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

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OFFICE OF
PREVENTION, PESTICIDES
AND TOXIC SUBSTANCES

MEMORANDUM DP Barcode: D193360,D194419,D204795,D208387,D222611
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SUBJECT: **Dimethoate**: Reregistration Eligibility Document - EFGWB Science Chapter

FROM: Dana Spatz, Chemist, CRS #2
Environmental Fate & Ground Water Branch/EFED (7507C)

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Environmental Fate & Ground Water Branch/EFED (7507C)

TO: Larry Schnaubelt, Reregistration Section II
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and

Kathy Monk, Team Leader
Science Analysis and Coordination Staff/EFED (7507C) 2/20/97

THRU: Mah T. Shamim, Ph.D., Section Head, CRS #2
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Attached is the EFGWB Science Chapter for the Dimethoate List A RED. The following items are included in this Chapter: 1) an Environmental Fate and Transport Assessment, 2) a Surface Water Assessment, 3) data evaluation records for supporting studies, and 4) a table of the current status of data requirements. All Environmental Fate data requirements for parent dimethoate have been fully satisfied, except for Spray Drift (201-1, 202-1). Cheminova is a member of the Spray Drift Task Force, which has submitted data that is currently undergoing Agency review.

There are, however, data gaps still remaining for dimethoxon (omethoate), the toxicologically significant metabolite of dimethoate. The environmental fate of dimethoxon is not as well understood as the fate of its parent. Based on field data only, it is believed that dimethoxon also degrades rapidly and thus will not move through the soil and contaminate

DATA EVALUATION RECORD

STUDY 5

CHEM 035001 Dimethoate §164-1

STUDY ID 43388002
Jacobson, B. and B. Williams. 1994. Dissipation of Dimethoate in Soil Under Field Conditions When Applied to Bare Ground in New York. Unpublished study performed by ABC Laboratories, Inc. and submitted by Cheminova Agro A/S, Denmark.

REVIEWED BY: Dana Spatz
TITLE: Chemist
ORG: EFGWB/EFED/OPP

SIGNATURE: Dana Spatz

CONCLUSIONS:

Dissipation - Soil Field Dissipation

1. This study is acceptable and partially fulfills the Soil Field Dissipation data requirement.

2. Dimethoate (Clean Crop Dimethoate 25W), applied at 4.0 lbs ai/acre to a bare ground (sandy loam) site near Waterloo, New York, dissipated rapidly with a half-life of approximately 5 days. Dimethoate was found in the 0-6 inch soil layer only through day 28 and was detected only once (0.023 ppm; one rep on day 10) in the 6-12 inch layer. No residues were found below the 6-12 inch layer, though it must be noted that only 11 inches of rainfall/irrigation fell during the 88-day study, with 4.23 inches falling by day 28.

   The metabolite omethoate was detected in the 0-6 inch soil layer on days 2 and 3 of the study. Omethoate was found in one replicate sample on day 2 at a concentration of 0.010 ppm and in all three replicates on day 3 at a mean concentration of 0.017 ppm. No residues were found below the 0-6 inch layer.

3. The results of the study indicate that dimethoate dissipates rapidly in the field when applied to bare ground. The degradate omethoate, which is of toxicological concern, is formed but also degrades rapidly.

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METHODOLOGY:

Site Characteristics:

Seneca County near Waterloo, New York. Slope: 0-1%, depth to water table: 6-10 ft.

Sandy loam 0-24 inches, (sand 66%, silt 30%, clay 4%, pH 6.4, CEC 8.8 meq/100 g, % OM 1.9.). Loam 24-48 inches.

One treated bare ground plot (60 ft wide x 250 ft long); 375 subplots (4 ft x 10 ft) divided into three equal areas for sampling purposes

One control plot (20 ft wide x 250 ft long); 125 subplots

Irrigation: overhead sprinkler, 1.22 inches; rainfall, 9.92 inches. Total was 14% greater than the NOAA 10-year mean (9.80 in.) for the same time period.

Treatment:

Application made on July 30, 1993.

