~~125301~~ 122601
Shaughnessy No.

Date out of EAB: 13 DEC 1983

To: Gardner/Heyward
Product Manager #17
Registration Division (TS-767)

From: Samuel M. Creeger, Chief
Environmental Chemistry Review Section 1
Exposure Assessment Branch
Hazard Evaluation Division (TS-769c)

Attached please find the EAB review of...

Reg./File No.: 35977-U/35977-L

Chemical: Fenoxycarb

Type Product: I

Product Name: Logic

Company Name: Maag Agrochemicals

Submission Purpose: fire ant registration

ZBB Code: other

ACTION CODE: 120/115

Date In: 8/24/83

EFB # 3508-09

Date Completed: 12 DEC 1983

TAIS (level II)	Days
61	7

Deferrals To:

_____ Ecological Effects Branch

_____ Residue Chemistry Branch

_____ Toxicology Branch

1.0 INTRODUCTION

Maag Agrochemicals has submitted data in support of its request to register fenoxycarb on fire ants.

2.0 Logic: Ro 13-5223: fenoxycarb
ethyl[2-(phenoxyphenoxy)ethyl]carbamate

3.0 DISCUSSION

The following volumes of data were a part of this submission:

Vol IV a, Acc No 071852
Vol IV b, Acc No 071853
Vol V a, Acc No 071847
Vol V b, Acc No 071848

These two volumes (IV and V) are identical. Consequently all references to studies will be made using volume V.

In previous submissions, fenoxycarb was found to be stable to hydrolysis. This study was found to be satisfactory and will not be re-reviewed. Also the interim (6 month) aerobic soil metabolism study was previously commented on. A more thorough review was reserved for the 1 year study. The final results were included in this submission. Other environmental fate studies had been submitted but not reviewed since they were not required for an EUP.

Logic is a fire ant bait that contains 1% fenoxycarb on [redacted] One application per year is recommended at a rate of 1.0-1.5 lb product/acre. Aerial and broadcast methods can be employed as well as individual mound treatment.

3.1 Laboratory Aerobic Soil Metabolism Studies with ^{14}C-Ro 13-5223/024, 1983. P. Dieterle, R. Kaufman, and M. Frei. Report No. 141/3644.

Three soils were treated in triplicate with radiolabeled fenoxycarb to give an ai concentration of 5 ppm. One sample of each soil type was kept as a control. The soil characteristics are reproduced in Table 0. It should be noted that these are not American soils. Soil samples were placed in 2L incubation flasks each of which was fitted with a trap to collect volatiles. All samples were kept in the dark and maintained at 22°C and 60% relative humidity.

Inert ingredient information is not included

Dry weight soil samples (50 g) were removed at t = 0, 1, 2, and 7 days, 2 and 3 weeks, and 1, 2, 3, 4, 6, 9, and 12 months. Samples were extracted with acetonitrile/buffer solvent. Aliquots of combined supernatants were submitted to LSC. Combustion analysis was used to determine non-extractable radioactivity in precipitate. Samples taken at or after 3 months were subjected to consecutive Soxhlet extraction with acetonitrile and methane.

After acetonitrile evaporation, the aqueous phases were extracted with ethyl acetate. After three partitionings, radioactivity in the organic and extracted aqueous phases was determined by LSC. Radio TLC was used to determine metabolites in organic phase, Radio HPLC was used to identify metabolites for the 2 and 3 month extractions.

Spiked samples gave 101% of recovery of radioactivity of which 98.4% was extractable; the rest was soil bound (analyzed by combustion). Trapping towers were removed and analyzed every two weeks.

Results

The patterns for dissipation of fenoxycarb appear to be similar in all soils. During the first two months, the amount of extractable material remained fairly constant but then dropped rapidly. Other than CO_2 production no other volatiles were found. These results are shown in Tables I-III and Figures 4-6.

Metabolite production was low (<8%). During the first two months, most of the residue was unchanged parent. Structural identification for two of the metabolites was possible using radio HPLC and radio TLC. It appears metabolism leads to CO_2 production and tightly bound soil residues. See Tables IV-VII and Figure 7.

Conclusions

After 1 year, 14% or less of the initially applied radioactivity was identified as fenoxycarb. Metabolite production is low. Extractable residues are in amounts less than 10% of originally applied material. Metabolism leads to CO_2 production and soil bound residues.

The results provided indicate that two separate degradation processes may be involved. The initial process about 30 days provides little degradation, but after 30 days, rapid decline of parent is noted. This may be due to breakdown of carrier over the first month releasing "bound" fenoxycarb. Once the parent is "free" of the carrier, it is available for the degradation process. The halflife is in the range of 2-3 months. Regression analyses are attached which verify halflives.

Fenoxycarb Science Reviews

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Pages _4_ through _15_ are not included in this copy.

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_____ The product confidential statement of formula.

