil at the 0 - 7.5 cm depth. Residue levels declined from 1.40 ug g^{-1} at 2 hours after application to 0.08 ug g^{-1} at 28 days after application. Table 1

The author concluded that the estimated half-life of fenoxycarb when applied at exaggerated rates was less than 14 days and no leaching was observed.

DISCUSSION:

The major deficiency in this study is that only one composite sample was analyzed for each sampling date. It appears that 20 soil cores were taken and composited into a single sample for analysis. Interpretation of data derived from only one sample analysis are of limited scientific value because it does not provide an estimate of the field sampling or analytical variability.

The field dissipation studies indicate fenoxycarb has a half-life of 7 days; however, the laboratory studies suggest the aerobic metabolism, a major route of degradation of fenoxycarb, has a half-life of 40 days. EFGWB has a concern on extrapolating between laboratory and field data from different soil types and origins. The laboratory soils used for the registration standard are of Swiss origin; however, the field dissipation studies were conducted in Florida soils. EFGWB recognizes the soil-forming factors (including climate, parent material, vegetation, topography, and time) differ between Swiss and U.S. soil; therefore, the physicochemical properties of soil may significantly vary between soils of different origin.

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DATA EVALUATION RECORD

STUDY IDENTIFICATION:

Fyler, J. 1983. Field Dissipation Study of Fenoxycarb (Ro 13-5223) When applied to Pasture Grass as a Fire Ant Bait at Expected Use Rates. Report No. US83-AL.2 Maag Agrochemicals. (MRID No. 00115237).

TYPE OF STUDY: Field dissipation soil

REVIEWED BY:

James A. Hetrick, Ph.D., Chemist
Review Section 1, EFGWB, EFED

Signature: James A. Hetrick
Date: 3-2-90

APPROVED BY:

Paul J. Mastradone, Section Chief
Review Section 1, EFGWB, EFED

Signature: Paul J Mastradone
Date:

CONCLUSIONS:

This study in combination with study (Flyer, 00128534) partially fulfills Subdivision N guideline data requirements. The study was conducted at one site and fenoxycarb dissipation was assessed to a depth of only 3cm. The ^{14}C-fenoxycarb field dissipation study conducted in Switzerland (reviewed and accepted in review dated 11/30/84), cannot be used to satisfy the data requirement because field dissipation studies must be conducted in the United States. As noted in study (Flyer, 00115234), an additional study designed and conducted according to field dissipation SEP protocol are needed to fulfill the data requirements.

EFGWB concludes fenoxycarb, applied at a rate of 0.01 lbs a.i./A, had a dissipation half-life of 7 days in surface soils.

MATERIALS AND METHODS:

Two plots of sandy soil (Table 00 for characteristics) with Bahia grass located in Vero Beach, Florida, were treated with two formulations of fenoxycarb: ACR 2913 (1% fenoxycarb on [redacted] and ACR 2913A (1% fenoxycarb on [redacted] at rates of 11.5 g ai/ ha (ACR 2913) and 10.4 g ai/ ha (ACR 2913A)via broadcast application. The rate is 1X the expected use rate.

Plots were sampled at 20 random locations to depth of 3 cm at 1 hour, 1, 3, and 7 days after application. Soil core samples were composited to make 1 sample for analysis.

INERT INGREDIENT INFORMATION IS NOT INCLUDED

The composite sample was frozen until analysis. Most samples were extracted after one day of storage and all samples were extracted within a week of sampling. Extracts were stored in hexane solution at -20° C until they could be cleaned up and analyzed. The soil sample was extracted by homogenizing in acetone. The extract was cleaned up by solvent partitioning using water and acetone followed by column chromatography with elution with 10% ethyl acetate in hexane. After clean up the sample was redissolved in acetonitrile and analyzed by reverse phase HPLC.

REPORTED RESULTS:

The author reported that residues were 0.018, 0.012, and 0.007 ug g^{-1} 1 hour, 1 and 3 days after ACR 2913 application, respectively. Residues were 0.014, 0.009 and 0.006 ug g^{-1} 1 hour, 1 and 3 days after ACR 2913A application (Appendix VI).

Based on the results, the author concluded that residues declined at a rapid rate in both soil and grass and were well below analytical detection limits at 7 days after treatment.

DISCUSSION:

The major deficiency in this study is that only one composite sample was analyzed for each sampling date. It appears that 20 soil cores were taken and composited into a single sample for analysis. Interpretation of data derived from only one sample analysis is of limited scientific value because it does not provide any estimate of field or analytical variability. Furthermore, the soil samples were taken only to a depth of 3 cm which prevents assessing the field leaching potential.

The field dissipation studies indicate fenoxycarb has a half-life of 7 days; however, the laboratory studies suggest the aerobic metabolism, a major route of degradation of fenoxycarb, has a half-life of 40 days. EFGWB has concern on extrapolating between laboratory and field data from different soil types and origins. The laboratory soils used for the registration standard are of Swiss origin; however, the field dissipation studies were conducted in Florida soils. EFGWB recognizes the soil-forming factors (including climate, parent material, vegetation, topography, and time) differ between Swiss and U.S. soil; therefore, the physicochemical properties of soil may significantly vary between soils of different origin.

Since no site description was provided in the report, EFGWB assumes the site of this study was similar and adjacent to that described in study (Flyer, 00128534).

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DATA EVALUATION RECORD

STUDY IDENTIFICATION:

A. Pryde and M. Atterli. 1982. Outdoor Dissipation Study with 14C-Ro 13-5223/024 Formulated as the Fire Ant Bait ACR-2913. (MRID No. 00142607).

