FILE

109301

Date Out EFB:

FEB 21 1985

TO: Don Stubbs
Product Manager 41
Registration Division
TS-767

FROM: Samuel M. Creeger, Chief
Review Section No. 1
Exposure Assessment Branch
Hazard Evaluation Division

Attached please find the environmental fate review of:

Reg./File No.: 85-DE-01

Chemical: Fenvalerate

Type Product: Insecticide

Product Name: Pydrin

Company Name: Delaware Department of Agriculture

Submission Purpose: Section 18 (emergency) exemption for use on carrots

Date in: 2/15/85

Date Completed: 2/20/85

ACTION CODE: 510

EFB # 5312

TAIS (level II)	Days
21	2

Deferrals To:

_____ Ecological Effects Branch

_____ Residue Chemistry Branch

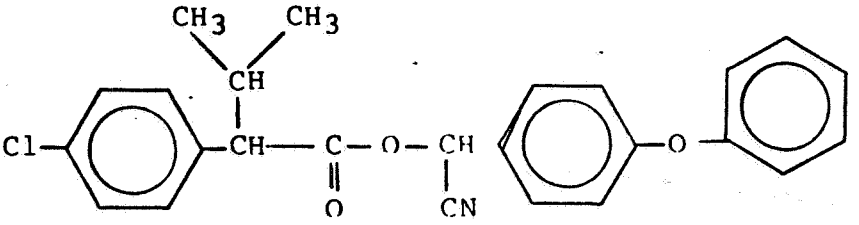
_____ Toxicology Branch

1.0 CHEMICAL

Common name: Fenvalerate

Chemical name: Cyano (3-phenoxyphenyl) methyl-4-chloro-alpha-(1-methylethyl) benzeneacetate

Chemical structure:



Formulation: PYDRIN® Insecticide

2.0 TEST MATERIAL

Studies considered in this review were conducted with ^{14}C-CN-, ^{14}C-CO-, ^{14}C-chlorophenyl- and/or ^{14}C-phenoxy-phenyl-fenvalerate (when position of label is identified).

3.0 ACTION

The Delaware Department of Agriculture has requested a Specific Exemption under Section 18 ("Emergency Exemption") for use of fenvalerate (PYDRIN®) insecticide to control carrot weevil in carrots grown in Delaware.

4.0 STUDY IDENTIFICATION

The following studies will be considered in supporting this request:

4.1 Hydrolysis: Hydrolytic Stability of PYDRIN 2.4EC Insecticide, K. S. Williams, Section A, p. 00002, Acc. No. 243109

4.2 Photochemical Degradation of SD 43775 on Silica Gel, Glass, Soil and in Water. H. Y. Fan, Report No. TIR-22-101-76, pg. 02842, Tab 2, Acc. No. 096386.

4.3 Aerobic soil metabolism:

Degradation of ^{14}C-Chlorophenyl-SD-43775 During Exposure to Soil Under Aerobic, Anaerobic and Sterile Conditions. J. E. Loeffler, Report No. TIR-22-108-76. Tab 2, Acc. No. 096386.

Degradation of ^{14}C-Chlorophenyl-SD-43775 During Exposure to Soil Under Aerobic, Anaerobic and Sterile Conditions, A. C. Page and E. W. Rutherford. Report No. TIR-22-108-76, Addendum # 1, Tab No. 4.

One-Year Study of the Fate of Phenoxy-phenyl-ring-labled ^{14}C-SD-43775 in Soil. H. Y. Fan, Report No. TIR-22-112-78, Tab No. 5. Acc. No. 097296.

One-Year Study of the Fate of ^{14}C-SD-43775 in Soil. H. Y. Fan, Report No. TIR-22-107-77, Tab No. 6.

One-Year Study of the Fate of ^{14}C-SD-43775 in Soil. H. Y. Fan, Report No. TIR-22-107-77 (Addendum) Tab No. 7.

One-Year Study of the Fate of ^{14}C-SD-43775 in Soil, H. Y. Fan, Report No. TIR-22-107-77 Addendum #2, Tab No. 8.

One-Year Study of the Fate of ^{14}C-SD-43775 in Soil, H. Y. Fan, Report No. TIR-22-107-77 (Addendum #3), Tab No. 9.

The following studies were submitted under Acc. No. 245470:

Comparative Aerobic Metabolism of ^{14}C-Chlorophenyl-SD-43775 in Sterilized and Nonsterilized Hanford Sandy Loam Soils. P. W. Lee and S. C. Stackhouse, 1979.

Aerobic and Anaerobic Soil Metabolism of ^{14}C-Chlorophenyl-SD 43775. P. W. Lee, 1979.