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REGRESSION ANALYSIS OF RESIDUE DECLINE DATA

NAME: DICK MORASKI DATE: 12/7/83

TITLE: FENOXYCARB

REMARKS: AEROBIC SOIL Commingled soil

FILE NAME: LOGIC RESIDUE LEVELS IN % INTERVALS IN DAYS

DATA ENTRIES 1 TO 13

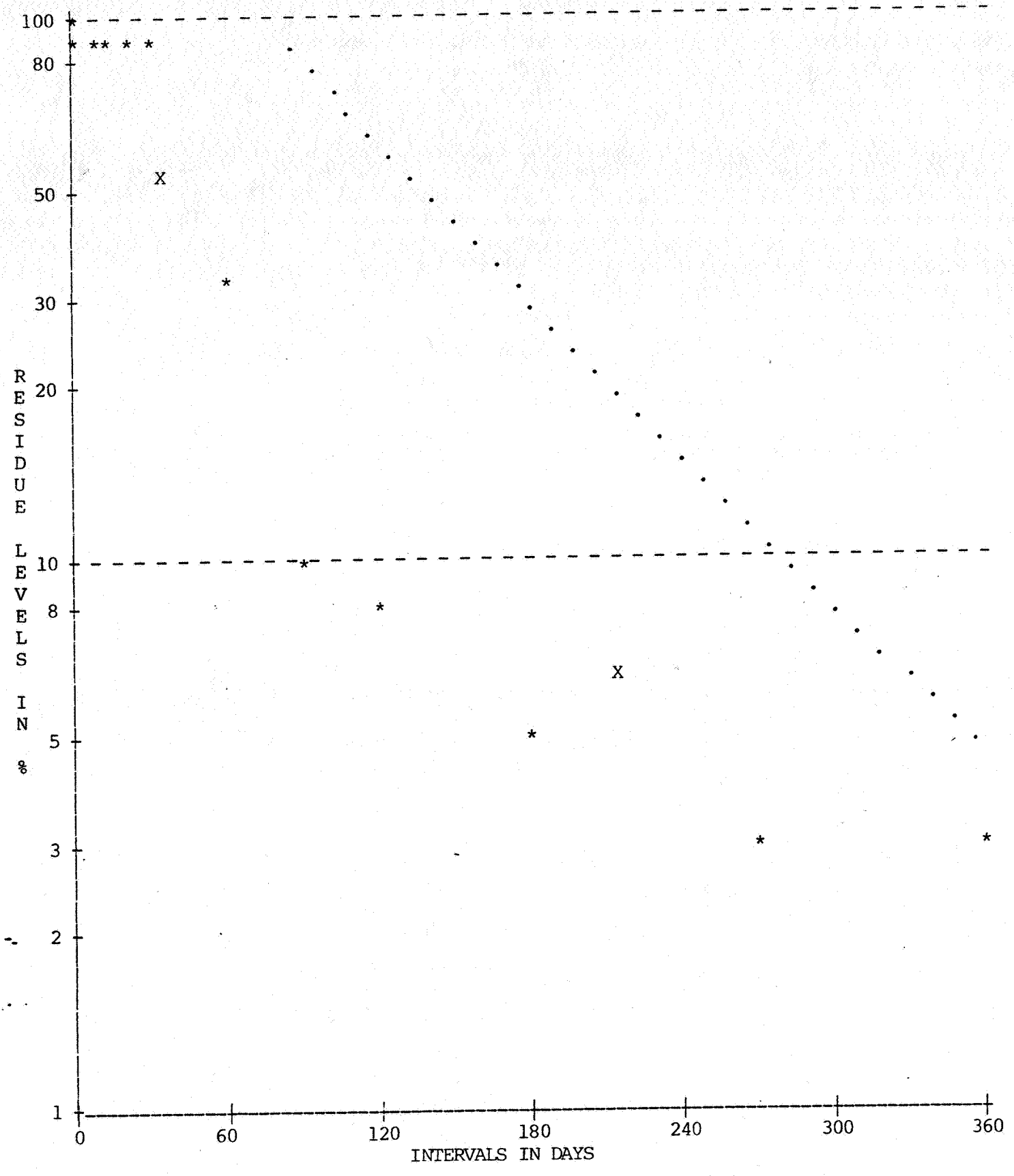
93 at 0 DAYS	94 at 14 DAYS	10 at 90 DAYS	3 at 360 DAYS
93 at 1 DAYS	93 at 21 DAYS	8 at 120 DAYS	
96 at 2 DAYS	92 at 30 DAYS	5 at 180 DAYS	
92 at 7 DAYS	33 at 60 DAYS	3 at 270 DAYS	

N= 13 SUM X= 1155 SUM X†2= 262591 SUM Y= 43.4342 SUM Y†2= 170.857 SUM X*Y= 1988.14
For the 95% confidence level, the appropriate 't' VALUE=1.7989 (For a one tailed test)

DF=11 CORRELATION COEFFICIENT=.921957 CORRELATION COEFFICIENT SQUARED=.850005
Y-INTERCEPT= 4.38011 RELATIVE % ERROR OF THE SLOPE= 12.7% % LOSS PER DAY= 1.16%

SLOPE= -.012, its UPPER 95% CL= -.009 and its LOWER 95% CL= -.014
HALF LIFE= 59.3 DAYS, its UPPER 95% CL= 76.8 DAYS and its LOWER 95% CL= 48.3 DAYS
~ 2 months
DAY ZERO LEVEL=79.847 %, its UPPER 95% CL=247.43 % and its LOWER 95% CL=25.767 %

FENOXYCARB
AEROBIC SOIL Commercial soil
(...=UPPER 95% CON. LIMIT)