TYPE OF STUDY: Field Dissipation Study

REVIEWED BY:

Soobok Hong, Ph.D., Chemist
Review Section 1, EAB, HED

APPROVED BY:

Samual M. Creeger, Section Chief
Review Section 1, EFGWB, EFED

COMPILED BY:

James A. Hetrick, Ph.D., Chemist
Review Section 1, EFGWB, EFED

Signature: James A. Hetrick
Date: 3/2/90

CONCLUSIONS:

This study was reviewed (11/28/84) and accepted as fulfilling the field dissipation data requirement. Upon further review, the field dissipation study is scientifically valid; however, the study does not fulfill the Subdivision N guidelines. Studies on foreign soils are not acceptable to fulfill field dissipation data requirements. Hence, EFGWB concludes the study provides supplemental data on field dissipation of fenoxycarb.

EFGWB concludes, based on supplemental data, that radiolabelled fenoxycarb (Ro 13-5223/024) has a dissipation rate of 17.6 days in Swiss soil. Trace quantities of a degradate, Ro 16-8797, were identified in soil during the experiment. Fenoxycarb appears to dissipate rapidly ($t_{1/2}$= 7 to 17 days) during an aerobic soil incubation.

MATERIALS AND METHODS:

Twenty-four cylindrical PVC tubes (cross-sectional area 26.4 cm^2; length, 15 cm) were driven into a $2m^2$ untreated outdoor bare loam soil plot (soil characteristics: humus 5.5%; pH 6.6; clay 26.2%; silt 31.1%; CEC: H^+ 4.16; Ca^{+2} 14.22; Mg^{+2} 1.57; K^+ 0.13; Na^+ 0.06) to a depth of 13 cm; the 2 cm rim prevented formulation from being washed during heavy rainfall. ACR-2913 (505 mg) was applied as monolayer to

the soil surface within each tube and the entire plot was protected with bird-netting. Sampling was done at 0, 1, 4, 8, 15, 36, 49, 57, 78, 93, and 133 days by removing 2 tubes and the soil they contained. On day 133, 4 tubes were removed; 2 tubes were combined resulting in two samples for analysis. The top 0-5 cm segments were analyzed for all samples investigated; in addition, the 5-13cm segments were also analyzed for samples older than 36 days.

The soil samples were extracted with acetone (Soxhlet, 6 hours), and the acetone extracts and the soil residues were radioassayed. After the acetone extract was evaporated to dryness and the residues redissolved in 10 ml of acetone, aliquots (ca. 4 x 10^5 dpm) were partitioned in hexane/acetonitrile. The acetonitrile phase was analyzed by radio-TLC (silica plates precoated Kieselgel 60 F254; hexane/EtOAc/ glac. HAc = 66/33/1, EtOAc/i-propanol/25 % NH_4OH = 99/2/2) and radio-HPLC. The acetone-extracted soil residues were re-extracted with acetonitrile (Soxhlet, 6 hours) and the acetonitrile extract was radioassayed.

REPORTED RESULTS:

The distribution of residual radioactivity in ACR-2913 treated soil samples (Table 1). The variation in the amounts of extractable and bound activity is shown in Figure 1, along with the radioactive recovery. Only 30 % of the applied activity was recovered after 133 days partly due to the loss of ^{14}C via $^{14}CO_2$ evolution. The amount of bound residues peaked at day 78 and thereafter declined.

Results from the TLC analysis of the original acetone extracts are shown in Table 2. Most of the radioactivity was due to the unaltered parent compound. Its major metabolite, tentatively identified as Ro 16-8797, and other unknown polar metabolites together accounted for less than 8% of the total radioactivity applied throughout the study. The half-life of the parent compound was estimated to be 17.6 days (Figure 2).

DISCUSSION:

The study was reviewed on 11/28/84 and accepted as fulfilling the field dissipation data requirement. However, upon further review the field dissipation study is considered only supplemental because it was conducted at a foreign site. Hence, EFGWB concludes the study provides supplemental information on fenoxycarb field dissipation data.

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DATA EVALUATION RECORD

STUDY IDENTIFICATION:

Ellgehausen, H. 1985. Accumulation and Elimination of 14C-Ro 13-5223/024 by Bluegill Sunfish in a Dynamic Flow Through System (MRID No. 00148191).

TYPE OF STUDY: Fish accumulation study

REVIEWED BY:

Akiva D. Abramovitch, Ph.D., Chemist
Review Section 1, EFGWB, EFED

APPROVED BY:

Sanuel Creeger, Section Chief
Review Section 1, EFGWB, EFED

COMPILED BY:

James A. Hetrick, Ph.D., Chemist
Review Section 1, EFGWB, EFED

Signature: James A. Hetrick
Date: 3-2-90

CONCLUSIONS:

Based on the combined results of this study and study (Ellgenhausen, 00148191), EFGWB accepts the fish accumulation studies fulfill the data requirements. The data submitted indicated the bioaccumulation factor for fenoxycarb was 277.6 (whole fish), 138.9 (edibles), and 439.6 (non-edibles) but 99.0, 98.1, and 98.4% of the initially accumulated organic material was eliminated in a two week depuration. Most of the residual material (94%) in the edible portion was the parent Ro 13-5223. The non-edible portion contained in addition to the parent compound (64%), some polar degradates of which hydroxylated metabolites were positively identified.