Twelve Months Aeroibc Soil Metabolism of ^{14}C-Chlorophenyl-SD 43775. P. W. Lee, 1979.

Aerobic and Anaerobic Soil Metabolism of ^{14}C-Phenoxyphenyl SD 43775. Annon.

Twelve-Month Aerobic Soil Metabolism of ^{14}C-Phenoxyphenyl of SD 43775.

4.3.2 Note: Other studies were submitted but are not considered here since they were, by themselves, were found deficient.

4.4 Anaerobic Soil Metabolism: Data are included in references listed in Section 4.3, above.

4.5 Leaching:

Parent: Leaching Studies of SD 43775 and Selected Reference Pesticides by Soil Thin-Layer Chromatography. R. L. Merritt, Report No. TIR-22-102-77, Tab 10, Acc. No. 096386.

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Sorption of SD 43775 on Soils. P. E. Porter, Report No. TIR-101-77, Tab 13, Acc. No. 09 36 (?)

Aged residues: The Leaching Behaviour of WL 43775 in Laboratory Soil Columns, C. Jackson and T. R. Roberts, Nov. 1, 1976, Group Research Report WKGR.0130.76, Tab 9, Acc. No. 096386.

Leaching Study of SD 43775 by Soil Column Chromatography, P. W. Lee; TIR-22-103-79, p. 00179, Section D, Acc. No. 243109.

4.6 Fish accumulation:

Residues of ^{14}C and SD 43775-^{14}C in Fish Exposed to SD 43775-^{14}C, J. C. Potter, Report No. TIR-22-105-76 Tab 22, Acc. No. 096386.

^{14}C and SD 43775 Residues in Catfish Exposed to a Soil/water Suspension treated with SD 43775-^{14}C. J. C. Potter, G. F Barber and C. R. Sauls, Report No. TIR-22-102-78, Tab 13.

4.6 Rotational crops:

Confined study: A 30- and 120-Day Rotational Crop Study Using ^{14}C-SD 43775 Following a Single Soil Treatment at a Dosage Rate of 2 lb ai/Acre. P. W. Lee, S. M. Stearns and W. R. Powell, Tab 13, Acc. No. 248812.

Field studies:

Residue Data for SD-43775 in Rotational Crops (English Peas and Turnips) Following Eight Applications of SD-43775 to Cotton the Previous Year. A Mississippi Study, 1978, Report No. TIR-24-199-78, Tab 27, (? Acc. No.).

Residue Data for SD-43775 in Rotational Crops (English Peas and Turnips) Following Eight Applications of SD-43775 the Previous Year to Cotton. A Mississippi Study, 1978, Report No. TIR-24-200-78, Tab 28, (? Acc. No.).

The following studies were submitted in Acc. No. 248812:

1982-Residue Data for SD 43775 in Radishes Following 38 or 48 Applications of SD 43775 to Cotton, A California Study, Tab 1.

1982-Residue Data for SD 43775. A possible Metabolite of SD 43775 in Radishes following 38 or 48 Applications of SD 43775 to Cotton, A California Study, Tab 2.

1982-Residue Data for SD 43775 on Soil from Radishes Following 38 or 48 Applications of SD 43775 to Cotton, A California Study, Tab 7.

1982- Residue Data for SD 437117, A Possible Soil Metabolite of SD 43775 in Soil from Radishes Following 38 or 48 Applications of SD 43775 to Cotton, A California Study, Tab 8.

1982-Residue Data for SD43775 in Collards Following 38 or 48 Applications of SD 43775 to Cotton, A California Study, Tab 3.

1982-Residue Data for SD 47117, A Possible Soil Metabolite of SD 43775 in Collards Following 38 or 48 Applications of SD 43775 to Cotton, A California Study, Tab 4.

1982-Residue Data for SD 43775 in Soil from Collards Following 38 or 48 Applications of SD 43775 to Cotton, A California Study, Tab 9.

1982-Residue Data for SD 47117, A Possible Soil Metabolite in Soil from Collards Following 38 or 48 Applications of SD 43775 to Cotton, A California Study, Tab 10.

1982-Residue Data for SD 43775 in Wheat Following 38 or 48 Applications of SD 43775 to Cotton, A California Study, Tab 5.

1982-Residue Data for SD 47117, A Possible Soil Metabolite of SD 43775 in Wheat Following 38 or 48 Applications of SD to Cotton, A California Study, Tab 6.

1982-Residue Data for SD 43775 in Soil from Wheat Following 38 or 48 Applications of SD 43775 to Cotton, A California Study, Tab 11.