REGRESSION ANALYSIS OF RESIDUE DECLINE DATA

NAME: DICK MORASKI DATE: 12/7/83

TITLE: FENOXYCARB

REMARKS: AEROBIC SOIL Dielsdorf soil

FILE NAME: LOGIC RESIDUE LEVELS IN % INTERVALS IN DAYS

DATA ENTRIES 1 TO 13

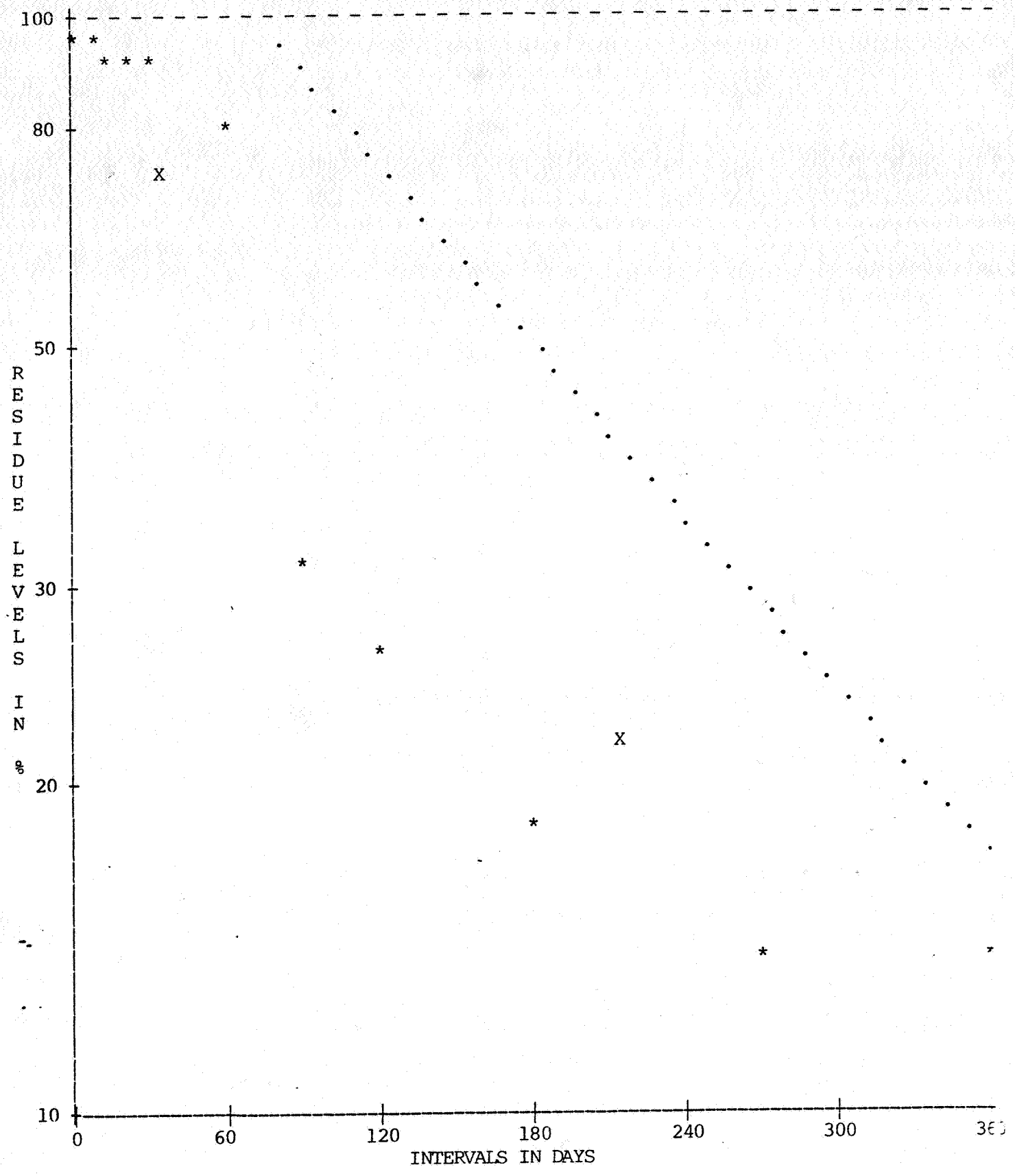
97 at 0 DAYS	93 at 14 DAYS	32 at 90 DAYS	14 at 360 DAYS
96 at 1 DAYS	92 at 21 DAYS	26 at 120 DAYS	
95 at 2 DAYS	91 at 30 DAYS	18 at 180 DAYS	
94 at 7 DAYS	80 at 60 DAYS	14 at 270 DAYS	

N= 13 SUM X= 1155 SUM X†2= 262591 SUM Y= 51.0758 SUM Y†2= 208.592 SUM X*Y= 3487.9
For the 95% confidence level, the appropriate 't' VALUE=1.7989 (For a one tailed test)

DF=11 CORRELATION COEFFICIENT=.932863 CORRELATION COEFFICIENT SQUARED=.870233
Y-INTERCEPT= 4.51206 RELATIVE % ERROR OF THE SLOPE= 11.6% % LOSS PER DAY= .65%

SLOPE= -.007, its UPPER 95% CL= -.005 and its LOWER 95% CL= -.008
HALF LIFE= 105.6 DAYS, its UPPER 95% CL= 133.6 DAYS and its LOWER 95% CL= 87.3 DAYS
3.5 months
DAY ZERO LEVEL=91.109 %, its UPPER 95% CL=163.298 % and its LOWER 95% CL=50.832 %

FENOXYCARB
AEROBIC SOIL Dielsdorf Soil
(...=UPPER 95% CON. LIMIT)