MATERIALS AND METHODS:

The study was conducted with a ^{14}C radiolabelled Ro 13-5223/024 of a specific radioactivity of 36.06 uCi mg^{-1} and 98% radiochemical purity. This material was mixed with unlabeled active ingredient resulting in a specific activity of 0.832 uCi mg^{-1}. The flow through system contained three individual water tanks containing 100 liters of water. Two tanks received 150 fish each and the control tank 50 fish. The fish (average weight of 3 gm) were acclimated for four weeks prior to experimentation and during that period only 0.6% mortality was observed. The temperature was maintained at 20°C (19.5-20.0°C) throughout the experiment. The pH and the temperature,

were recorded when the samples were taken at days 0, 1, 3, 7, 14, 21 and 28 of the exposure period and 7.4-8 and the oxygen concentration averaged 7.4 mg L^{-1}. Samples of 15 fish were taken at the specified time intervals. Additional fish (12-30) were taken for future analysis of metabolites. Control fish were taken at the specified time intervals. Additional fish were taken for future analysis of the metabolites. Control fish were taken for analysis at days 0 and 28. The fish samples were separated into edible and non-edible portions and homogenized. Aliquots of the homogenized fish samples were placed in 25 ml glass scintillation vials and 2.0 ml of tissue solubilizer was added and incubated at 50°C for 24 hours. Then 20 ml of scintillation mixture were added and the radioactivity was determined. For control purposes, the radioactivity in various samples was also determined also by combustion. Water samples were extracted with chloroform and analyzed on TLC plates in reference to authentic samples of Ro-5223/024 and potential metabolites.

REPORTED RESULTS:

The accumulation in fish reached a plateau in about 7 days and reached values of 77.04+/-8.38 mg kg^{-1} for the whole fish, 38.52 +/-4.8 mg kg^{-1} for the edible parts and 121.99 +/-25.6 mg kg^{-1} for the non-edible parts. A bioaccumulation factor of 277.6, 138.9, and 439.6 was not obtained for the whole fish, edible and non-edible parts, respectively. Depuration was fast within the initial 7 days and the residual radioactivity dropped to 1.5, 2.4, and 2.1% of their plateau values for the edible, non-edible and whole fish, respectively. The elimination rate of residual radioactivity can be described by a second order reaction kinetics. Based on the octanol/water partition coefficient, a value of 277, the registrant calculated a BCF value of 69.6 based on log=4.28 and the formula log BCF = 0.83 x log P - 1.71.

DISCUSSION:

Based on the 28 day data, BCF of 163, 572, and 319 were obtained in the edibles, non-edibles, and whole fish, respectively.

For added clarity the two fish accumulation studies should have been combined into one study. Furthermore, EFGWB disagree with author's position that the accumulation plateau was reached at 7 days (it appears that accumulation was still occurring when exposure was at 28 days).

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DATA EVALUATION RECORD

STUDY IDENTIFICATION:

Ellgehausen, H. 1985.Nature of Radioactive Residues in 14C-Ro 13-5223/024 - Treated Bluegill Sunfish (MRID No. 00148191).

TYPE OF STUDY: Fish accumulation study

REVIEWED BY:

Akiva D. Abramovitch, Ph.D., Chemist
Review Section 1, EFGWB, EFED

APPROVED BY:

Samual M. Creeger, Section Chief
Review Section 1, EFGWB, EFED

COMPILED BY:

James A. Hetrick, Ph.D., Chemist
Review Section 1, EFGWB, EFED

Signature: James A. Hetrick
Date: 3/2/90

CONCLUSIONS:

Based on the results of this study and previous studies (Ellgenhausen, 00148191), EFGWB considers the data requirement for the fish accumulation study fulfilled. The data submitted indicated that the bioaccumulation factor for Ro 13-5223 was 277.6 (whole fish), 138.9 (edibles), and 439.6 (non-edibles) but 99.0, 98.1, and 98.4% of the initially accumulated organic material was eliminated in a two week depuration. Most of the residual material (94%) in the edible portion was the parent Ro 13-5223. The non-edible portion contained in addition to the parent compound (64%), some polar degradates of which hydroxylated metabolites were positively identified. Based on the low use rates associated with the proposed fire ant bait use, potential for impact on aquatic systems and accumulation by aquatic organisms is low.

MATERIALS AND METHODS:

Fish samples that were removed after 21 and 28 days of exposure were separated into edible and non-edible portions and homogenized. Aliquots were combusted to determine the total amount of radioactivity. Other portions were extracted with chloroform in asoxhlet for 24 hours, the chloroform was evaporated to dryness and the residue was then dissolved in hexane (100 ml) and partitioned into acetonitrile (100 ml). Additional extraction was accomplished

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with methanol/water (3:1).

REPORTED RESULTS:

Ninety-nine percent of the accumulated radioactivity in the edible sample was extracted with chloroform, the remainder 4.1% with methanol/water (3:1) and unextracted residues (2.1%) were accounted by combustion for a total of 105%. Ninety-six percent of the radioactivity in the chloroform extract, was found in the acetonitrile and 5.5% in the hexane for a total of 101.5%. Analysis of the acetonitrile phase by HPLC indicated that 94.5% of the radioactivity initially accumulated in the edible sample was the parent compound (Ro 13-5223). Radioactivity recoveries of 73.7% were found in the chloroform extract indicated that it contained 63% of the radioactivity initially found in the parent compound and 18.5% of the accumulated radioactive material were fast eluting polar compounds. The major polar degradates identified was Ro 16-8797 (3.9%). Other polar degradates were not identified.

DISCUSSION:

Based on the 28 day data, BCF of 163, 572, and 319 were obtained in the edibles, non-edibles, and whole fish, respectively.

For added clarity the two fish accumulation studies should have been combined into one study. Furthermore, EFGWB disagree with author's position that the accumulation plateau was reached at 7 days (it appears that accumulation was still occurring when exposure was at 28 days).

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The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.

DATA EVALUATION RECORD

STUDY IDENTIFICATION:

A. Pryde and M. E. Herli. 1982. Ro 13-5223/024 (^{14}C) Bioaccumulation Factor and Metabolism Study in Fish as the Fire Ant Bait ACR-2913. Accession No. 041-3489.