1982-Residue Data for DS 47117, A Possible Soil Metabolite of SD 43775 in Soil from Wheat Following 38 or 48 Applications of SF 43775 to Cotton, A California, Tab 12.

1983-Residue Data for SD43775 in Table Beets Grown in Soil Which Had Previously Received Ten Applications of SD 43775, A California Study, (? Acc. No.).

4.6.2 Note: Other studies were submitted but are not referenced here since, by themselves, they were found deficient.

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4.8 Field Dissipation:

The following studies were submitted under Acc. No. 243109:

1979-Dissipation of SD 43775 in Undisturbed Soil Following 15 Ground Spray Applications of SD 43775 to Cotton; An Alabama Study; F. R. Gilliland, Contractor, Agricon, Inc.;
Tab # ?.

1979-Dissipation of SD 43775 in Undisturbed Soil Following Fifteen Applications of Sd 43775 to Cotton, An Arizona Study; G. F. Barber, Contactor; Az-Tech Ag. Specialist, Inc.; TIR-24-140-79; Tab 2.

Dissipation of SD 43775 in Undisturbed Soil Receiving Fifteen Ground Spray Applications of SD 43775 to Cotton, a Louisiana Study, C. K. Huston, Contractor: L. F. Bewick, TIR-24-391-78, Tab 3.

1978-Residue Data SD 43775 in Undisturbed Soil Receiving 5, 10, or 15 Ground Spray Applications of SD 43775 to Cotton, An Oklahoma Study; C. K. Huston; TIR-24-381-78-B; Tab 4.

The following studies were submitted under Acc. No. 245832:

RIR-24-135-79-D 1979- Residue Data for Some Possible Degradation Products of SD 43775 in Soil Receiving 10 and 15 Applications of SD 43775, An Alabama Study.

RIR-24-140-79-C 1979- Residue Data for Some Possible Degradation Products of SD 43775 in Soil Receiving 10 and 15 applications of SD 43775, an Arizona Study.

RIR-24-391-78-C 1978- Residue Data for Some Possible Degradation Produts of SD 43775 in Soil Receiving 10 and 15 Applications of SD 43775, A Louisiana Study.

RIR-24-381-78-D 1978- Residue Data for Some Possible Degradation Products of SD 43775 in Soil Receiving 10 and 15 Applications of SD 43775, An Oklahoma Study.

4.8.1 Note: Other studies were submitted but are not referenced here since, by themselves, were found deficient.

5.0 REVIEWED BY

Clinton Fletcher, Chemist
Review Section 1
Exposure Assessment Branch
Hazard Evaluation Division

Signature: Clinton Fletcher
Date: 2/21/85

6.0 APPROVED BY

Samuel Creeger, Head
Review Section 1
Expsoure Assessment Branch
Hazard Evaluation Division

Signature: Samuel Creeger
Date: FEB 21 1985

7.0 CONCLUSIONS

Data considered in this review in support of the requested Section 18 Specific Exemption were reviewed in previous EAB reviews. The conclusions from these reviews are included in this review in summary:

7.1 Hydrolysis: Fenvalerate is stable to hydrolysis at environmental pH and temperature.

This data requirement has been satisfied for the proposed use.

7.2 Photolysis:

Aqueous: Fenvalerate is considered stable to photolysis. In aqueous solutions exposed to natural sunlight for 28 days, approximately 52% of the parent compound was degraded. EAB calculated the half-life to be 41 days.

In a 2% aqueous acetone solution, degradation was faster- approximately 20% of SD 43775 remained with the same exposure time to sunlight. The data for the sensitized solution gave poor regression correlation (r^2= .605) for a calculated half-life of 28 days. The major photodegradation product(s) were not identified.

This data requirement has been partially satisfied for the proposed use. The photodegradation products were not identified. Such data will be needed to complete this study and satisfy this data requirement.

Soil Surface: Fenvalerate does not photodegrade readily to significant amounts of non-volatile products on the surface of soil. In both the exposed and control samples,

53-68% of the applied ^{14}C was parent compound and 18-23% was the primary degradation product (at the end of the 28 day exposure period). The major photodegradation product was identified as amide, SD-47114.

This data requirement has been satisfied for the proposed use.

7.3 Aerobic soil metabolism

SD-43775 degraded in soil maintained under aerobic conditions in the laboratory. The half-lives ranged from 65 days (sandy loam soil) to 8 months (loam soil). The amide (SD-47117) is the only major metabolite. At least six other products are formed at no more than a few percent of the applied material for each compound.

This data requirement has been satisfied for the proposed use.

