6-23-88

Shaughnessy No.: 103301
Date Out of EAB: JUN 23 1988

To: W. H. Miller
Product Manager 16
Registration Division (TS-767C)

From: Paul Mastradone, Acting Chief
Environmental Chemistry Review Section #1
Exposure Assessment Branch/HED (TS-769C)

Through: Paul F. Schuda, Chief
Exposure Assessment Branch/HED (TS-769C)

Attached, please find the EAB review of . . .

Reg./File # : 239-2471

Chemical Name : O,S-Dimethyl acetylphosphoramidothioate

Type Product : Insecticide

Product Name : Orthene

Company Name : Chevron Chemical Company

Purpose : Addendum to a Standard

Date Received: 3-1-88 Action Code: 660

Date Completed: EAB # (s): 80476

Monitoring Study Requested: Total Reviewing time: 2.0 days

Monitoring Study Volunteered:

Deferrals to:

_____ Ecological Effects Branch

_____ Residue Chemistry Branch

_____ Toxicology Branch

1. CHEMICAL: Common name:

Acephate.

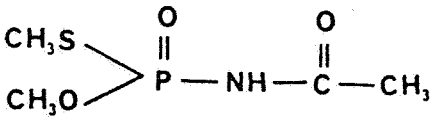
Chemical name:

O,S-Dimethyl acetylphosphoramidothioate.

Trade name(s):

Orthene.

Structure:



Formulations:

75% Wettable Powder.

Physical/Chemical properties:

Molecular formula: $C_4H_1ONO_3PS$.
Molecular weight: 183.16.
Physical state: White solid.
Solubility: 65% soluble in water; <5% soluble in aromatic solvents; >10% soluble in acetone or ethanol.

2. TEST MATERIAL:

75% wettable powder.

3. STUDY/ACTION TYPE:

Addendum to a Standard.

4. STUDY IDENTIFICATION:

Lai, J.C. 1987a. Terrestrial field dissipation of acephate (California bell pepper field). Laboratory Project Identification R12T7014FD. Prepared and submitted by Chevron Chemical Company, Ortho Research Center, Richmond, CA. (40504814)

Lai, J.C. 1987b. Terrestrial field dissipation of acephate (Florida cauliflower field). Laboratory Project Identification R12T7013FD. Prepared and submitted by Chevron Chemical Company, Ortho Research Center, Richmond, CA. (40504815)

Lai, J.C. 1987c. Terrestrial field dissipation of acephate (Iowa soybean field). Laboratory Project Identification R12T7016FD. Prepared and submitted by Chevron Chemical Company, Ortho Research Center, Richmond, CA. (40504813)

Lai, J.C. 1987d. Terrestrial field dissipation of acephate (Mississippi tobacco field). Laboratory Project Identification R12T7015FD. Prepared and submitted by Chevron Chemical Company, Ortho Research Center, Richmond, CA. (40504812)

5. REVIEWED BY:

S. Simko
6.23.88

S. Simko
Chemist, Section 1
EAB/HED/OPP

6. APPROVED BY:

Paul J. Mastradone
JUN 23 1988

Paul Mastradone
Chief (acting), Section 1
EAB/HED/OPP

7. CONCLUSION:

The submitted field dissipation studies appear to be good studies but a final evaluation cannot be made until questions about the storage stability tests that were conducted for this study are addressed. Results for the storage stability tests were extremely erratic (see discussions points for the individual studies). Although the storage stability data submitted in study four were less variable, the storage data from all four studies must be considered in total. The question of the variability of the data must be resolved before any data can be accepted. Based on soil metabolism laboratory studies in which methamidophos was the only observed degradate of acephate, soil samples were analyzed only for acephate and methamidophos. If future data indicate that other degradates may be present, additional data may be required. Acephate degrades rapidly in the field with a half-life of 2 days and was not detected below a depth of 50 cm. The degradate methamidophos had a similar rate of decline and was not detected below a depth of 30 cm.

8. RECOMMENDATIONS:

Questions about the storage stability tests must be resolved before a final determination can be made on this submission.

9. BACKGROUND:

Introduction

The registration standard for acephate was issued in 1987 (the EAB portion was completed in 1982).

