(UNDATED)

DATA EVALUATION RECORD

DRAFT

STUDY 1

CHEM 060101 Thiabendazole §164-1, -5

FORMULATION--14--FLOWABLE CONCENTRATE (FlC)

STUDY ID 43187201
Jacobson, B. 1994c. Terrestrial field dissipation for thiabendazole in wheat. Laboratory ID No. 618-360-92530. Merck Study No. 92530. Unpublished study performed by Qualls Agricultural Laboratories, Ephrata, WA, and ABC Laboratories, Inc., Columbia, MO; and submitted by Merck & Company, Three Bridges, NJ.

DIRECT REVIEW TIME = 40

REVIEWED BY: K. Ferguson TITLE: Task Leader

EDITED BY: C. Cooke TITLE: Staff Scientist
M. Anderson Staff Scientist

APPROVED BY: W. Spangler TITLE: Project Manager

ORG: Dynamac Corporation
Rockville, MD
TEL: 301-417-9800

APPROVED BY: J. Breithaupt
TITLE: Agronomist
ORG: EFGWB/EFED/OPP
TEL: 703-305-5925

DRAFT

DRAFT

SIGNATURE:

CONCLUSIONS:

Field Dissipation - Terrestrial
Field Dissipation - Long Term

1. This study can be used toward the fulfillment of data requirements.

2. Thiabendazole [2-(thiazol-4-yl)benzimidazole] dissipated with a calculated half-life of 1100 days from the upper 6 inches of a vegetated (winter wheat) plot of loamy sand soil in Washington following two applications of thiabendazole (Mertect 340-F; 3.8 lb ai/gallon flowable concentrate) at 0.72 and 0.36 lb ai/A (total 1.08 lb ai/A; 34-day retreatment interval) in April/May 1989; applications

were made when the wheat was in the 2-3 tiller growth stage and when the flag leaf first emerged. In the 0- to 6-inch soil depth, thiabendazole ranged from 0.14-0.28 ppm following the first application of thiabendazole, 0.17-0.48 ppm in the 406 days following the second application with no clear pattern of decline, and averaged 0.20 ppm at 674 days, 0.15 ppm at 945 days, and 0.14 ppm at 1096 days. In general, thiabendazole was generally not detected below the 6-inch soil depth. The degradate, benzimidazole (1,3-benzodiazole), was not detected (0.01 ppm) at any sampling interval at any depth.

3. This study is acceptable and contributes toward the fulfillment of EPA Data Requirements for Registering Pesticides by providing information on the dissipation of the flowable concentrate formulation of thiabendazole in a plot of loamy sand soil in Washington that was planted to wheat and treated with thiabendazole [2-(thiazol-4-yl)benzimidazole; Mertect 340-F; 3.8 lb ai/gallon flowable concentrate] at 0.72 and 0.36 lb ai/A (total 1.08 lb ai/A).

4. This study may be used to support the registration of the flowable concentrate formulation of thiabendazole at an application rate of 1.08 lb ai/A. Acceptable data have been provided on the dissipation of the flowable concentrate formulation of thiabendazole on soybeans in Illinois and Georgia (MRIDs 43187202 and 43187203, Studies 2 and 3 of this submission, respectively). For complete fulfillment of the terrestrial field dissipation requirement, acceptable data are required for each <u>additional</u> formulation type at two typical use sites.

<u>Ancillary Study - Freezer Storage Stability</u>

1. Freezer storage stability studies are not specifically required by Subdivision N guidelines.

2. Thiabendazole [2-(thiazol-4-yl)benzimidazole] did not degrade in loamy sand soil during 1120 days of incubation in polyethylene bottles at -20 C. Thiabendazole averaged 97-102% of the applied through 3 months posttreatment, 89-91% at 6 through 18 months, and 102% at 3 years. In contrast, the degradate benzimidazole (1,3-benzodiazole) degraded slowly under similar conditions, averaging 102% of the applied immediately posttreatment, 93% at 0.5 months, 90% at 1 month, 78-80% at 3 through 12 months, 72% at 18 months, and 54% at 3 years.