REGRESSION ANALYSIS OF RESIDUE DECLINE DATA

NAME: DICK MORASKI DATE: 12/7/83

TITLE: FENOXYCARB

REMARKS: AEROBIC SOIL Steinmour Soil

FILE NAME: LOGIC RESIDUE LEVELS IN % INTERVALS IN DAYS

DATA ENTRIES 1 TO 13

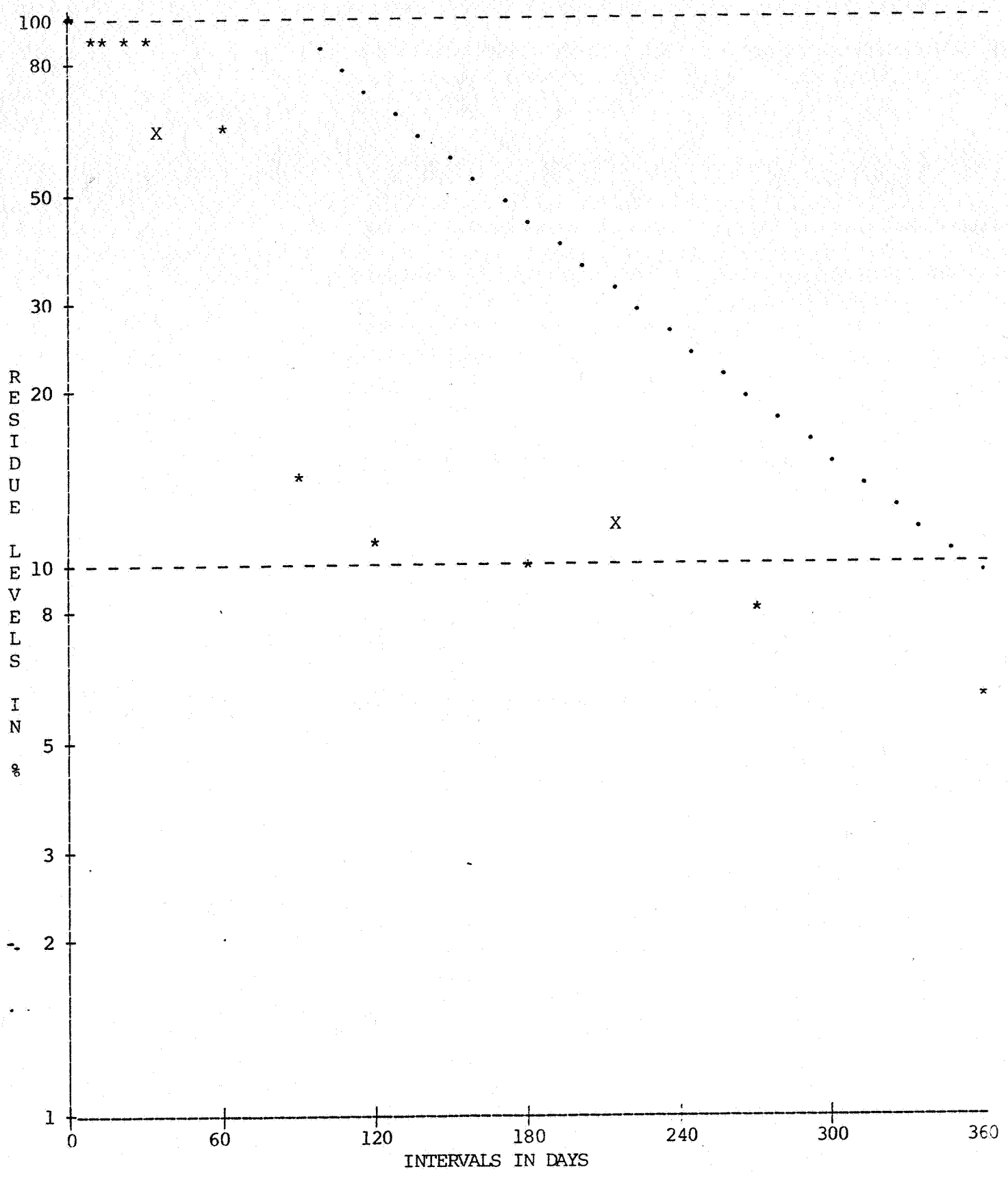
98 at 0 DAYS	91 at 14 DAYS	15 at 90 DAYS	6 at 360 DAYS
96 at 1 DAYS	89 at 21 DAYS	11 at 120 DAYS	
96 at 2 DAYS	89 at 30 DAYS	10 at 180 DAYS	
95 at 7 DAYS	64 at 60 DAYS	8 at 270 DAYS	

N= 13 SUM X= 1155 SUM X†2= 262591 SUM Y= 47.1943 SUM Y†2= 187.286 SUM X*Y= 2739.6
For the 95% confidence level, the appropriate 't' VALUE=1.7989 (For a one tailed test)

DF=11 CORRELATION COEFFICIENT=.909747 CORRELATION COEFFICIENT SQUARED=.82764
Y-INTERCEPT= 4.43754 RELATIVE % ERROR OF THE SLOPE= 13.8% % LOSS PER DAY= .90%

SLOPE= -.009, its UPPER 95% CL= -.007 and its LOWER 95% CL= -.011
HALF LIFE= 76.3 DAYS, its UPPER 95% CL= 101.4 DAYS and its LOWER 95% CL= 61.2 DAYS
2.5 months
DAY ZERO LEVEL=84.567 %, its UPPER 95% CL=219.663 % and its LOWER 95% CL=32.557 %

FENOXYCARB
AEROBIC SOIL Steinmant Soil
(...=UPPER 95% CON. LIMIT)



REGRESSION ANALYSIS OF RESIDUE DECLINE DATA

NAME: DICK MORASKI

DATE: 12/7/83

TITLE: FENOXYCARB

REMARKS: AEROBIC SOIL Commercial

FILE NAME: LOGIC

RESIDUE LEVELS IN %

INTERVALS IN DAYS

DATA ENTRIES 1 TO 7

93 at 0 DAYS	96 at 2 DAYS	94 at 14 DAYS	92 at 30 DAYS
93 at 1 DAYS	92 at 7 DAYS	93 at 21 DAYS	

N= 7 SUM X= 75 SUM X†2= 1591 SUM Y= 31.749 SUM Y†2= 144.001 SUM X*Y= 339.758
For the 95% confidence level, the appropriate 't' VALUE=2.0039 (For a one tailed test)

DF=5 CORRELATION COEFFICIENT=.415449 CORRELATION COEFFICIENT SQUARED=.172598
Y-INTERCEPT= 4.54115 RELATIVE % ERROR OF THE SLOPE= 97.9% % LOSS PER DAY=.05%

SLOPE= -.001, its UPPER 95% CL= .001 and its LOWER 95% CL= -.002
HALF LIFE= 1331.7 DAYS, its UPPER 95% CL=-1384.1 DAYS and its LOWER 95% CL= 449.6 DAYS