Directions for Use

Acephate is a systemic, organophosphate, broad spectrum insecticide registered for use on terrestrial food crop, terrestrial nonfood, forestry, indoor (both commercial and residential), and greenhouse sites. As an organophosphate, acephate exerts its toxic action by inhibiting certain important enzymes of the nervous system (cholinesterase). Acephate is formulated into soluble concentrate solids, soluble concentrate liquids, granulars, pressurized liquids, and an 85% cartridge. There are 23 products registered in the United States; these include 18 single active ingredient formulations and 5 multiple active ingredient formulations. Methods of application include aerial, ground, injection (into tree trunks), and dip treatment (for ornamentals).

10. DISCUSSION OF INDIVIDUAL TESTS OR STUDIES:

Reviews of individual studies are attached.

11. COMPLETION OF ONE-LINER:

DYNAMAC
CORPORATION

ACEPHATE ADDENDUM

Initial Draft Report

Task 1: Review and Evaluation of Individual Studies

Contract No. 68-02-4250

MAY 20, 1988

Submitted to:
Environmental Protection Agency
Arlington, VA 22202

Submitted by:
Dynamac Corporation
The Dynamac Building
11140 Rockville Pike
Rockville, MD 20852

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ACEPHATE

Table of Contents

INTRODUCTION

Acephate is a systemic, organophosphate, broad spectrum insecticide registered for use on terrestrial food crop, terrestrial nonfood, forestry, indoor (including commercial and residential buildings), and greenhouse sites. As an organophosphate, acephate exerts its toxic action by inhibiting certain important enzymes of the nervous system (cholinesterase). Acephate is formulated into soluble concentrate solids, soluble concentrate liquids, granulars, pressurized liquids, and an 85% cartridge. There are 23 products registered in the United States; these include 18 single active ingredient formulations and 5 multiple active ingredient formulations. Methods of application include aerial, ground, injection (into tree trunks), and dip treatment (for ornamentals).

DATA EVALUATION RECORD

ACEPHATE STUDY 1

CHEM 103301 Acephate

BRANCH EAB

FORMULATION--07--WETTABLE POWDER

FICHE/MASTER ID 40504812
Lai, J.C. 1987d. Terrestrial field dissipation of acephate (Mississippi tobacco field). Laboratory Project Identification R12T7015FD. Prepared and submitted by Chevron Chemical Company, Ortho Research Center, Richmond, CA.

SUBST. CLASS = S

DIRECT RVW TIME = 8

REVIEWED BY: J. Harlin TITLE: Staff Scientist

EDITED BY: K. Patten TITLE: Task Leader

APPROVED BY: W. Spangler TITLE: Project Manager

ORG: Dynamac Corporation
Rockville, MD
TEL: 468-2500

APPROVED BY: S. Simko
TITLE: Chemist
ORG: EAB/HED/OPP
TEL: 557-0237

S Simko
6.23.88

SIGNATURE:

CONCLUSIONS:

Field Dissipation - Terrestrial

This study is scientifically sound and provides supplemental information towards the registration of acephate. This study does not fulfill EPA Data Requirements for Registering Pesticides because adequate freezer storage stability data were not provided. Based on soil metabolism laboratory studies in which methamidophos was the only observed degradate of acephate, soil samples were analyzed only for acephate and methamidophos. If future data indicate that other degradates may be present, additional data may be required.

SUMMARY OF DATA BY REVIEWER:

Acephate (Orthene Tobacco Insect Spray, 75% WP) dissipated with a half-life of 1-3 days (calculated 1.72 days) in the upper 5 cm of a field plot of silt loam soil planted to tobacco in Greensville, Mississippi, after six foliar applications (6- to 9-day intervals) of acephate at 0.75 lb ai/A/application. Average acephate concentrations in the upper 5 cm of soil declined from 0.33 ppm immediately after the sixth application to 0.08 ppm at 3 days and to <0.02 ppm (detection limit) at 7 days. Average acephate concentrations were $\leq$0.05 ppm in the 5- to 10-cm depth and $\leq$0.02 ppm in soil deeper than 10 cm at all sampling intervals; no residues were detected in soil deeper than 45 cm. The maximum average acephate concentration in the upper 5 cm was 1.09 ppm immediately after the first foliar application; acephate did not accumulate with repeated foliar applications. Methamidophos, the only degradate measured, dissipated with a calculated half-life of 2 days in the 0- to 5-cm soil depth; average methamidophos concentrations declined from 0.07 ppm immediately after the sixth application of acephate to 0.02 ppm at 3 days and <0.01 ppm (detection limit) at 7 days. Average methamidophos concentrations were $\leq$0.03 ppm in the 5- to 10-cm depth and <0.01 ppm in soil deeper than 10 cm at all sampling intervals. The maximum average methamidophos concentration (0.11 ppm) was detected in the upper 5 cm of soil immediately after the fourth foliar application.