3. This study is scientifically sound and provides information on the stability of thiabendazole and benzimidazole in soil stored for 1120 days at -20 C.

4. No additional information on the stability of thiabendazole and benzimidazole in soil during 3 years of frozen storage is required at this time. Additional data on the stability of these compounds in frozen soil have been provided (MRIDs 43187202 and 43187203, Studies 2 and 3 of this submission, respectively).

METHODOLOGY:

Field Dissipation - Terrestrial
Field Dissipation - Long Term

Thiabendazole [2-(thiazol-4-yl)benzimidazole; Mertect 340-F; 3.8 lb ai/gallon flowable concentrate, Merck & Company] was applied twice, at 0.72 and 0.36 lb ai/A (total 1.08 lb ai/A; 34-day retreatment interval), to a plot (75 x 75 feet) of loamy sand soil (0- to 12-inch depth; 77% sand, 20% silt, 3% clay, 0.39% organic matter, pH 7.8, CEC 6.9 meq/100 g) located near Ephrata, Washington. The site had been planted to winter wheat on September 14, 1988; applications were made when the wheat was in the 2-3 tiller growth stage (April 18, 1989) and when the flag leaf first emerged (May 22, 1989) using a tractor-mounted boom spray applicator. An untreated plot (25 x 75 feet) of wheat located 110 feet from the treated plot was maintained as a control. In both the treated and control plots, the wheat was cut to a height of 8 inches and the grain removed on July 10, 1989; the plots were left fallow and untilled for the remainder of the study. Sprinkler irrigation was used "as per normal agricultural practice for winter wheat production for the area."

For sampling purposes, the treated and control plots were divided into 3- x 5-foot subplots. Soil samples (36-inch depth) were collected prior to and immediately after the first application; at 1, 7, 14, and 28 days after the first application; prior to and immediately after the second application; and 1, 7, 14, 28, 56, 84, 126, 182, 225, 315, 406, 495, 674, 795, 945, and 1096 days after the second application. At each sampling interval, fifteen and five soil cores were randomly collected from the treated and control plots, respectively. Cores were collected from the center of the sampled subplots. Soil from the 0- to 6-inch depth was collected using a zero-contamination hand-held probe (0.9-inch id). "In an adjacent area [not further defined], the soil was then excavated by hand-spooning the soil" to a depth of 6 inches using a 3- x 6-inch metal tube. A soil core (6- to 36-inch depth) was then collected through the surface excavation using a zero-contamination probe (0.9-inch id). Following sampling, the sample holes were filled with uncontaminated soil and marked to prevent resampling. The soil cores were stored in a cooler in the field, then frozen at the field cooperator facilities, and were shipped to and stored frozen (approximately -20 C) at the analytical laboratory until analysis.

At the analytical laboratory, the soil cores were divided into 0- to 6-, 6- to 12-, 12- to 18-, 18- to 24-, and 24- to 36-inch segments. The fifteen soil cores from the treated plot were composited by sampling interval and soil depth into a three samples (5 cores/sample); the five cores collected from the control plot at each sampling interval were composited into a single sample. The soil samples were finely ground and homogenized with dry ice in a grinding mill, then returned to the freezer until analysis.