DAY ZERO LEVEL=93.799 %, its UPPER 95% CL=96.9 % and its LOWER 95% CL=90.796 %

REGRESSION ANALYSIS OF RESIDUE DECLINE DATA

NAME: DICK MORASKI

DATE: 12/7/83

TITLE: FENOXYCARB

REMARKS: AEROBIC SOIL Commercial

FILE NAME: LOGIC

RESIDUE LEVELS IN %

INTERVALS IN DAYS

DATA ENTRIES 1 TO 6

92 at 0 DAYS 30 d	10 at 60 DAYS 90 d	5 at 150 DAYS 180 d	
33 at 30 DAYS 60 d	8 at 90 DAYS 120 d	3 at 240 DAYS 270 d	

N= 6 SUM X= 570 SUM X†2= 92700 SUM Y= 15.1084 SUM Y†2= 46.0954 SUM X*Y= 935.283
For the 95% confidence level, the appropriate 't' VALUE=2.1314 (For a one tailed test)

DF=4 CORRELATION COEFFICIENT=.897492 CORRELATION COEFFICIENT SQUARED=.805491
Y-INTERCEPT= 3.75026 RELATIVE % ERROR OF THE SLOPE= 24.6% % LOSS PER DAY= 1.29%

SLOPE= -.013, its UPPER 95% CL= -.006 and its LOWER 95% CL= -.02
HALF LIFE= 53.4 DAYS, its UPPER 95% CL= 112.2 DAYS and its LOWER 95% CL= 35.1 DAYS
1.8 months

DAY ZERO LEVEL=42.532 %, its UPPER 95% CL=206.17 % and its LOWER 95% CL=8.774 %

REGRESSION ANALYSIS OF RESIDUE DECLINE DATA

NAME: DICK MORASKI DATE: 12/7/83

TITLE: FENOXYCARB

REMARKS: AEROBIC SOIL Dielsdorf

FILE NAME: LOGIC RESIDUE LEVELS IN % INTERVALS IN DAYS

DATA ENTRIES 1 TO 6

97 at 0 DAYS	95 at 2 DAYS	93 at 14 DAYS
96 at 1 DAYS	94 at 7 DAYS	91 at 30 DAYS

N= 6 SUM X= 54 SUM X†2= 1150 SUM Y= 27.2797 SUM Y†2= 124.033 SUM X*Y= 244.257
For the 95% confidence level, the appropriate 't' VALUE=2.1314 (For a one tailed test)

DF=4 CORRELATION COEFFICIENT=.952989 CORRELATION COEFFICIENT SQUARED=.908189
Y-INTERCEPT= 4.56369 RELATIVE % ERROR OF THE SLOPE= 15.9% % LOSS PER DAY= .19%

SLOPE= -.002, its UPPER 95% CL= -.001 and its LOWER 95% CL= -.003
HALF LIFE= 365.3 DAYS, its UPPER 95% CL= 552.5 DAYS and its LOWER 95% CL= 272.9 DAYS

DAY ZERO LEVEL=95.937 %, its UPPER 95% CL=97.758 % and its LOWER 95% CL=94.15 %

REGRESSION ANALYSIS OF RESIDUE DECLINE DATA

NAME: DICK MORASKI DATE: 12/7/83

TITLE: FENOXYCARB

REMARKS: AEROBIC SOIL Dielsdorf

FILE NAME: LOGIC RESIDUE LEVELS IN % INTERVALS IN DAYS

DATA ENTRIES 1 TO 6

91 at 0 DAYS 30d	32 at 60 DAYS 90d	18 at 150 DAYS 180d
80 at 30 DAYS 60d	26 at 90 DAYS 120d	14 at 240 DAYS 270d

N= 6 SUM X= 570 SUM X†2= 92700 SUM Y= 21.1462 SUM Y†2= 77.4954 SUM X*Y= 1699.56
For the 95% confidence level, the appropriate 't' VALUE=2.1314 (For a one tailed test)

DF=4 CORRELATION COEFFICIENT=.914342 CORRELATION COEFFICIENT SQUARED=.836022
Y-INTERCEPT= 4.28663 RELATIVE % ERROR OF THE SLOPE= 22.1% % LOSS PER DAY= .80%

SLOPE= -.008, its UPPER 95% CL= -.004 and its LOWER 95% CL= -.012
HALF LIFE= 86.4 DAYS, its UPPER 95% CL= 163.6 DAYS and its LOWER 95% CL= 58.7 DAYS
2.9 months

DAY ZERO LEVEL=72.721 %, its UPPER 95% CL=175.329 % and its LOWER 95% CL=30.162 %

REGRESSION ANALYSIS OF RESIDUE DECLINE DATA

NAME: DICK MORASKI DATE: 12/7/83

TITLE: FENOXYCARB

REMARKS: AEROBIC SOIL Stevenson

FILE NAME: LOGIC RESIDUE LEVELS IN % INTERVALS IN DAYS

DATA ENTRIES 1 TO 7

98 at 0 DAYS	96 at 2 DAYS	91 at 14 DAYS	89 at 30 DAYS
96 at 1 DAYS	95 at 7 DAYS	89 at 21 DAYS	

N= 7 SUM X= 75 SUM X†2= 1591 SUM Y= 31.7557 SUM Y†2= 144.07 SUM X*Y= 337.643
For the 95% confidence level, the appropriate 't' VALUE=2.0039 (For a one tailed test)

DF=5 CORRELATION COEFFICIENT=.955235 CORRELATION COEFFICIENT SQUARED=.912474
Y-INTERCEPT= 4.57186 RELATIVE % ERROR OF THE SLOPE= 13.9% % LOSS PER DAY= .33%

SLOPE= -.003, its UPPER 95% CL= -.002 and its LOWER 95% CL= -.004
HALF LIFE= 210.2 DAYS, its UPPER 95% CL= 291 DAYS and its LOWER 95% CL= 164.5 DAYS