During the study, air temperatures ranged from 59 to 90 F. Rainfall totaled 1.62 inches between the first and second foliar treatments, 0.60 inches between the second and third, 1.85 inches between the third and fourth, 0.0 inches between the fourth and fifth, 1.1 inches between the fifth and sixth, and 0.0 inches during the 7 days following the sixth treatment.

DISCUSSION:

1. The freezer storage stability data provided by the registrant were highly variable (Studies 1-4). For treated soil samples stored frozen at -20 C for up to 197 days, acephate varied from 10 to 213% of the applied and methamidophos varied from 25 to 300% with no discernible pattern. Although the storage stability data submitted in Study 4 were less variable, with acephate ranging from 73.7 to 125%, no data were submitted for methamidophos. Since it could not be conclusively determined whether the extreme variability in the storage stability data was due to an inadequate analytical method or the lack of compound stability in the frozen soil samples, we recommend that an additional storage stability study, using a more precise analytical method, be conducted.

2. Although the registrant stated that no acephate residues were found in the pretreatment and control samples analyzed, no data were provided.

3. Field test data were incomplete; soil temperature data were incomplete, and slope of the field and depth to the water table were not provided.

4. Based on soil metabolism laboratory studies in which methamidophos was the only observed metabolite of acephate, soil samples were analyzed only for acephate and methamidophos.

5. The treated field plot was also treated with Prowl (pendimethalin) at 0.75 lb/A on May 8, 1987. The control field plot was treated with Sevin (carbaryl) at 0.5 lb ai/A on May 5 and June 10, 1987, and diazinon at 1 lb ai/A on July 2, 9, and 16, 1987.

MATERIALS AND METHODS

(1

MATERIALS AND METHODS:

Acephate (Orthene Tobacco Insect Spray, 75% WP, Chevron Chemical Company) was applied to a field plot (50 x 100 feet) of silt loam soil planted to tobacco in Greensville, Mississippi. The plot was treated with acephate initially at 0.75 lb ai/A in transplant water on May 11, 1987. Then beginning June 17, 1987, the plot was treated with acephate six times as a foliar spray at 0.75 lb ai/A/application, with 6-9 days between applications. An untreated plot served as the control. Soil samples (0- to 5-, 5- to 10-, 10- to 15, 15- to 30-, 30- to 45-, 45- to 60-, 60- to 75-, and 75- to 90-cm depths) were taken immediately after each application and at 1, 3, 7, and 10 days after the last application. Samples were stored frozen at -20°C prior to analysis.

The soil samples were analyzed for acephate and its degradate methamidophos using Method RM125-1. Soil samples were mixed with deionized water and sodium sulfate, then extracted with ethyl acetate and filtered. The extraction and filtration steps were repeated twice. The filter was rinsed with ethyl acetate, and the combined filtrates were evaporated to dryness and redissolved in acetone. The soil extracts were analyzed by GLC with flame photometric detection. Recovery efficiencies from soil fortified with acephate at 0.25 ppm and methamidophos at 0.10 ppm ranged from 89.4 to 122% and 67.4 to 117%, respectively. The detection limits were 0.02 ppm for acephate and 0.01 ppm for methamidophos.

Acephate

RIN 3279-96

Page_____ is not included in this copy.

Pages 13 through 30 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.

✓ FIFRA registration data.

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

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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

ACEPHATE STUDY 2

CHEM 103301 Acephate

BRANCH EAB

FORMULATION--07--WETTABLE POWDER

FICHE/MASTER ID 40504814

Lai, J.C. 1987a. Terrestrial field dissipation of acephate (California bell pepper field). Laboratory Project Identification R12T7014FD. Prepared and submitted by Chevron Chemical Company, Ortho Research Center, Richmond, CA.