Subsamples (20 g) of the composited soil samples were extracted with 6 N HCl:dimethylformamide (1:1) by shaking for 1 hour. The samples were then filtered, and the extraction bottle and soil marc were rinsed with additional solvent. The extract was diluted sequentially with 4 N NaOH and 2 N Na_2CO_3 (approximate ratio 1:1:1, v:v:v), then partitioned three times with ethyl acetate. The ethyl acetate extracts were filtered and combined, and the combined solution was evaporated to near dryness on a rotoevaporator at 30-40 C. The concentrate was diluted with 10% acetic acid in water, and analyzed for thiabendazole and its degradate benzimidazole by reverse-phase HPLC using a Supelco LC-8-DB column eluted with water:methanol (60:40 for thiabendazole, 70:30 for benzimidazole); the column was equipped with fluorometric detection. Recovery efficiencies from soil samples fortified during analysis of the field samples at 0.01-1.0 ppm with either thiabendazole or benzimidazole ranged, in general, from 62-112 and 64-111% of the applied, respectively (average recoveries 80 ± 8.7% and 82 ± 7.3%, respectively; Tables M-2 through M-4). Recovery efficiencies from soil samples fortified during analysis of the field spike samples were 78-79% of the applied for thiabendazole and 93-94% for benzimidazole (Table S-1). The method detection limit was 0.01 ppm.

Ancillary Study - Freezer Storage Stability

Samples (20 g) of soil from the control plot were treated with either 0.20 ppm of thiabendazole [2-(thiazol-4-yl)benzimidazole; purity 99.8%, Merck & Company], 0.20 ppm of benzimidazole (1,3-benzodiazole; purity 98%, Aldrich Chemical Company), or 0.20 ppm each of thiabendazole and benzimidazole. The treated soils were stored frozen at -20 C in polyethylene bottles for up to 1120 days posttreatment; samples were collected at 0, 14, 32, 62, 101, 188, 366, 572, and 1120 days posttreatment. The soils were extracted and analyzed for thiabendazole and benzimidazole as previously described.

DATA SUMMARY:

Field Dissipation - Terrestrial
Field Dissipation - Long Term

Thiabendazole [2-(thiazol-4-yl)benzimidazole] dissipated with a registrant-calculated half-life of 1100 days from the upper 6 inches of a plot of loamy sand soil following two applications of thiabendazole (Mertect 340-F; 3.8 lb ai/gallon flowable concentrate) at 0.72 and 0.36 lb ai/A (total 1.08 lb ai/A; 34-day retreatment interval) in April and May 1989 (Table 8). The test plot, located in Washington, had been planted to winter wheat on September 14, 1988, and was treated when the wheat was in the 2-3 tiller growth stage (April 18, 1989) and when the flag leaf first emerged (May 22, 1989).

In the 0- to 6-inch soil depth, thiabendazole was 0.14-0.28 ppm (average 0.21 ppm) immediately following the first application, and

ranged from 0.11-0.27 ppm during the 34 days prior to the second application (Tables A-1 and A-2). Thiabendazole was 0.22-0.28 ppm immediately following the second application, ranged from 0.17-0.48 ppm (average 0.21-0.33 ppm) between 1 and 406 days (35 to 440 days following the initial application) with no clear pattern of decline, and averaged 0.20 ppm at 674 days, 0.15 ppm at 945 days, and 0.14 ppm at 1096 days. In the 6- to 12-inch soil depth, thiabendazole averaged ≤0.011 ppm through 674 days posttreatment, and was ≤0.026 ppm (average 0.013-0.015 ppm) at 795, 945, and 1096 days. Thiabendazole was not detected below the 12-inch soil depth at any sampling interval. The degradate, benzimidazole, was not detected (0.01 ppm) at any sampling interval at any depth.

During the study, the air temperatures ranged from -15 to 107 F; average soil temperatures (2-, 4,-, 6-, or 8-inch depth) ranged from 1 to 97 C. The treated and control plots received 0.16 inches of water 0 days (irrigation) and again 1 day (rainfall) following the first application. During the 1096-day study, precipitation totaled 17 inches, and irrigation totaled 47 inches. The elevation of the test plot was 1100 feet, the slope of the test plot was <1%, and the depth to the water table was approximately 30 feet. There was no subsurface drainage.

Ancillary Study - Freezer Storage Stability

Thiabendazole [2-(thiazol-4-yl)benzimidazole] did not degrade in loamy sand soil that was treated with thiabendazole (purity 99.8%) at 0.20 ppm and incubated in polyethylene bottles at -20 C for up to 1120 days. Thiabendazole averaged 97-102% of the applied through 3 months posttreatment, 89-91% at 6 through 18 months, and 102% at 3 years (Table S-2).