DAY ZERO LEVEL=96.724 %, its UPPER 95% CL=99.585 % and its LOWER 95% CL=93.944 %

REGRESSION ANALYSIS OF RESIDUE DECLINE DATA

NAME: DICK MORASKI DATE: 12/7/83

TITLE: FENOXYCARB

REMARKS: AEROBIC SOIL Stevenson

FILE NAME: LOGIC RESIDUE LEVELS IN % INTERVALS IN DAYS

DATA ENTRIES 1 TO 6

89 at 0 DAYS	30 d	15 at 60 DAYS	90 d	10 at 150 DAYS	180 d
64 at 30 DAYS	60 d	11 at 90 DAYS	120 d	8 at 240 DAYS	210 d

N= 6 SUM X= 570 SUM X†2= 92700 SUM Y= 18.1355 SUM Y†2= 60.1536 SUM X*Y= 1347.51
For the 95% confidence level, the appropriate 't' VALUE=2.1314 (For a one tailed test)

DF=4 CORRELATION COEFFICIENT=.827487 CORRELATION COEFFICIENT SQUARED=.684735
Y-INTERCEPT= 3.94759 RELATIVE % ERROR OF THE SLOPE= 33.9% % LOSS PER DAY= .97%

SLOPE= -.01, its UPPER 95% CL= -.003 and its LOWER 95% CL= -.017
HALF LIFE= 71.2 DAYS, its UPPER 95% CL= 257.1 DAYS and its LOWER 95% CL= 41.3 DAYS
2.4 months
DAY ZERO LEVEL=51.81 %, its UPPER 95% CL=266.072 % and its LOWER 95% CL=10.089 %

3.2 Photolysis of ^{14}C-Ro 13-5223/024 in Solution and on Soil Surfaces, 1982. P. Dieterle and R. Kaufman. Report No. 141/3061.

3.2.1 Water photolysis

Ring-labeled fenoxycarb was added to distilled water and acetonitrile to form a 1 ppm solution and irradiated for up to 24 hours. The light source was a high pressure mercury vapor lamp. A volatiles trap was used. In addition, a 0.99 ppm solution with acetone sensitizer was irradiated for 12 hours. Dark controls showed only parent present. A third unsensitized solution was prepared to give a concentration of 25 ppm. This solution was irradiated for 7.75 hours to help identify photoproducts.

Results

Tables I and II and Fig 3 and 4 give results for both unsensitized and sensitized photolysis. Table IV gives results from 7.75 hour photolysis study with 25 ppm fenoxycarb. Volatile components or $^{14}CO_2$ accounted for less than 8% of applied radioactivity. Two isomers were identified in the exaggerated concentration study (Table IV). Halflife values are 5.7 hour for the unsensitized photolysis and 5.0 hour for the sensitized reaction. Linear regression analyses verify the halflife determinations.

Conclusion

Water photolysis is rapid with a halflife of less than 6 hours.

3.2.2 Soil photolysis

Dielsdorf soil was spiked with 5 ppm fenoxycarb and irradiated for 24 hours.

Result

No photolysis was observed.

Conclusion

This study is not satisfactory since it was carried out for an extremely short time period. Extent of soil photolysis may not be evident for several days. The guidelines recommend a 30 day time period to observe any photolysis on soil surface unless patterns of decline are established sooner.

Fenoxycarb Science Reviews

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_____ Description of the product manufacturing process.

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_____ 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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REGRESSION ANALYSIS OF RESIDUE DECLINE DATA

NAME: DICK MORASKI DATE: 12/7/83

TITLE: FENOXYCARB

REMARKS: WATER PHOTOLYSIS unsensitized

FILE NAME: LOGIC RESIDUE LEVELS IN % INTERVALS IN HOURS

DATA ENTRIES 1 TO 6

107 at 0 HOURS	69 at 3.5 HOURS	47 at 6.3 HOURS
74 at 2.3 HOURS	63 at 4.8 HOURS	14 at 24 HOURS

N= 6 SUM X= 40.9 SUM X†2= 656.27 SUM Y= 23.8433 SUM Y†2= 97.2418 SUM X*Y= 132.199
For the 95% confidence level, the appropriate 't' VALUE=2.1314 (For a one tailed test)

DF=4 CORRELATION COEFFICIENT=.989211 CORRELATION COEFFICIENT SQUARED=.978539
Y-INTERCEPT= 4.52167 RELATIVE % ERROR OF THE SLOPE= 7.4% % LOSS PER HOUR= 7.72%

SLOPE= -.08, its UPPER 95% CL= -.068 and its LOWER 95% CL= -.093
HALF LIFE= 8.6 HOURS, its UPPER 95% CL= 10.2 HOURS and its LOWER 95% CL= 7.4 HOURS

DAY ZERO LEVEL=91.989 %, its UPPER 95% CL=121.694 % and its LOWER 95% CL=69.535 %

The % probability that 14 % at 24 HOURS is a OUTLIER is 85.36%

The % probability that 14 % at 24 HOURS is a OUTLIER is 85.36%

REGRESSION ANALYSIS OF RESIDUE DECLINE DATA

NAME: DICK MORASKI DATE: 12/7/83

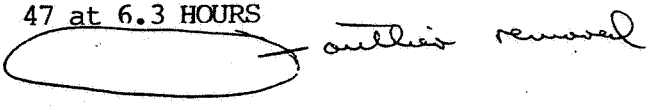
TITLE: FENOXYCARB

REMARKS: WATER PHOTOLYSIS unsensitized

FILE NAME: LOGIC RESIDUE LEVELS IN % INTERVALS IN HOURS

DATA ENTRIES 1 TO 5

107 at 0 HOURS	69 at 3.5 HOURS	47 at 6.3 HOURS
74 at 2.3 HOURS	63 at 4.8 HOURS	



N= 5 SUM X= 16.9 SUM X†2= 80.27 SUM Y= 21.2043 SUM Y†2= 90.2772 SUM X*Y= 68.8617
For the 95% confidence level, the appropriate 't' VALUE=2.3465 (For a one tailed test)