SUBST. CLASS = S

DIRECT RVW TIME = 5

REVIEWED BY: J. Harlin TITLE: Staff Scientist

EDITED BY: K. Patten TITLE: Task Leader

APPROVED BY: W. Spangler TITLE: Project Manager

ORG: Dynamac Corporation
Rockville, MD

TEL: 468-2500

APPROVED BY: S. Simko
TITLE: Chemist
ORG: EAB/HED/OPP
TEL: 557-0237

S Simko
6 23 88

SIGNATURE:

CONCLUSIONS:

Field Dissipation - Terrestrial

This study is scientifically sound and provides supplemental information towards the registration of acephate. This study does not fulfill EPA Data Requirements for Registering Pesticides because adequate freezer storage stability data were not provided. Based on soil metabolism laboratory studies in which methamidophos was the only observed degradate of acephate, soil samples were analyzed only for acephate and methamidophos. If future data indicate that other degradates may be present, additional data may be required.

SUMMARY OF DATA BY REVIEWER:

Acephate (Orthene 75 S, 75% WP) dissipated with a half-life of 1-3 days (calculated 1.65 days) in the upper 5 cm of a field plot of silt loam soil planted to bell peppers in Fresno, California, after eight foliar applications (3- to 7-day intervals) of acephate at 1.0 lb ai/A/application. Average acephate concentrations in the upper 5 cm of soil declined from 0.99 ppm immediately after the eighth application to 0.47 ppm at 3 days and to <0.02 ppm (detection limit) at 7 days. The maximum average acephate concentration in the 5- to 10-cm depth was 0.24 ppm immediately after the eighth foliar application; after 1 day, average acephate concentrations were ≤0.04 ppm. In general, average acephate concentrations in soil deeper than 10 cm were ≤0.05 ppm. Acephate did not accumulate with repeated foliar applications. Methamidophos, the only degradate measured, dissipated with a calculated half-life of 3 days in the 0- to 5-cm soil depth; average methamidophos concentrations were 0.07 ppm immediately after the eighth application of acephate, 0.09 ppm at 1 day, 0.04 ppm at 4 days, and <0.01 ppm (detection limit) at 7 days. Average methamidophos concentrations were ≤0.03 ppm in the 5- to 10-cm depth and ≤0.01 ppm in the soil deeper than 10 cm at all sampling intervals.

During the study, air temperatures ranged from 62 to 114 F. No rainfall occurred during the entire study.

DISCUSSION:

1. The freezer storage stability data provided by the registrant were highly variable (Studies 1-4). For treated soil samples stored frozen at -20 C for up to 197 days, acephate varied from 10 to 213% of the applied and methamidophos varied from 25 to 300% with no discernible pattern. Although the storage stability data submitted in Study 4 were less variable, with acephate ranging from 73.7 to 125%, no data were submitted for methamidophos. Since it could not be conclusively determined whether the extreme variability in the storage stability data was due to an inadequate analytical method or the lack of compound stability in the frozen soil samples, we recommend that an additional storage stability study, using a more precise analytical method, be conducted.

2. Although the registrant stated that no acephate residues were found in the pretreatment and control samples analyzed, no data were provided.

3. Field test data were incomplete; soil temperature data were provided for the sampling intervals only, and the slope of the field and depth to the water table were not provided. It was stated that the plots were sprinkled with 1 inch of water every other day, except on days of acephate application; however, no cumulative irrigation data were provided.

4. Based on soil metabolism laboratory studies in which methamidophos was the only observed metabolite of acephate, soil samples were analyzed only for acephate and methamidophos.

5. The field plot was also treated with trifluralin as a preplant incor-

MATERIALS AND METHODS

MATERIALS AND METHODS:

Acephate (Orthene 75 S, 75% WP, Chevron Chemical Company) was applied to a field plot (25 x 100 feet) of silt loam soil planted to bell peppers in Fresno, California. The plot was treated with acephate eight times as a foliar spray at 1.0 lb ai/A/application, beginning July 17, 1987, with 3-7 days between applications. An untreated plot served as the control. Soil samples (0- to 5-, 5- to 10-, 10- to 15-, 15- to 30-, 30- to 50-, 50- to 70-, and 70- to 90-cm depths) were taken immediately after each application and at intervals up to 14 days following the last application. Samples were stored frozen at -20°C prior to analysis.