TYPE OF STUDY: Fish accumulation study

REVIEWED BY:

Richard V. Moraski, Ph.D., Chemist
Review Section 1, EAB, HED

APPROVED BY:

Samual M. Creeger, Section Chief
Review Section 1, EFGWB, EFED

COMPILED BY:

James A. Hetrick, Ph.D., Chemist
Review Section 1, EFGWB, EFED

Signature:
Date:

CONCLUSIONS:

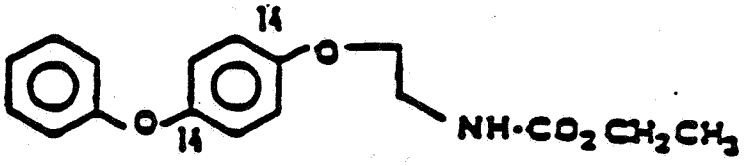
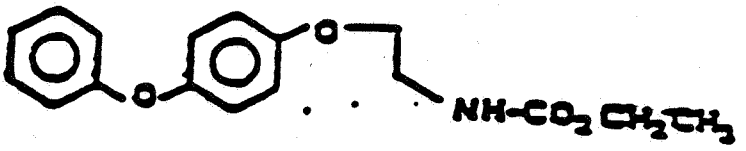
The study is scientifically valid; however, the study does not meet the Subdivision N guidelines. The fish accumulation study was conducted using a static exposure system. EFGWB does not accept static accumulation studies due to the possibility of improper tank mixing of the pesticide solution. EFGWB concludes the study provides supplemental data for the fish accumulation data requirement.

Radiolabelled fenoxycarb (Ro 13-5223/024) appears to have an approximate bioaccumulation factor of 95. In contrast, a companion fish accumulation study (Ellgehausen,00148191) report a whole-fish fenoxycarb bioaccumulation factor of 277. Therefore, EFGWB concludes that fenoxycarb has a bioaccumulation factor between 100 to 277.

MATERIALS AND METHODS:

A static fish accumulation study was conducted using aquarium water spiked with 0.152 ug ml of fenoxycarb. The species of fish used was the bitterling. Forty-six fish were placed in the aquarium; 5 were removed and sampled daily. Samples were taken during the first 4 days. Radioactivity was measured by combustion analysis. During depuration phase, samples were taken on days 1, 3, 6, 11, and 17.

Table 1: Structure of the test compound.

Designation	Structure
^{14}C-Ro 13-5223/024	
Ro 13-5223/000	

depuration phase, samples were taken on days 1, 3, 6, 11, and 17. Metabolite identification was conducted using GC-MS and HPLC.

REPORTED RESULTS:

Using HPLC, radio GC-MS, no unchanged fenoxycarb was recovered from depuration water. Metabolites were present in low quantities. One metabolite was identified as 4,4'-dihydroxybiphenyl ether. A sample of the aquarium water after 4 days accumulation period indicated no parent fenoxycarb was present. Table 1 gives results of accumulation and depuration phases. An approximate bioaccumulation factor of 95 was calculated.

DISCUSSION:

The study was reviewed (11/28/84) and is considered supplemental to fulfilling the fish accumulation data requirements. The fish accumulation study is considered to be a supplemental study because it was conducted in a static system. EFGWB recognizes that a static fish study may invoke pesticide concentration gradients due to improper mixing.

Page 140 is not included in this copy.

Pages _____ through _____ are not included.

The material not included contains the following type of information:

____ Identity of product inert ingredients.

____ Identity of product impurities.

____ Description of the product manufacturing process.

____ Description of quality control procedures.

____ Identity of the source of product ingredients.

____ Sales or other commercial/financial information.

____ A draft product label.

____ The product confidential statement of formula.

____ Information about a pending registration action.

X FIFRA registration data.

____ The document is a duplicate of page(s) _____.

____ The document is not responsive to the request.

The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.

EXECUTIVE SUMMARY

GENERAL:

The environmental fate of fenoxycarb cannot be fully assessed from the submitted data. However, the fate of fenoxycarb (based on all submitted data) in aerobic terrestrial ecosystems appears to be microbially-mediated and is integrally associated with the soil organic matter. Fenoxycarb and its degradates appear to either be oxidized to CO_2 or incorporated into a nonlabile soil organic fraction such as humic acids. Furthermore, fenoxycarb , based on supplemental data, has a high soil colloid adsorption capacity which prevents leaching into ground water.

The soils used in these studies were of Swiss origin and therefore may not be representative of U.S. soils. The registrant provided the necessary soil chemical and physical data (including soil texture, cation exchange capacity, pH); however, there was little attempt to extrapolate soil properties of Swiss soils to comparable U.S. soils. Furthermore, there was no consistency in the soil preparation procedures between experiments. The soils used in the mobility studies were finely-sieved (0.8 to 0.5 mm particle-size distribution). In contrast, the soils used in the anaerobic and aerobic metabolism studies were sieved to less than a 1.6 mm particle-size distribution. Therefore, the lack of a consistent soil particle-size may prevent extrapolation between environment fate experiments. In particular, the exclusion of medium and coarse sand fractions in the fenoxycarb mobility studies may overestimate the adsorption capacity because of a concentration (based on soil mass) of silt and clay size particles. Hence, the lack of soil information and inconsistent soil preparation may limit extrapolation of the environmental fate assessment to U.S soils.

The following guidelines are considered fulfilled by scientifically sound and acceptable data:

HYDROLYSIS (161-1)

(Dieterle and Kaufman, 00109328)

Radiolabelled fenoxycarb (specific activity 36 uCi mg^{-1}, radiochemical purity=98%) did not hydrolyze at 35°C or 50°C in buffered solutions (pH 3, 7, and 9).

SOIL PHOTOLYSIS (161-3)

(Dieterli and Glaus, 405109001)

Radiolabelled fenoxycarb (specific activity 36.03 uCi $mole^{-1}$, 98% radiopurity) in a irradiated sandy loam soil Swiss soil (Dielsdorf soil, pH 6.9) did not photodegrade during a 30 day exposure period. There was no fenoxycarb degradation in soil not exposed to light.