DF=3 CORRELATION COEFFICIENT=.982822 CORRELATION COEFFICIENT SQUARED=.965939
Y-INTERCEPT= 4.65099 RELATIVE % ERROR OF THE SLOPE= 10.8% % LOSS PER HOUR= 11.43%

SLOPE= -.121, its UPPER 95% CL= -.09 and its LOWER 95% CL= -.152
HALF LIFE= 5.7 HOURS, its UPPER 95% CL= 7.7 HOURS and its LOWER 95% CL= 4.6 HOURS

DAY ZERO LEVEL=104.688 %, its UPPER 95% CL=127.009 % and its LOWER 95% CL=86.29 %

3.3 Lab Anaerobic Soil Metabolism Study with ^{14}C-13-5223/024, 1982. P. Dieterle and R. Kaufman. Report No. 141/2841.

The soils treated aerobically (see 3.1) with 5 ppm fenoxycarb were aged for 1 month aerobically before the onset of anaerobic conditions. Soils were incubated anaerobically for up to 60 days.

Results

Tables III-V give the results of the anaerobic study. Linear regression analyses provided halflife estimates of 7.7 months in Commugny soil, 5.6 months in Dielsdorf soil, and 2.8 months in Steinmaur soil. CO^2 production was low. No metabolite was present in amounts greater than 10% of initially applied radioactivity.

Conclusion

Under anaerobic conditions, the degradation of fenoxycarb is retarded with halflife estimates ranging from approximately 3 to 8 months.

3.4 Laboratory Sterile Soil Metabolism with ^{14}C-Ro 13-5223/024, 1982. A Pryde and M. Etterli. Report No. 041/2677.

This study is not required under current operational guidelines. It was not thoroughly reviewed for this reason. However, the conclusion reached by the registrant is that fenoxycarb is stable to degradation when incubated in sterile soil for 28 days.

Fenoxycarb Science Reviews

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3.5 Laboratory Leaching Studies with ^{14}C-Ro 13-5223/024, 1982. A Pyrde and M. Etterli. Report No. 041/2830.

The leaching characteristics of both the parent and metabolites were studied. Two soils (Table O for soil properties) were used. Thirty cm columns, 5 cm in diameter of the two soils were treated with fenoxycarb and eluted with 393 mL deionized water over 2 days.

Each soil core was divided into six 5 cm sections. The top section (0-5 cm) of soil was extracted using acetonitrile-buffer solution. Radioactivity in supernatant was determined by LSC. Soil samples were Soxhlet extracted for 24 hours with acetonitrile and radioactivity determined by combustion analysis in soil residues and by LSC and radio-TLC in the acetonitrile extracts. The acetonitrile-buffer soil extract was further partitioned after acetonitrile removal by ethyl acetate and analyzed by radio-TLC. All other segments were analyzed directly by combustion analysis.

For the aged leaching studies, 3 x 28 cm columns were used. At 30 days after aerobic aging 50 g of fenoxycarb treated Steinmaur soil were removed from incubation flasks, put on top of soil columns to give a 30 cm depth, and 408 mL of water was added over a period of 40 days.

Results

In the non-aged study, most radioactivity was found in the top segment (0-5 cm). Less than 1% was found in all other segments. Most of the radioactivity was unchanged fenoxycarb. (Tables 1 and 2).

Table 3 show the results of the aged leaching study. As with the fresh treatment, about 94% of radioactivity was found in top 5 cm; about 2% in the 5-10 cm segment, and less than 0.3% in the rest. Most radioactivity recovered was unchanged parent.

Conclusion

Results from both the fresh and aged leaching studies indicates that fenoxycarb exhibits little or no tendency to leach. However, the results from the fresh study are somewhat clouded because the volume of water required to pass through the column was less than half the amount required by the guidelines.

According to the Guidelines § 163-1(c)(2)(v)(B) "The column(s)... should be eluted with a volume of water equal to 20 inches (50.8 cm) times the cross-sectional area of the column."

In the unaged study this is equivalent to 50.8 cm x 3.14 $(2.5\ cm)^2$ = 997 mL. The amount actually used was 393 mL.

In the aged study 50.8 cm x 3.14 x $(1.5\ cm)^2$ = 359 mL. Amount actually used was 408 mL.

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3.6 Freundlich Adsorption and Desorption Constants for ^{14}C-Ro 13-5223/024 in Four Soils, 1982. A Pryde and M. Etterli. Report No. 041/2674.

Four concentrations of ai were prepared and mixed with fresh soil and shaken for 24 hours at 20°C to determine adsorption. The soil characteristics are given in Table O. Following two centrifugation procedures, radioactivity was analyzed in aqueous phase by LSC. By difference, the ai in soil was determined.

For the desorption study, filtered soil samples from adsorption study were shaken for 24 hours at 20°C with either distilled water or calcium sulfate solution. After centrifugation, analysis of aqueous phase for radioactivity was done by LSC.

Results

A summary of the results is given in Table 9. On soils with organic content greater than 2% the Freundlich constants are high - 49 and 77 - but on the Wallis soil with organic content of 1.4%, the constant is lower at 18. Desorption from distilled water and $CaSO_4$ produced higher constants.

Conclusion

Binding is moderate to strong depending on soil type indicating little potential for leaching.

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3.7.1 Field Dissipation Study of Fenoxycarb (Ro 13-5223) When Applied to Pasture Grass as a Fire Ant Bait at Expected Use Rates, 1983. J. Fyler. Report No. US 83-AL.2

Two plots of bahia grass were treated at 11 g ai/ha (0.01 lb ai/acre), the expected use rate. One plot was treated with fenoxycarb on a [redacted] and the other plot was treated with fenoxycarb on an [redacted] Grass and soil samples were collected at 1 hour, 1 day, 3 days, and 7 days after treatment. Appendix II gives soil characteristics.