The soil samples were analyzed for acephate and its degradate methamidophos using Method RM125-1. Soil samples were mixed with deionized water and sodium sulfate, then extracted with ethyl acetate and filtered. The extraction and filtration steps were repeated twice. The filter was rinsed with ethyl acetate, and the combined filtrates were evaporated to dryness and redissolved in acetone. The soil extracts were analyzed by GLC with flame photometric detection. Recovery efficiencies from soil fortified with acephate at 0.25 ppm and methamidophos at 0.10 ppm ranged from 94.3 to 124% and 69.7 to 121%, respectively. The detection limits were 0.02 ppm for acephate and 0.01 ppm for methamidophos.

Acephate

RW 3279-96

Page_____ is not included in this copy.

Pages 34 through 54 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.

✓ FIFRA registration data.

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DATA EVALUATION RECORD

ACEPHATE STUDY 3

CHEM 103301 Acephate

BRANCH EAB

FORMULATION--07--WETTABLE POWDER

FICHE/MASTER ID 40504813

Lai, J.C. 1987c. Terrestrial field dissipation of acephate (Iowa soybean field). Laboratory Project Identification R12T7016FD. Prepared and submitted by Chevron Chemical Company, Ortho Research Center, Richmond, CA.

SUBST. CLASS = S

DIRECT RVW TIME = 4

REVIEWED BY: J. Harlin TITLE: Staff Scientist

EDITED BY: K. Patten TITLE: Task Leader

APPROVED BY: W. Spangler TITLE: Project Manager

ORG: Dynamac Corporation
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TEL: 468-2500

APPROVED BY: S. Simko
TITLE: Chemist
ORG: EAB/HED/OPP
TEL: 557-0237

S Simko
6 23 88

SIGNATURE:

CONCLUSIONS:

Field Dissipation - Terrestrial

This study is scientifically sound and provides supplemental information towards the registration of acephate. This study does not fulfill EPA Data Requirements for Registering Pesticides because adequate freezer storage stability data were not provided. Based on soil metabolism laboratory studies in which methamidophos was the only observed degradate of acephate, soil samples were analyzed only for acephate and methamidophos. If future data indicate that other degradates may be present, additional data may be required.

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SUMMARY OF DATA BY REVIEWER:

Acephate (Orthene 75 S, 75% WP) dissipated with a half-life of <3 days (calculated 1.96 days) in the upper 5 cm of a field plot of loam soil planted to soybeans in Dallas Center, Iowa, after six preemergence applications (7-day intervals) of acephate at 1.0 lb ai/A/application. Average acephate concentrations in the upper 5 cm of soil were 0.12 ppm immediately after the sixth application, 0.24 ppm at 1 day, 0.05 ppm at 3 days, and <0.02 ppm (detection limit) at 7 days. The maximum average acephate concentration in the upper 5 cm was 0.84 ppm immediately after the third application. Average acephate concentrations in soil deeper than 5 cm were $\leq$0.12 ppm; no residues were detected in soil deeper than 45 cm. Acephate did not accumulate with repeated applications. Average concentrations of methamidophos, the only degradate measured, were $\leq$0.08 ppm in the upper 5 cm of soil; no residues were detected (<0.01 ppm, detection limit) in soil deeper than 5 cm.

During the study, air temperatures ranged from 54 to 100 F. Rainfall totaled 0.05 inches during the first and second preemergence application, 0.65 inches between the second and third, 1.80 inches between the third and fourth, 0.00 inches between the fourth and fifth, 5.05 inches between the fifth and sixth, and 0.60 inches during the 7 days following the sixth application.

DISCUSSION:

1. The freezer storage stability data provided by the registrant were highly variable (Studies 1-4). For treated soil samples stored frozen at -20 C for up to 197 days, acephate varied from 10 to 213% of the applied and methamidophos varied from 25 to 300% with no discernible pattern. Although the storage stability data submitted in Study 4 were less variable, with acephate ranging from 73.7 to 125%, no data were submitted for methamidophos. Since it could not be conclusively determined whether the extreme variability in the storage stability data was due to an inadequate analytical method or the lack of compound stability in the frozen soil samples, we recommend that an additional storage stability study, using a more precise analytical method, be conducted.

2. Although the registrant stated that no acephate residues were found in the pretreatment and control samples analyzed, no data were provided.

3. Field test data were incomplete; soil temperature data were provided for the sampling intervals only.

4. The CEC of the soil was not provided.

5. Based on soil metabolism laboratory studies in which methamidophos was the only observed degradate of acephate, soil samples were analyzed only for acephate and methamidophos.