AEROBIC SOIL METABOLISM (162-1)

(Dieterle et al., 00131804)

Radiolabelled fenoxycarb (specific activity 36.03 uCi mole-1, 98% radiopurity) in three Swiss soils had an average aerobic metabolism half-life of 83 days. In a 12 month incubation period, approximately 25% of the parent fenoxycarb was respired as CO2 and 65% was found in intermediate phenolic metabolites. Two degradation products were tentatively identified as Ro-16-8797 ({ethyl[2-(p-(p-hydroxyphenoxy) phenoxy)ethyl] carbamate) and Ro 17-3192 which accounted for 1 to 3 % of the parent fenoxycarb after a 2-3 months incubation period (Appendix 1). The material balance at time 0 and after a 12 month incubation period was 100% and 80%, respectively.

The sterile soil metabolism study (Pryde and Etterli,00109331) provides supplemental data for the aerobic metabolism study (Dieterle et al., 00131804). Although, the study is scientifically sound it is not required to satisfy the Subdivision N data requirement.

(Pryde and Etterli,00109331)

Radiolabelled fenoxycarb (specific activity 36.6 uCi mg^{-1}; radiopurity > 98%) did not degrade during a 28 day incubation in sterile soil. The ^{14}C-parent fenoxycarb was quantitatively removed from soil using a sequential acetonitrile-ethyl acetate extraction. Trace quantities (e.g., < 5%) of the ^{14}C parent fenoxycarb was found in metabolites or bound to soil.

ANAEROBIC SOIL METABOLISM (162-2)

(Dieterle and Kaufman, 00109330)

Radiolabelled fenoxycarb (specific activity 36 uCi mg^{-1}, 98% purity) in three Swiss soils had an average anaerobic soil metabolism half-life of 165 days (5.5 months). During a two month incubation period, less than 1% of the parent fenoxycarb was respired as CO_2 and only 6% was found in degradates. The majority of parent fenoxycarb, nearly 70%, was unaltered and extractable during a 60 day anaerobic incubation period. After an aerobic incubation period, anaerobic incubation conditions were established by flooding the soil with water and purging the O_2 with N_2. Apparently, the equilibrated soil redox potential did not approach a pe + pH of 7 because methane did not form during the incubation period.

FISH ACCUMULATION STUDIES (165-4)

(Ellgehausen, 00148191)

Radiolabelled fenoxycarb (specific activity 36 uCi mg^{-1}, radiopurity=98%) bioaccumulated in whole fish, edible parts, and non-edible parts by 277.6, 138.9, and 439.6, respectively. During the 14

day depuration period, nearly 100% of the radiolabeled organic material was eliminated from the fish. Using second-order kinetics, the fenoxycarb half-life in whole fish, edible parts, and non-edible parts were calculated as 2.6, 4.1, and 3.7 hours, respectively.

(Ellgehausen, 00148191)

Radiolabelled fenoxycarb in bluegill tissue was chemically partitioned into a chloroform extractable (99.2%), methanol/water extractable (4.1%) and bound (2.1%) fractions. Approximately, 96% of the ^{14}C-parent fenoxycarb found in the chloroform extract was distributed between an acetonitrile and hexane fraction. Within the edible parts, approximately 94% of the acetonitrile fraction was identified as the parent fenoxycarb. In the non-edible parts, 63% of the radioactivity was found in the chloroform extract. The methanol and water extract contained only 0.7% of the parent fenoxycarb compound and 18.9% polar degradates. The major degradate was structurally identified as Ro 16-8797; otherwise, numerous polar degradates were detected by HPLC and not structurally identified.

The study (Pyrde and Herli, 0413489) supplements the data requirements for the fish accumulation study.

In a static fish culture, bitterling (Rhodus sericeus) had a bioaccumulation factor of 95 when exposed to radiolabelled fenoxycarb solution. One metabolite, 4,4'-dihydroxybiphenyl ether, was found in trace quantities after a 17 day depuration period.

The following guidelines are considered to be partially fulfilled according to Subdivision N guidelines.

FIELD DISSIPATION STUDIES (164-1)

The following two studies in combination partially satisfy the field dissipation data requirement because they represent one field study site. The Subdivision N guidelines require a minimum of two sites representative of typical pesticide-use areas.

(Flyer, 00115237)

Fenoxycarb, applied as LOGIC ant bait to Bahia grass pasture, had an estimated field dissipation half-life of 7 days in a Florida sandy soil. Fenoxycarb, was broadcast applied at a rate of 251 g ai (approximately 100 ug kg^{-1} based on uniform mixing to a 15 cm soil depth or 22 ug m^{-2} based on a soil surface application without incorporation) to a Florida sandy soil planted with Bahia grass. No parent fenoxycarb or degradates were found below the surface 5 cm of soil.

(Flyer, 00128534)

Fenoxycarb, applied as LOGIC ant bait to Bahia grass pasture, had a field dissipation half-life of approximately 7 days in a Florida sandy soil. Fenoxycarb was broadcast applied in different inert carriers at 1X rates of 11.5 or 10.4 g ai/ha (approximately 5 ug kg^{-1} based on uniform mixing to a 15 cm soil depth or 1.12 ug m^{-2} based on a soil surface application without incorporation) .

The study (Pryde and Atterli, 00142607) supplements the field dissipation study data requirements.

(Pryde and Atterli, 00142607)

Radiolabelled parent fenoxycarb amended to Swiss soils had an estimated dissipation half-life of 17.6 days. After 133 days, only 30% of the applied parent fenoxycarb was accounted for in extractable and bound forms. One degradate was tentatively identified as Ro 16-8797; however, trace quantities of unidentified polar degradates were detected after a 133 days. There was less than 15 % of the recovered parent fenoxycarb found in soil between the 5-13 cm depth.

The following guideline is considered unfulfilled according to Subdivision N data requirements.

