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Shaughnessey No. 114501

Date Out EFR: 06 JUL 1984

To: Ellenberger/Comfort
Product Manager 12
Registration Division (TS-767)

From: Samuel Creeger, Chief 
Review Section No. 1
Exposure Assessment Branch
Hazard Evaluation Division (TS-769)

Attached please find the environmental fate review of:

Reg./File No: 264-378 and -379

Chemical: Thiodicarb

Type Product: Insecticide

Product Name: LARVIN

Company Name: Union Carbide

Submission Purpose: Response to data gap - field dissipation study

ZBB Code: other

ACTION CODE: 305

Date in: 5/2/84

EFR # 4333,4334

Date completed: 7/6/84

Tais (level II)

Days

62

1.5

Deferrals To:

Ecological Effects Branch

Residue Chemistry Branch

Toxicology Branch

1.0 INTRODUCTION

Union Carbide Agricultural Products Company, Inc. has submitted a new field dissipation study for thiodicarb [N,N'(thiohis(methylimino)carbonyloxyl))bis-dimethyl ester].

2.0 CHEMICAL STRUCTURE AND DIRECTIONS FOR USE

See previous reviews.

No specific use pattern is applicable for this review.

3.0 DISCUSSION OF DATA

Larvin, Thiodicarb, Dissipation of Soil Residues Under Field Use Conditions. T.W. Hunt and S.L. Harrison. April 2, 1984. Project No. 804R11. Acc. No. 252958.

All environmental data requirements have been satisfied for thiodicarb except for field dissipation. Field dissipation studies have been previously reviewed and found efficient. In February 1984 Union Carbide agreed to submit new field dissipation studies. This submission contains the new field dissipation studies.

Procedure:

Strip plots of bare soil in California, North Carolina, and Mississippi were treated with thiodicarb, using ground equipment, at the rate of 0.9 lb ai/A. The number of applications was equal to that which was customary for the particular region (CA, 8; NC & MS, 15). The treated plots were divided into three replicates and were located downhill from the untreated plots.

The California soil was a fine sandy loam with a pH of 7.2 and <1% organic matter. The plot was 3 X 140 m with a slope of less than 1%. The North Carolina soil was a sandy loam with a pH of 5.6 and 0.4% organic matter. The plot was 8 X 61 m with a slope of less than 1%. The water table was at 1.1 m. The soil in Mississippi was a silty clay loam with a pH of 5.7 and 1.5% organic matter. The plot was 8.2 X 40 m with a slope of 0.5-2%. The water table varied from 0.6 to 1.2 m.

Samples were taken pretreatment; immediately after the 1st, 5th, 10th, and 15th applications for MS and NC or 1st, 4th, 8th applications for CA; 3 and 7 days, 2 and 4 weeks, and 2, 3, 6, 12, and 18 months after last application. At each sampling 10 one-inch cores were taken. Cores were subdivided by depth (0-15 cm and 15-30 cm) and composited at each depth within each plot. Samples were also taken at 30-60 and 60-120 cm.

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Samples were analyzed for total thiodicarb residue by the Thiodicarb/Methomyl-FDP-General method of analysis. The report states that the method is attached for reference in the Appendix, but was not found. This method determines "total thiodicarb" residues consisting of all thiodicarb and methomyl and most methomyl oxime residues present. The report states that thiodicarb and methomyl are hydrolyzed to methomyl oxime which is quantified. The "thiodicarb" residue is then calculated, so that the thiodicarb residues reported represent the sum total of thiodicarb, methomyl and methomyl oxime.

Results:

Tables I-VI show the mean thiodicarb residues and the climatic conditions at each site. Figures I-III show the decline curves for each of the sites.

Residues increased with additional applications of thiodicarb to the soil. The maximum levels reached at the 0-15 cm and 15-30 cm levels were 0.40 and 0.19 ppm in California, 0.21 and 0.10 ppm in North Carolina and 0.71 and 0.39 ppm in Mississippi. The half-life of thiodicarb was calculated from the decline curve for each site.

Conclusions:

The half-lives were not consistent, but varied with the type of soil (light soils led to faster dissipation) and amount of rainfall (greater rainfall increased the dissipation). The half-life of thiodicarb in the fine sandy loam of California with a total of 204 mm of rainfall was 6 days. In the sandy loam soil of North Carolina with a total of 475 mm of rainfall, the half-life was 3 days. In the Mississippi silty clay loam with 469 mm of rainfall, the half-life was 8 days.