Benzimidazole (1,3-benzodiazole) degraded slowly in loamy sand soil that was treated with benzimidazole (purity 98%) at 0.20 ppm and incubated in polyethylene bottles at -20 C for up to 1120 days. Benzimidazole averaged 102% of the applied immediately posttreatment, 93% at 0.5 months, 90% at 1 month, 78-80% at 3 through 12 months, 72% at 18 months, and 54% at 3 years (Table S-2).

COMMENTS:

1. Many of the soil samples were analyzed several times during the course of the study. The length of storage prior to analysis ranged from 19 to approximately 967 days (Table A-4).

2. To determine the stability of thiabendazole and benzimidazole during shipping and handling, on 10/4/91 two 20-g samples of control soil were treated with 4 ug of thiabendazole, and two additional samples were treated with 4 ug of benzimidazole. The treated soil samples were capped and frozen, then shipped in a freezer truck and stored frozen until analysis on 11/13/91 (40 days posttreatment).

Recoveries from the duplicate samples were 93 and 100% of the applied for both thiabendazole and benzimidazole.

Soil samples collect on or before 14 days following the second application were shipped to the analytical laboratory on dry ice. Soil samples collected after 14 days following the second application were shipped to the analytical laboratory in a freezer truck.

3. To confirm the application rate, five 9.0-cm square Petri dishes were placed in the treated plot prior to the initial application; each dish was located in a separate spray pass. The dishes were collected and frozen immediately posttreatment. The five Petri dishes contained 62, 75, 87, 143, and 175% of the theoretical application (average 108 ± 48%). Also, following the initial application, five spray solutions were collected from separate nozzles of the spray boom. The spray solution contained 91-114% of the theoretical concentration (average 103 ± 11%). There was no reported attempt to confirm the application rate during the second treatment.

4. In the 3 years prior to the initiation of the study, the test plots were treated with ethalfluralin, dacthal, and 2,4-D. The test plots were planted to pumpkins in 1986, to winter wheat in 1987, and to pumpkins in 1988.

5. To control grass and broadleaf weeds during the study, the test plots were treated with 2,4-D amine, glyphosate, and gromoxone + X-77.

6. For the freezer storage stability study, all samples were not treated on the same date. The majority of the samples were treated on 6/13/89; the 0-day sample was treated on 8/31/89, the 0.5-month sample was treated on 7/27/89, and the 18-month sample was treated on 12/13/90. The study author did not provide a reason why all samples were not treated on the same date.

7. Additional data have been provided on the stability of these compounds in frozen soil (MRIDs 43187202 and 43187203, Studies 2 and 3 of this submission, respectively). In MRID 43187202, thiabendazole was stable and benzimidazole degraded slowly in sandy loam soil that was treated with thiabendazole or benzimidazole at 0.20 ppm and incubated in polyethylene bottles at -20 C for up to 1219 days. Thiabendazole averaged 93-99% of the applied through 730 days posttreatment, and 101% at 1219 days. Benzimidazole averaged 100-103% of the applied through 90 days posttreatment, 89-95% at 180 through 730 days with no discernable pattern of decline, and 90% at 1219 days. In MRID 43187203, thiabendazole was stable and benzimidazole degraded slowly in sandy loam soil that was incubated at -20 C for up to 1171 days. Thiabendazole averaged 106% of the applied immediately posttreatment, and 86.3-99.1% of the applied at 28 through 1171 days with no discernable pattern of decline. Benzimidazole averaged 89.5-100% of the applied through 180 days posttreatment with no discernable pattern of decline, and 85.2-90.3% at 364 through 1171 days.

Page ___ is not included in this copy.

Pages 7 through 59 are not included in this copy.

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) _____.

_____ 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.