AQUEOUS PHOTOLYSIS (161-2)

The study (Dieterle and Kaufman, 00115232) is scientifically sound but does not meet the Subdivision N guidelines because the light source (mercury-arc) is did not simulate natural sunlight distribution and intensity.

(Dieterle and Kaufman, 00115232)

Radiolabelled fenoxycarb (^{14}C at the 1st and 4th C of the dioxyphenyl ring) dissolved in a distilled water/acetonitrile (95:5) buffered solution (pH 3, 5, and 7) had a photolytic half-life of 6 hours. In photosensitized solutions fenoxycarb had a photolytic half-life of 5 hours. Two identified photodegradates were formed by the cleavage of the diphenyether bond of a known standard (Ro 17-3194). Furthermore, numerous unidentified polar degradates (53% of the parent ^{14}C-fenoxycarb) were formed in both sensitized and unsensitized solutions irradiated samples. There was no hydrolytic degradation in the dark control samples. The material balance in the irradiated and control samples was an average 93 and 102 %, respectivitly.

MOBILITY STUDIES (163-1)

The mobility studies (Pryde and Etterli, 00109332; Pryde and Etterli, 00109332) do not satisfy Subdivision N guidelines because the soils were finely-sieved (< 0.5 to 0.8 mm particle-size distribution).

Finely-sieved soil increases the soil pesticide adsorption capacity (based on soil mass) by concentrating sand and silt size particles. Therefore, EFGWB cannot assess the pesticide mobility due to this experimental artifact.

(Pryde and Etterli, 00109333)

In this batch equilibrium study, radiolabelled fenoxycarb (radiolabelled in the 1,4 carbon positions of the dioxyphenyl ring) had a moderate to high absorption capacity (K_d 17-88) for soil. In a sandy loam Swiss soil (1.4% organic matter) fenoxycarb had a moderate adsorption capacity (K_d 18) when compared to a heavier loam Swiss soil (5.6% organic matter; K_d of 88). The adsorption coefficients of four Swiss soils were determined using a batch equilibrium system in distilled and deionized water at constant temperature of 20°C.

(Pryde and Etterli, 00109332)

In a supplemental soil column study, radiolabelled fenoxycarb (radiolabelled in the 1,4 carbon positions of the dioxyphenyl ring) was applied at a rate of 0.875 kg ha^{-1} a.i. to a soil depth of 5 cm. The parent fenoxycarb or degradates did not leach through columns packed with moist loam or sandy loam Swiss soils. After a two day leaching period, simulating a 22 cm rainfall, less than 1% of the radioalabelled fenoxycarb had moved below the 5 cm depth of application. Similarly, less than 3% of the fenoxycarb degradates moved below the depth of application. The fenoxycarb degradates were not structurally identified because they were found in trace amounts. A material balance accounted for approximately 108% and 95% of the parent fenoxycarb quantities in unaged and aged residues, respectively.

Environmental Fate Assessment

Based on all submitted data, the fate of fenoxycarb depends on the ecosystem conditions. In terrestrial ecosystems, the fate of fenoxycarb is apparently dependent upon a microbially-mediated process including biological oxidation and chemical transformations. The rate of dissipation, however, is dependent on the soil redox conditions. In aerobic soil conditions, the fate of parent fenoxycarb is integrally linked to the soil carbon cycle through immobilization into a nonlabile soil organic fraction with subsequent biological oxidation to CO_2. Apparently, fenoxycarb is initially incorporated into a soil organic matter fraction which is moderately resistant to mineralization (i.e., humic acids); therefore, the substrate chemistry controls the mineralization rate to a half-life of approximately 65 days. In contrast, under anaerobic soil conditions the microbially-mediated degradative process is substantially reduced and, therefore, the parent fenoxycarb compound persist for long periods of time ($t_{1/2}$= 165 days). The major degradates from aerobic metabolism were tentatively identified as Ro-16-8797 (ethyl [2(p-(p-hydroxyphenoxy)phenoxy)ethyl] carbamate) and

Ro-17-3192. In addition, aerobic metabolism caused the formation of numerous polar degradates that are not structurally identified. Fenoxycarb was stable to hydrolysis and photolysis degradation further supporting the environmental fate assessment that soil dissipation is a microbially-mediated process.

The mobility of fenoxycarb and degradates in terrestrial ecosystems is controlled by a moderate to high adsorption affinity (K_d 17 to 77) to either soil minerals or organic matter. The parent fenoxycarb will apparently desorb from soil colloid without a significant hysteresis effect when in equilibrium with distilled water or dilute salt solutions. Furthermore, soil-column leaching studies indicate the immobile nature of fenoxycarb because less than 1% moved below the soil application site.

GROUNDWATER AND SURFACE-WATER ASSESSMENT

The ability of fenoxycarb and degradates to leach into groundwater is predominately controlled by soil adsorption. The recommended application rate of fenoxycarb is equivalent to 0.005 ug g^{-1} (based on a 15 cm soil depth). The estimated fenoxycarb concentration in soil solution (assuming 10% moisture content) would be 0.051 ug ml^{-1} ($10^{-6.78}$ M). The soil solution fenoxycarb concentration is several orders of magnitude lower than the solubility product ($10^{-4.70}$ M). Hence, a precipitation/dissolution mechanism does not appear to control the soil solution fenoxycarb concentration.

The actual extent of fenoxycarb retention in soil cannot be adequately assessed without more reliable mobility data. However, based on supplemental batch equilibrium data (Pryde and Etterli, 00109333), fenoxycarb adsorption was roughly modeled by the Freundlich isotherm using the coefficients from a worst-case scenario (K_d=18; 1/n= 0.90). The fenoxycarb soil solution concentration (assuming 10% moisture content) is approximately 0.051 ug ml^{-1} ($10^{-6.78}$ M); therefore, the estimated amount of adsorbed pesticide is 1.23 ug g^{-1}. It appears the adsorbed pesticide concentration exceeds the recommended application rate. In conclusion, it appears fenoxycarb applied at recommended rates should be adsorbed to the soil matrix, and therefore, limit movement of fenoxycarb through soil and into groundwater.