7.4 Anaerobic soil metabolism

Fenvalerate degraded in soil maintained under anaerobic conditions with a half-life probably about 6 months. It does not appear that any metabolite consisting of over 10% of the starting material is formed after the establishment of anaerobicity. Similar degradation products were found in soil under anaerobic as were found in soil under aerobic conditions.

This data requirement has been satisfied for the proposed use.

7.5 Leaching: Fenvalerate was immobile in the soils tested either by soil TLC or by soil column leaching. Soils tested included sandy loam, silty clay loam, silty loam and agricultural sand soils. Also, in a sandy loam soil, fenvalerate had a K value (sorption coefficient) of greater than 15,000 and sorption was only slowly reversible.

Fenvalerate aged degradation products do not leach significantly in a sandy loam soil column. However, small amounts of 2-(4-chlorophenyl)isovaleric acid were identifed in the leachate in one study.

This data requirement has been satisified for the proposed use.

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7.6 Fish accumulation: SD 43775 accumulated in edible tissues of rainbow trout to approximately 400X after 30 days exposure. Parent material accounted for about 90% of the fish residues present. Depuration was relatively slow with about 40-60(%) of residual activity remaining after 33 days of withdrawal and virtually all as intact parent compound.

SD 43775 accumulated in catfish with a bioaccumulation factor of 62X (based on total ^{14}C residues) and 490X based on SD 43775 residues found in fish and water. The half-life for clearance of total ^{14}C residues from whole fish is indicated as 46 days.

Also, EAB notes that, in a fish chronic toxicity study using flathead minnows, accumulation factors in the range of 1800 to 8100X were calculated for SD 43775.

This data requirement has been satisfied for the proposed use.

7.6 Rotational crops:

Confined study: From the data, it appears that residues of fenvalerate and its metabolites are at levels near or below limits of detection at 30 and 120 day planting intervals after an original single application of fenvalerate at a rate equivalent to 2 lb ai/acre.

Field study: The rotational crop data show that residues of fenvalerate are not likely to occur in grain and leafy vegetable crops. However, residues are likely to occur in root crops planted earlier than 9 months after last application.

This data requirement has been satisfied provided the label bears a restriction against planting root crops other than those listed on the label earlier than 9 months after last application of fenvalerate from the proposed use.

7.7 Field dissipation:

Fenvalerate degrades in the soil under field conditions. Field dissipation of fenvalerate was essentially all in the 0-4 inch layer with a half-life of 1 to 2 months. After 183 days residues were at negligible or undetectable levels.

✓ The 3 major metabolites (SD 48838, SD 44064, SD 47117)† do not persist in the different soil types.

This data requirement has been satisfied for the propsed use.

8.0 RECOMMENDATION

8.1 Adequate data are available to define the environmental fate of the residues of fenvalerate from the proposed exemption for use on carrots in Delaware. The exemption should require a label restriction prohibiting the planting of root crops (other than those listed on the label) earlier than 12 months after the last application of fenvalerate. (Note: The request provides a "suggested restriction" prohibiting the planting of root crops other than those listed on the label within 12 months after last application.)

8.2 EAB notes that the aqueous photolysis study has been only partially satisfied in that the aqueous photodegradation study followed the disappearance of parent material. The degradation products were not identified. This data will be needed to satisfy this data requirement. However, this deficiency will not affect the above recommendation (in 8.1) for the limited use under the requested exemption.

9.0 BACKGROUND

The Delaware Department of Agriculture has requested a specific exemption (Section 18 emergency exemption) for the use of PYDRIN® 2.4EC (EPA Reg. No. 201-401) (fenvalerate, as a.i.) for use on carrots grown in Delaware. The duration of application is from May 15 until September 30, 1985.

The request calls for application of 0.1 to 0.2 lb ai/A by ground or aircraft to approximately 1,000

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†SD 48838: 4-chloro-alpha-(1-methylethyl)-cyano-(3-phenoxy-4-hydroxyphenyl)methyl benzenacetate;
SD 47117: 4-chloro-alpha-(1-methylethyl), (aminocarbonyl)-(s-phenoxyphenyl)methyl benzenacetate;
SD 44064: 4-chloro-alpha (1-methylethnyl) benzeneacetic acid.

acres of carrots. A maximum of 8 applications per acre per season will be made. The total amount of active ingredient used is not to exceed 2 lbs per acre.

10. DISCUSSION OF INDIVIDUAL TESTS OR STUDIES

No additional data were submitted with the request. Data considered in this review were evaluated in previous EAB reviews. For the complete details of the supporting stuides, see the previous EAB reviews.

11. COMPLETION OF ONE-LINER

No additional information will submitted to add to the one-liner.

12. CBI APPENDIX

No CBI data are included in this review.