The plots which measured 6 m by 45 m were divided into 1 m^2 areas. A composite sample from 20 random locations was taken at each sampling time. Soil cores were taken to a depth of 3 cm. Grass samples were taken from same locations. Samples were extracted using acetone and analyzed by reversed phase HPLC.

Results

Appendices V and VI give the results of the soil and grass analysis. These data indicate residues of fenoxycarb using [redacted] were below limits of detection (0.05 ppm) at all sampling times while low residues of fenoxycarb were found 1 hour and 1 day post treatment (0.16 ppm and 0.09 ppm, respectively, using the [redacted] Grass samples in both cases showed residues but less than 0.02 ppm to less than 0.005 ppm.

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3.7.2 Field Dissipation Study of Ro 13-5223 When Applied to Pasture Grass as a Fire Ant Bait, 1982, J. Fyler. Report No. US 82-A1.2a

In this study 10 plots of bahia grass were treated with Ro 13-5223 at a rate of 1.34 kg ai/ha (over the 100x the proposed use rate of 11.6 g ai/ha). The [redacted] was used. Soil cores to 30 cm in depth were taken. Grass samples were also taken. Extractions and analyses were performed as in the other field study. Sampling was carried out at various times up to 28 days after treatment.

Results

The results are given in Appendices II and III. No residues (<0.02 ppm) were found below 7.5 cm at any sampling time. Residue ranges from 1.4 ppm 2 hours after treatment to 0.08 ppm 28 days after treatment. All grass samples showed residues with the exception of the 28 d sample which was below detection limit. Highest residues were found 2 hours after treatment at 1.27 ppm.

Conclusion

Both field studies indicate that under exaggerated and normal use conditions dissipation of fenoxycarb is expected to be rapid.

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3.8 Ro-13-5223 (Fenoxycarb) 10% Fire Ant Bait: Rate of Removal from Treated Field, 1983. Office Correspondence from J.T. Bridges to R.H Stanton.

The correspondence is reproduced in it entirety. Results of this study indicate rapid removal of bait by fire ants (within 24 hours).

3.9 Ro 13-5223/024 (^{14}C) Bioconcentration Factor and Metabolism Study in Fish, 1982. A. Pryde and M.E. Herli. Report No. 141/2986.

A static fish accumulation study was conducted using aquarium water spiked with 0.152 ppm fenoxycarb. The species of fish used was the bitterling. The pH of the water ranged from 7.3-8.3 and was not thermostated. Forty-six fish were placed in the aquarium; 5 were removed and sampled daily. Samples were taken during first 4 days. Radioactivity was measured by combustion analysis. During depuration phase, samples were taken on days 1, 3, 6, 11, and 17.

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 aquarium water after 4 days accumulation period indicated no parent present. Table 1 gives results of accumulation and depuration phases. An approximate bioconcentration factor of 95 was calculated.

3.10 American Soil vs. European Soil

EAB is in basic agreement with the registrant's philosophical argument concerning which soil (American vs European) to use. Certainly no specific soil can be considered representative of the U.S. This concept is clearly recognized in the Guidelines - more than one soil is recommended for many tests. But a soil could be representative of a particular region which grows a limited number of crops where the pesticide may find its major use(s).

In the case of fenoxycarb, an insecticide intended for use across the southeastern quadrant of the U.S. against the fire ant, it is agreed that no one soil would be truly representative. Consequently EAB accepts as valid those <u>laboratory</u> studies using European soils (except where those studies are unacceptable for other reasons). This decision is reinforced by the fact that the <u>field</u> dissipation studies were conducted on U.S. soils and that the results of these studies support conclusions made in laboratory studies.

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4.0 SUMMARY

4.1 Fenoxycarb is stable to hydrolysis.

4.2 Laboratory aerobic soil metabolism studies indicate degradation of fenoxycarb occurs once the parent "leaches" from the carrier. Halflife range is 2-3 months. Metabolism leads to CO_2 and tightly bound soil residues. Few extractable metabolites are formed.

4.3 Photolysis in water is rapid with a halflife for unsensitized reaction of 5.7 hours.

4.4 Soil photolysis is inconclusive - study needs to be repeated and carried out for 30 days or until decline can be identified-whichever comes first.

4.5 Anaerobic soil metabolism appears to be slower than aerobic metabolism. Halflife estimates range from 3 to 8 months.

4.6 Fenoxycarb is stable to degradation in sterile soil. (Study not thoroughly reviewed.)

4.7 The potential for leaching is minimal. Soil column studies using fresh and aged soils indicate a low potential for leaching. Adsorption/desorption studies indicate moderate to strong soil binding. Unaged leaching study found to be inadequate because of low volume of water used to elute column.

4.8 Field studies using expected and exaggerated use rates indicate rapid dissipation of fenoxycarb and no leaching beyond 7.5 cm.

4.9 A static fish accumulation study gives a bioconcentration factor of 95.

5.0 CONCLUSIONS and RECOMMENDATIONS

5.1 The following studies satisfy environmental fate guideline requirements for registration of fenoxycarb on noncropland:

Hydrolysis
Water photolysis
Aerobic soil metabolism
Anaerobic soil metabolism
Aged leaching; adsorption/desorption
Field soil dissipation

5.2 The following studies were found unsatisfactory.

Soil photolysis
Leaching

However, since the aged leaching, adsorption/desorption and field studies have all indicated a low potential for leaching with moderate to strong soil binding and field studies indicate a rapid removal of bait from soil, the fresh leaching study will not need be repeated.

5.3 Studies that still need to be submitted for noncropland use:

Soil photolysis
Flow through fish accumulation

5.4 EAB recommends the conditional registration of Logic to control fire ants pending submission of the studies mentioned above. If other uses will be sought (forestry or crop, for example) additional studies may be required.

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