6. The field plot was also treated with trifluralin at 0.75 lb ai/A (pre-plant incorporated application) and metribuzin at 0.38 and 0.25 lb ai/A

MATERIALS AND METHODS

MATERIALS AND METHODS:

Acephate (Orthene 75 S, 75% WP, Chevron Chemical Company) was applied to a field plot (50 x 50 feet; slope of the field <2%; average depth to the water table ≈5 feet) of silt loam soil planted to soybeans in Dallas Center, Iowa. The plot was treated with acephate six times as a post-emergence application at 1.0 lb ai/A/application, beginning June 8, 1987, with 7 days between applications. An untreated plot served as the control. Soil samples (0- to 5-, 5- to 10-, 10- to 15-, and 15- to 30-cm depths) were taken immediately after each application and at 1, 3, 7, and 14 days after the last application. Additional soil samples (30- to 45-, 45- to 60-, 60- to 75-, and 75- to 90-cm depths) were taken at 1, 3, 7, and 14 days after the last application. Samples were stored frozen at -20°C prior to analysis.

The soil samples were analyzed for acephate and its degradate methamidophos using Method RM125-1. Soil samples were mixed with deionized water and sodium sulfate, then extracted with ethyl acetate and filtered. The extraction and filtration steps were repeated twice. The filter was rinsed with ethyl acetate, and the combined filtrates were evaporated to dryness and redissolved in acetone. The soil extracts were analyzed by GLC with flame photometric detection. Recovery efficiencies from soil fortified with acephate at 0.25 ppm and methamidophos at 0.10 ppm ranged from 70.3 to 103% and 69.9 to 104%, respectively. The detection limits were 0.02 ppm for acephate and 0.01 ppm for methamidophos.

Acephate

RN 3279-96

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_____ 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.

✓ FIFRA registration data.

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DATA EVALUATION RECORD

ACEPHATE STUDY 4

CHEM 103301 Acephate

BRANCH EAB

FORMULATION--07--WETTABLE POWDER

FICHE/MASTER ID 40504815
Lai, J.C. 1987b. Terrestrial field dissipation of acephate (Florida cauliflower field). Laboratory Project Identification R12T7013FD. Prepared and submitted by Chevron Chemical Company, Ortho Research Center, Richmond, CA.

SUBST. CLASS = S

DIRECT RVW TIME = 5

REVIEWED BY: J. Harlin TITLE: Staff Scientist

EDITED BY: K. Patten TITLE: Task Leader

APPROVED BY: W. Spangler TITLE: Project Manager

ORG: Dynamac Corporation
Rockville, MD
TEL: 468-2500

APPROVED BY: S. Simko
TITLE: Chemist
ORG: EAB/HED/OPP
TEL: 557-0237

S Simko
6.23.88

SIGNATURE:

CONCLUSIONS:

Field Dissipation - Terrestrial

This study is scientifically sound and provides supplemental information towards the registration of acephate. This study does not fulfill EPA Data Requirements for Registering Pesticides because samples were not taken to a depth sufficient to define the extent of leaching and adequate freezer storage stability data were not provided (see Discussion). Based on soil metabolism laboratory studies in which methamidophos was the only observed degradate of acephate, soil samples were analyzed only for acephate and methamidophos. If future data indicate that other degradates may be present, additional data may be required.

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SUMMARY OF DATA BY REVIEWER:

Acephate (Orthene 75 S, 75% WP) dissipated with a half-life of 1-3 days (calculated 1.95 days) in the upper 5 cm of a field plot of sand soil planted to cauliflower in Ocoee, Florida, after six ground applications (7-day intervals) of acephate at 1.0 lb ai/A/application. Average acephate concentrations in the upper 5 cm of soil declined from 1.617 ppm immediately after the sixth application to 0.143 ppm at 3 days; after 7 days, residues were $\leq$0.027 ppm (detection limit of 0.02 ppm). The maximum average acephate concentration in the upper 5 cm was 2.653 ppm immediately after the second application. Average acephate concentrations in the 5- to 10-cm soil depth were 0.047 ppm immediately after the sixth application, 0.150 ppm at 1 day and 0.080 ppm at 3 days following the last application; after 7 days, residues were nondetectable. Acephate concentrations in the 10- to 30-cm soil depths were nondetectable immediately after the sixth application, 0.063-0.220 ppm at 1 and 3 days posttreatment, and were nondetectable after 7 days. Acephate did not accumulate with repeated ground applications. Methamidophos, the only degradate measured, dissipated with a calculated half-life of 3 days in the 0- to 5-cm soil depth; average methamidophos concentrations declined from 0.317 ppm immediately after the sixth application of acephate to 0.173 ppm at 1 day, 0.043 ppm at 3 days, and <0.01 ppm (detection limit) at 7 days. Average methamidophos concentrations were $\leq$0.033 ppm in the 5- to 30-cm soil depths at all sampling intervals. The maximum average methamidophos concentration (0.320 ppm) was detected in the upper 5 cm of soil immediately after the fourth application. Methamidophos accumulated slightly with repeated ground applications.

During the study, air temperatures ranged from 38 to 85 F. Rainfall and irrigation totaled 0.63 inches between the first the second treatments, 1.21 inches between the second and third, 1.72 inches between the third and fourth, 0.15 inches between the fourth and fifth, 0.33 inches between the fifth and sixth, and 8.09 inches during the 7 days following the last application.

DISCUSSION:

1. Soil samples were not taken and analyzed to an adequate depth to define the extent of leaching. The maximum depth sampled was 30 cm, generally because a layer of clay hard pan at soil depths of 30- to 35-cm prevented sampling without the use of specialized equipment. Since acephate residues were detected at the 25- to 30-cm soil depth, soil samples were not taken at an adequate depth to define the extent of leaching. The registrant stated that due to this limitation in sampling procedures, the study provided as supplemental data only.

2. The freezer storage stability data provided by the registrant were highly variable in studies 1-4 (MRID's 40504812, 40504814, 40504813 and 40504815, respectively). For treated soil samples stored frozen at -20 C for up to 197 days, acephate varied from 10 to 213% of the applied and methamidophos varied from 25 to 300% with no discernible pattern.

Although the storage stability data submitted in the present study were less variable, with acephate ranging from 73.7 to 125%, the storage data from all four studies must be considered in total. The question of the variability of the data must be resolved before any data can be accepted. No data were submitted for methamidophos. Since it could not be conclusively determined whether the extreme variability in the storage stability data was due to an inadequate analytical method or the lack of compound stability in the frozen soil samples, we recommend that an additional storage stability study, using a more precise analytical method, be conducted.

3. Although the registrant stated that no acephate residues were found in the pretreatment and control samples analyzed, no data were provided.

4. Field test data were incomplete; soil temperature data were provided on each sampling date only.

5. Based on soil metabolism laboratory studies in which methamidophos was the only observed degradate of acephate, soil samples were analyzed only for acephate and methamidophos.

MATERIALS AND METHODS

MATERIALS AND METHODS:

Acephate (Orthene 75 S Soluble Powder, 75% WP, Chevron Chemical Company) was applied to a field plot (25 x 100 feet) of sand soil planted to cauliflower in Ocoee, Florida. The plot was treated with acephate as six ground applications beginning February 17, 1987, at 1 lb ai/A/application, with 7 days between applications. An untreated plot served as the control. During the study, the depth to the water table ranged from 24.25 to 34.50 inches; the slope of the field was 0.5 to 1%. Soil samples (0- to 5-, 5- to 10-, 10- to 15-, 15- to 20-, 20- to 25-, 25- to 30-, and 30- to 35-cm depths) were taken immediately after each application and at 1, 3, 7, 10, 14, 21, and 28 days after the last application. Samples were stored frozen at -20°C prior to analysis.

The soil samples were analyzed for acephate and its degradate methamidophos using Method RM125-1. Soil samples were mixed with deionized water and sodium sulfate, then extracted with ethyl acetate and filtered. The extraction and filtration steps were repeated twice. The filter was rinsed with ethyl acetate, and the combined filtrates were evaporated to dryness and redissolved in acetone. The soil extracts were analyzed by GLC with flame photometric detection. Recovery efficiencies from soil fortified with acephate at 0.25 ppm and methamidophos at 0.10 ppm ranged from 94.3 to 124% and 69.7 to 121%, respectively. The detection limits were 0.02 ppm for acephate and 0.01 ppm for methamidophos.

Acephate

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