Single broadcast application at 4 lbs. ai/acre of dimethoate formulated as a 25% a.i. wettable powder (Clean Crop Dimethoate 25W) using a tractor-mounted twelve nozzle spray boom.

Verification of the application rate was performed by burying fifteen wide-mouth glass jars with control soil in the treated plot and also by collecting twelve 25 mL spray solution samples before application.

Sampling:

Treated and control plots were sampled: pre-treatment, days 0, 1, 2, 3, 6, 10, 14, 28, 60, and 88 post-application.

Treated Plot: Three sampling areas, five cores composited by depth per sampling area, at each sampling event.

Control Plot: One sampling area, five cores composited by depth per sampling event.

Core depth: 48 inches, 0-6, 6-12, 12-18, 18-24, 24-30, 30-36, 36-48"

Analytical Methodology:

All soil samples were ground and homogenized. 25 g of sample were extracted with 250 mL of 95/5 acetone/water. The slurried sample was vacuum filtered and transferred to a 500 mL flat bottom flask where

the acetone was removed by rotary evaporation. The extract was transferred to a 250 mL separatory funnel and the flask rinsed with 25 mL of 20% sodium chloride solution. The aqueous extract was partitioned with 50 mL of methylene chloride and dried with anhydrous sodium sulfate. The methylene chloride was removed by vacuum rotary evaporation. 1-3 mL of 1/1 hexane/acetone was added to each sample flask. The sample extract was transferred to a cleanup column of Celite using 1/1 hexane/acetone, then 200 mL of this solvent were used to elute the desired residues. The solvent was vacuum rotary evaporated and the sample was submitted for gas chromatographic determination of dimethoate and omethoate.

Column: 30-m x 0.53-mm i.d. x 1.5-μm film thickness Rtx-5 capillary

Gas Flow: He carrier: 8.0 mL/min
He aux: 29.0 mL/min
Air: 100 mL/min
H_2: 75 mL/min

Selected samples were submitted for confirmatory analysis on an alternate GC column with different elution characteristics.

Column: 15-m x 0.53-mm i.d. x 1.0-μm film thickness DB-17 capillary

Gas Flow: He carrier: 16.3 mL/min
He aux: 9.0 mL/min
Air: 100 mL/min
H_2: 75 mL/min

DATA SUMMARY:

Dimethoate (Clean Crop Dimethoate 25W), applied on July 30, 1993 at 4.0 lbs ai/acre to a bare ground (sandy loam) site near Waterloo, New York, dissipated rapidly with a half-life of approximately 5 days. Dimethoate was found in the 0-6 inch soil layer only through day 28 and was detected only once (0.023 ppm; one rep on day 10) in the 6-12 inch layer. No residues were found below the 6-12 inch layer, though it must be noted that only 11 inches of rainfall/irrigation fell during the 88-day study, with 4.23 inches falling by day 28.

In the 0-6 inch soil layer, dimethoate averaged 1.38 ppm (wet wt.) immediately after application, 1.52 ppm on day 2, and declined to 0.012 ppm on day 28. No residues of dimethoate were found at or above the LOQ of 0.010 ppm after the day 28 sampling. In the 6-12 inch soil layer, dimethoate was found only one time in one replicate at 0.023 ppm on day 10. No residues were found below the 6-12 inch layer.

The metabolite omethoate was detected in the 0-6 inch soil layer on days 2 and 3 of the study. Omethoate was found in one

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replicate sample on day 2 at a concentration of 0.010 ppm and in all three replicates on day 3 at a mean concentration of 0.017 ppm. No residues were found below the 0-6 inch layer.

The results of the study indicate that dimethoate dissipates rapidly in the field when applied to bare ground. The degradate omethoate, which is of toxicological concern, is formed but also degrades rapidly.

COMMENTS:

1. Verification of the application by analyzing the spray solution showed that the three dimethoate spray solution samples ranged from 98 to 103% of theoretical. Results of the verification jar samples showed the average percent of theoretical to be 95.6%

2. The limit of quantitation was 0.010 ppm for dimethoate and omethoate.

3. Recovery from fortified samples analyzed concurrently with field samples averaged 92.4 ± 14.4% for dimethoate and 77.5 ± 11.5% for omethoate.