In summary, the data suggests that fenoxycarb may not be prone to leach into groundwater due to an adsorption(K_d 18-77) to the soil matrix. Based on a broadcast application, another dissipation pathway in which fenoxycarb could enter water sources through surface-water runoff. Surface-water runoff for fenoxycarb is a function of the soil erosional processes and, therefore, is likely to be a site specific problem for fenoxycarb movement.

RECOMMENDATION

EFGWB has concerns about extrapolating fenoxycarb environmental fate data for foreign soils to U.S. soils. Furthermore, EFGWB recognizes that soil preparation procedures differ between experiments and therefore limit the comparison between submitted environmental fate studies (See comments in EXECUTIVE SUMMARY). Although EFGWB is concerned with the experimental methods a tentative environmental fate and ground water assessment was derived from the submitted studies.

1. The following data requirements are satisfied. No additional information is required on the accepted studies at this time.

161-1 Hydrolysis
161-3 Photodegradation in soil
162-1 Aerobic soil metabolism
162-2 Anaerobic soil metabolism
165-4 Fish accumulation

2. The following data requirements are considered partially satisfied.

164-1 Field dissipation: The studies (Flyer 00115237; Flyer 00128534) partially satisfy the field dissipation data requirement. An additional study is required at another site typical of a fenoxycarb-use area. This study should address the points noted in the field dissipation standard evaluation procedure (SEP) of December, 1989.

3. The following data requirements for terrestrial food and non-food use of fenoxycarb remain unfulfilled.

161-2 Photodegradation in Water: The study (Dieterle and Kaufman, 00115232) was considered unacceptable because a mercury-vapor lamp was used to simulate sunlight. EFGWB does not accept mercury-vapor irradiation due to a high light energy over very discrete wavelengths.

163-1 Leaching Adsorption/Desorption: The soil mobility studies (Pryde and Etterli, 00109333; Pyrde and Etterli, 00109333) were considered unacceptable because the test soils were finely-sieved. EFGWB recognizes that finely-sieved soils will increase the pesticide adsorption capacity (based on soil mass) by increasing the concentration of silt and clay size particles. Future studies should use soils that are sieved through a 2 mm screen to avoid altering the soil physicochemical properties.

163-2 Laboratory Volatility Study: The registrant is required to submit a laboratory volatility study for terrestrial food-crop use pattern.

165-1 Confined Rotational Crop Accumulation Study: The registrant is required to submit a confined rotational crop study for a terrestrial food-crop use pattern.

202-1 Drift Field Evaluation/ Size Spectrum: The registrant is required to submit a field drift evaluation since fenoxycarb has a catagory 2 toxicity rating and is recommended to be broadcast applied.

4. The following data requirements are reserved pending acceptance of tier 1 data requirements.

161-4 Photodegradation in Air: The air photodegradation study is reserved pending assessment of an acceptable laboratory volatility study.

163-3 Field Volatility: The field volatility study is reserved pending assessment of an acceptable laboratory volatility study.

164-5 Long-term Soil Dissipation Study: The long-term field dissipation is reserved pending assessment an acceptable of field dissipation studies.

165-2 Rotational Field Crop Study: The rotational field crop study is reserved pending assessment of an acceptable confined rotational crop study.

165-5 Aquatic Non-Target Organism Accumulation: The aquatic non-target organism accumulation study is reserved pending assessment of use-pattern.

5. The following data requirements are defined or are not for presently registered uses:

162-2 Anaerobic Aquatic Metabolism Study: No data reviewed. No data are required because fenoxycarb has no proposed aquatic or forestry uses, or any aquatic impact uses involving direct discharges of treated water into outdoor aquatic sites.

162-4 Aerobic Aquatic Metabolism Studies: No data reviewed. No data are required because fenoxycarb has no proposed aquatic or forestry uses, or any aquatic impact uses involving direct discharges of treated water into outdoor aquatic sites.

164-2 Aquatic Field Volatility Dissipation: No data required. No data are required because fenoxycarb has no proposed forestry use.

164-3 Forestry dissipation studies: No data reviewed. No data are required because fenoxycarb has no proposed forestry use.

164-5 Dissipation Studies for Combination Products and Tank Mix Uses: No data reviewed. No data required because combination products or tank mix use studies are currently not being imposed.

165-3 Accumulation studies on irrigated crops: No data reviewed. No data are required because fenoxycarb is not intended for aquatic food crop uses, for uses in or around holding ponds used for irrigation, or for uses involving effluents or discharges to water used for crop production.

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TABLE A. GENERIC DATA REQUIREMENTS FOR FENOXYCARB

Data Requirement	Composition[1]	Use Pattern[2]	Does EPA have data to satisfy this requirement?	Bibliographic Citation	Must additional data be submitted under FIFRA Sec. 3(c)(2)(B)?
40 CFR §158.290 Environmental Fate					
DEGRADATION STUDIES -- LAB:					
161-1. Hydrolysis	TGAI/PAIRA	A,B	YES	00109328	NO
PHOTODEGRADATION:					
161-2. In Water	TGAI/PAIRA	A,B	NO		YES
161-3. On Soil	TGAI/PAIRA	A	YES	40519001	NO
161-4. In Air		A[3]	NO		RESERVED[3]
METABOLISM STUDIES:					
162-1. Aerobic Soil	TGAI/PAIRA	A,B	YES	00131804	NO
162-2. Anaerobic Soil	TGAI/PAIRA	A	YES	00109330	NO
162-3. Anaerobic Aquatic		N/A[4]	NO		NO
162-4. Aerobic Aquatic		N/A[4]	NO		NO

(Continued, footnotes follow)

152

TABLE A. GENERIC DATA REQUIREMENTS FOR FENOXYCARB.