4.0 CONCLUSION/RECOMMENDATION

While there is some variation in the soil dissipation half-life for thiodicarb, all half-lives were very short (3-8 days). This field dissipation study is acceptable and shows that the half-life of thiodicarb in soil is about 1 week. The analytical method used for the soil residues was not submitted with this study. In order for the field dissipation data requirement to be completely satisfied, the analytical method must be submitted for review.



Norma Kay Whetzel
July 6, 1984
Review Section No. 1
Exposure Assessment Branch
Hazard Evaluation Division

TABLE I. Thiodicarb residues (mean \pm s.d.) in Soil, California, 1962-3.

Sampling Period	Thiodicarb (depth)			
	0-15 cm (ppm)	15-30 cm (ppm)	30-60 cm ¹ (ppm)	60-120 ppm ¹ (ppm)
Pretreatment	<0.02	<0.02	<0.02	<0.02
Post 1st application	0.17 \pm 0.01	0.23 \pm 0.05		
Post 4th application	0.40 \pm 0.03	0.08 \pm 0.12		
Post 8th application	0.21 \pm 0.05	0.19 \pm 0.17	0.03 \pm 0.00	0.04 \pm 0.02
3 DALA	0.18 \pm 0.12	0.02 \pm 0.01		
8 DALA	0.08 \pm 0.03	<0.02		
14 DALA	0.07 \pm 0.03	<0.02	<0.02	<0.02
28 DALA	<0.02	<0.02	<0.02	<0.02
56 DALA	<0.02	<0.02	<0.02	<0.02

¹ Apparent residues at these depths are probably due to contamination while extracting the sample since no rainfall or irrigation occurred to leach residues to this depth.

applications 1-8 were made 6-8 days apart.

TABLE II. California Climatological Data for Periods Between Sampling Dates.

PERIOD	MEAN MAXIMUM AIR TEMPERATURE (°C)	TOTAL RAINFALL (mm)
Pretreatment to 1st application	35.6	0
1st to 4th applications	33.1	0
4th to 8th applications	32.3	0
8th application to 3 DALA	33.3	0
3 DALA to 8 DALA	34.6	0
8 DALA to 14 DALA	31.1	58
14 DALA to 28 DALA	24.6	32
28 DALA to 56 DALA	24.8	83
56 DALA to 84 DALA	14.6	31

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TABLE III. Thiodicarb residues (mean \pm s.d.) in Soil, North Carolina, 1982-3.

*Applications 1-15
were made 4-6
days apart*

Sampling Period	Thiodicarb (depth)			
	0-15 cm (ppm)	15-30 cm (ppm)	30-60 cm (ppm)	60-120 ppm (ppm)
Pretreatment	<0.02	<0.02	<0.02	<0.02
Post 1st application	0.09 \pm 0.07	0.07 \pm 0.04		
Post 5th application	0.13 \pm 0.04	0.05 \pm 0.01		
Post 10th application	0.21 \pm 0.04	0.10 \pm 0.02		
Post 15th application	0.17 \pm 0.04	0.08 \pm 0.03	0.09 \pm 0.07	0.06 \pm 0.05
3 DALA	0.17 \pm 0.06	0.14 \pm 0.11		
7 DALA	0.02 \pm 0.01	0.04 \pm 0.04		
14 DALA	<0.02	<0.02	<0.02	<0.02

TABLE IV. North Carolina Climatological Data for Periods Between Sampling Dates.

PERIOD	MEAN MAXIMUM AIR TEMPERATURE (°C)	TOTAL RAINFALL (mm)
Pretreatment to 1st application	30.0	0
1st to 5th application	30.0	58
5th to 10th application	30.6	125
10th to 15th application	28.8	74
15th application to 3 DALA	29.7	6
3 DALA to 7 DALA	28.4	8
7 DALA to 14 DALA	23.9	29
14 DALA to 28 DALA	24.7	3
28 DALA to 60 DALA	19.0	65
60 DALA to 91 DALA	15.7	107

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TABLE V. Thiodicarb residues (mean \pm s.d.) Soil, Mississippi, 1982-3.