4. Average recovery (corrected for procedural recovery) for dimethoate from frozen fortified soils at day 0, 61, 123, and 172 days was 97, 94, 99, and 94%, respectively. For omethoate, recoveries were 98, 86, 94, and 84%, respectively. All test samples were analyzed within the 172 day time frame.

5. The registrant reported that the degradates found in the laboratory studies (dimethyl phosphoric acid, dimethyl thiophosphoric acid, and desmethyl dimethoate) were not looked for in the field because they "were not observed above 3% under the moist, aerobic environments anticipated in the field." Omethoate, though not found in the laboratory studies, was included as an analyte in the field studies because of its toxicological significance. According to the registrant, the other degradates are not of toxicological concern.

Excerpt from Dimethoate EFGWB Chapter

Page _____ is not included in this copy.

Pages 6 through 27 are not included in this copy.

The material not included contains the following type of information:

_____ Identity of product inert ingredients.

_____ Identity of product inert 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.

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✓ FIFRA registration data.

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DATA EVALUATION RECORD

STUDY 6

CHEM 035001 Dimethoate §164-1

STUDY ID 43388001

Jacobson, B. and B. Williams. 1994. Dissipation of Dimethoate in Soil Under Field Conditions With Grain Sorghum in Texas. Unpublished study performed by ABC Laboratories, Inc. and submitted by Cheminova Agro A/S, Denmark.

REVIEWED BY: Dana Spatz
TITLE: Chemist
ORG: EFGWB/EFED/OPP

SIGNATURE: Dana Spatz

CONCLUSIONS:

Dissipation - Soil Field Dissipation

1. This study is acceptable and partially fulfills the Soil Field Dissipation data requirement.

2. Dimethoate (Clean Crop Dimethoate 400, emulsifiable concentrate), applied at 1.5 lbs ai/acre to a grain sorghum plot (silt loam) site in Burleson County near Snook, Texas, dissipated rapidly with a half-life of approximately 9 days. Dimethoate was found in the 0-6 inch soil layer only through day 28. No residues were found below the 0-6 inch layer, though it must be noted that only 8.6 inches of rainfall/irrigation fell during the 90-day study, with 2.09 inches falling by day 28.

   The metabolite omethoate was detected in the 0-6 inch soil layer in one replicate sample on day 6 at a concentration of 0.010 ppm. No residues were found below the 0-6 inch layer.

3. The results of the study indicate that dimethoate dissipates rapidly in the field when applied post-emergence over the top to two- to three-leaf stage grain sorghum. The degradate omethoate, which is of toxicological concern, is formed but also degrades rapidly.

METHODOLOGY:

Site Characteristics:

Burleson County near Snook, Texas. Slope: 1%, depth to water table: 50 ft.

Silt loam, (sand 20%, silt 59%, clay 21%, pH 8.1, CEC 29.4 meq/100 g, % OM 1.3).

One treated grain sorghum plot (150 ft wide x 163 ft long); 375 subplots (6.5 ft x 10 ft) divided into three equal areas for sampling purposes

One control plot (33 ft wide x 200 ft long); 125 subplots

Irrigation: overhead sprinkler, 4.25 inches; rainfall, 4.35 inches. Total was 0.91 inches greater than the NOAA 10-year mean (7.69 in.) for the same time period.

Treatment:

Application made on July 8, 1993.

Single broadcast application at 1.5 lbs. ai/acre of dimethoate formulated as a 43.5% a.i. emulsifiable concentrate (Clean Crop Dimethoate 400) using a tractor-mounted eight nozzle spray boom. Application was made to two- to three-leaf stage grain sorghum.

Verification of the application rate was performed by burying fifteen wide-mouth glass jars with control soil in the treated plot and also by collecting three 25 mL spray solution samples before application.

Sampling:

Treated and control plots were sampled: pre-treatment, days 0, 1, 2, 3, 6, 11, 14, 28, 60, and 90 post-application.

Treated Plot: Three sampling areas, five cores composited by depth per sampling area, at each sampling event.