Data Requirement		Composition	Use Pattern	Does EPA have data to satisfy this requirement?	Bibliographic Citation	Must additional data be submitted under FIFRA Sec. 3(c)(2)(B)?
40 CFR §158.290 Environmental Fate (continued)						
MOBILITY STUDIES:						
163-1	Leaching and Adsorption/Desorption	TGAI/PAIRA	A,B	NO[5]		YES
163-2	Volatility (Lab)		A[3]	NO		YES
163-3	Volatility (Field)		A	NO		RESERVED
DISSIPATION STUDIES -- FIELD:						
164-1	Soil	TEP	A,B	PARTIAL[6]	00115237 00128534	YES
164-2	Aquatic (Sediment)		N/A			
164-3	Forestry		N/A			NO
164-4	Combination and Tank Mixes		N/A			
164-5	Soil, Long-Term	TEP	A,B			RESERVED[7]

(Continued, footnotes follow)

153

TABLE A. GENERIC DATA REQUIREMENTS FOR FENOXYCARB.

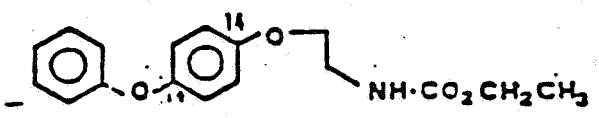
Data Requirement		Composition	Use Pattern	Does EPA have data to satisfy this requirement?	Bibliographic Citation	Must additional data be submitted under FIFRA Sec. 3(c)(2)(B)?
40 CFR §158.290 Environmental Fate (continued)						
ACCUMULATION STUDIES:						
165-1	Rotational Crops (Confined)	PAIRA	A	NO		YES[8]
165-2	Rotational Crops (Field)	TEP	A	NO		RESERVED[9]
165-3	Irrigated Crops		N/A	NO		NO
165-4	In Fish	TGAI/PAIRA	A,B	YES	00148191	NO
165-5	In Aquatic Non-Target Organisms		N/A	NO		RESERVED[10]
40 CFR §158.440 Spray Drift						
201-1	Drift Field Evaluation		A,B	NO		YES[11]
202-1	Drift Size Spectrum		A,B	NO		YES

1. TGAI = Technical Grade of the Active Ingredient; PAIRA = Pure Active Ingredient, Radiolabeled; TEP = Typical End Use Product.

154

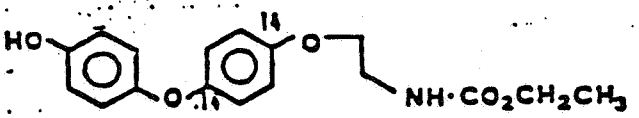
PROPOSED DEGRADATIVE PATHWAY FOR FENOXYCARB

PARENT FENOXCARB:



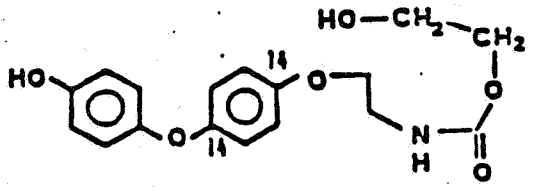
Ro 13—5223

[(2-phenoxyphenoxy) ethyl] carbamate

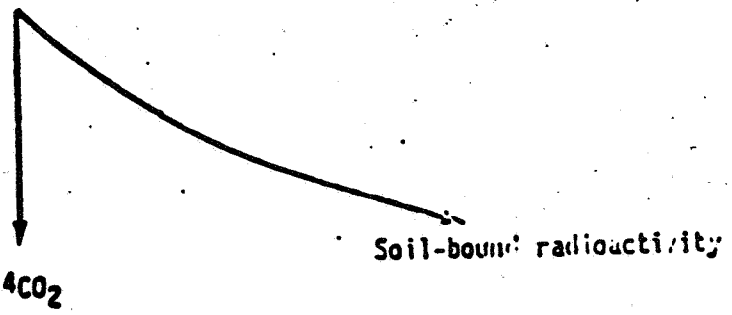


Ro 16—8797

[ethyl(2(p-(p-hydroxyphenoxy)phenoxy)ethyl)carbamate]



Ro 17—3192



155

2. The use patterns are coded as follows: A = terrestrial food crop; B = terrestrial non-food; C = aquatic food crop (includes rice); D = aquatic non-food; E = greenhouse food crop; F = greenhouse non-food; G = forestry; H = domestic outdoor; I = indoor; J = indirect discharge aquatic use; and NA = not applicable.

3. Data requirement is reserved pending the evaluation of an acceptable laboratory volatility study.

4. Not required to support the registration of terrestrial food and non-food use patterns.

5. The leaching and batch equilibrium studies did not fulfill the data requirements because the soil was finely-sieved. Finely-sieved soil increases the soil adsorption capacity by concentrating the clay and silt-size particles. Therefore, future experiments should use soils which have been sieved through a 2mm sieve.

6. Two terrestrial field dissipation studies were reviewed and found to partially fulfill the data requirements. The field dissipation studies partially fulfill the requirement because they were conducted at a single site. The data requirements would be fulfilled if the field dissipation study is conducted at another site and addresses the experimental criteria set forth in the field dissipation SEP of 12/89.

7. Reserved pending results of the soil dissipation study.

8. The registrant requested a waiver of this data requirement because pastures may be permanent plantings. EFGWB recognizes that pasture can be part of a crop rotation system. Therefore, a confined-crop rotational study is necessary to establish fenoxycarb accumulation in food crop.8.

9. Reserved pending results of an acceptable confined rotational study.

10. Accumulation studies for aquatic non-target organisms is reserved pending review of fish bioaccumulation studies.

11. Spray drift studies are required because fenoxycarb is a catagory 2 toxicological hazard with a recommended broadcast application method.