Sampling Period	Thiodicarb (depth)			
	0-15 cm (ppm)	15-30 cm (ppm)	30-60 cm (ppm)	60-120 ppm (ppm)
Pretreatment	<0.02	<0.02	<0.06 ^a	<0.02 ^a
Post 1st application	0.10 \pm 0.05	0.07 \pm 0.01		
Post 5th application	0.12 \pm 0.08	0.11 \pm 0.06		
Post 10th application	0.24 \pm 0.29	0.12 \pm 0.05		
Post 15th application	0.71 \pm 0.12	0.39 \pm 0.07	0.63 \pm 0.75	0.04 \pm 0.03
3 DALA	0.40 \pm 0.15	0.49 \pm 0.43		
7 DALA	0.34 \pm 0.08	0.05 \pm 0.04		
14 DALA	0.22 \pm 0.04	0.02 \pm 0.01	<0.02	0.09 \pm 0.09
28 DALA	0.06 \pm 0.02	<0.02	<0.02	<0.02
61 DALA	0.02 \pm 0.02	<0.02		
91 DALA	<0.02	<0.02		

^a single analysis

Applications were made 3-7 days apart.

TABLE VI. Mississippi Climatological Data for Periods Between Sampling Dates.

PERIOD	MEAN MAXIMUM AIR TEMPERATURE (°C)	TOTAL RAINFALL (mm)
Pretreatment to 1st application	31.1	0
1st to 5th application	32.2	1
5th to 10th application	31.1	36
10th to 15th application	31.0	42
15th application to 3 DALA	28.9	0
3 DALA to 7 DALA	29.2	0
7 DALA to 14 DALA	29.9	79
14 DALA to 28 DALA	25.1	6
28 DALA to 61 DALA	22.7	183
61 DALA to 91 DALA	16.6	122

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FIGURE I. Dissipation Curve for Thiodicarb in Dinuba Fine Sandy Loam Soil.

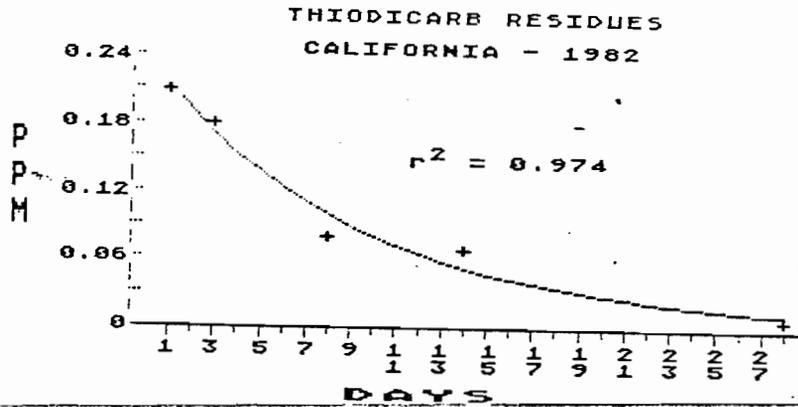


FIGURE II. Dissipation Curve for Thiodicarb in Norfolk Sandy Loam Soil.

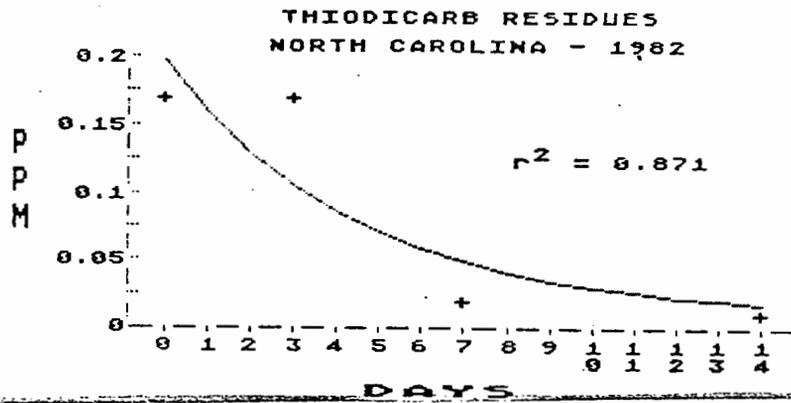


FIGURE III. Dissipation Curve for Thiodicarb in Dundee Silty Clay Loam Soil.