Control Plot: One sampling area, five cores composited by depth per sampling event.

Core depth: 48 inches, 0-6, 6-12, 12-18, 18-24, 24-30, 30-36, 36-48"

Analytical Methodology:

All soil samples were ground and homogenized. 25 g of sample were extracted with 250 mL of 95/5 acetone/water. The slurried sample was vacuum filtered and transferred to a 500 mL flat bottom flask where the acetone was removed by rotary evaporation. The extract was transferred to a 250 mL separatory funnel and the flask rinsed with 25 mL of 20% sodium chloride solution. The aqueous extract was partitioned with 50 mL of methylene chloride and dried with anhydrous sodium sulfate. The methylene chloride was removed by vacuum rotary evaporation. 1-3 mL of 1/1 hexane/acetone was added to each sample flask. The sample extract was transferred to a cleanup column of Celite using 1/1 hexane/acetone, then 200 mL of this solvent were used to elute the desired residues. The solvent was vacuum rotary evaporated and the sample was submitted for gas chromatographic determination of dimethoate and omethoate.

Column: 30-m x 0.53-mm i.d. x 1.5-μm film thickness Rtx-5 capillary

Gas Flow: He carrier: 8.0 mL/min
He aux: 29.0 mL/min
Air: 100 mL/min
H_2: 75 mL/min

Selected samples were submitted for confirmatory analysis on an alternate GC column with different elution characteristics.

Column: 15-m x 0.53-mm i.d. x 1.0-μm film thickness DB-17 capillary

Gas Flow: He carrier: 16.3 mL/min
He aux: 9.0 mL/min
Air: 100 mL/min
H_2: 75 mL/min

DATA SUMMARY:

Dimethoate (Clean Crop Dimethoate 400, emulsifiable concentrate), applied at 1.5 lbs ai/acre to a grain sorghum plot (silt loam) site in Burleson County near Snook, Texas, dissipated rapidly with a half-life of approximately 9 days. Dimethoate was found in the 0-6 inch soil layer only through day 28. No residues were found below the 0-6 inch layer, though it must be noted that only 8.6 inches of rainfall/irrigation fell during the 90-day study, with 2.09 inches falling by day 28.

In the 0-6 inch soil layer, dimethoate averaged 0.48 ppm (wet wt.) immediately after application, 0.40 ppm on day 2, 0.21 on day 10, and declined to 0.088 ppm on day 28. No residues of dimethoate were found at or above the LOQ of 0.010 ppm after the day 28 sampling. No residues were found below the 0-6 inch layer.

The metabolite omethoate was detected in the 0-6 inch soil layer in one replicate sample on day 6 at a concentration of 0.010 ppm. No residues were found below the 0-6 inch layer.

The results of the study indicate that dimethoate dissipates rapidly in the field when applied post-emergence over the top to two- to three-leaf stage grain sorghum. The degradate omethoate, which is of toxicological concern, is formed but also degrades rapidly.

COMMENTS:

1. Verification of the application by analyzing the spray solution showed that the three dimethoate spray solution samples ranged from 91 to 125% of theoretical. Results of the verification jar samples showed the average percent of theoretical to be 82.3%

2. The limit of quantitation was 0.010 ppm for dimethoate and omethoate.

3. Recovery from fortified samples analyzed concurrently with field samples averaged 90.7 ± 11% for dimethoate and 78.3 ± 17.6% for omethoate.

4. Average recovery (corrected for procedural recovery) for dimethoate from frozen fortified soils at day 0, 75, and 123 days was 113, 110, and 115%, respectively. For omethoate, recoveries were 97, 91, and 98%, respectively. All test samples were analyzed within the 123 day time frame.

5. The registrant reported that the degradates found in the laboratory studies (dimethyl phosphoric acid, dimethyl thiophosphoric acid, and desmethyl dimethoate) were not looked for in the field because they "were not observed above 3% under the moist, aerobic environments anticipated in the field." Omethoate, though not found in the laboratory studies, was included as an analyte in the field studies because of its toxicological significance. According to the registrant, the other degradates are not of toxicological concern.

Excerpt from [illegible] EFGWB Chapter

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