DP Barcode :D179386, 194324
PC Code No. :129032
EFGWB Out : SEP 13 1993

TO: Richard Mountfort
Product Manager PM 10
Registration Division (H7505C)

FROM: Akiva Abramovitch, Ph.D., Head
Environmental Chemistry Review Section #3
Environmental Fate & Ground Water Branch/EFED (H7507C)

THRU: Henry Jacoby, Chief
Environmental Fate & Ground Water Branch/EFED (H7507C)

Henry Jacoby 9/9/93

Attached, please find the EFGWB review of...

Reg./File # :192989

Common Name :Pyriproxyfen

Product Name :Sumilarv

Company Name :Sumitomo Chemical Company, Ltd.

Purpose :Review of 161-1 study and 164-1 protocol of pyriproxyfen in support of registration
Type Product :Insecticide Action Code: 116, 117 EFGWB #(s): 92-1063,93-0956 Review Time: 3.5 days

EFGWB Guideline/MRID/Status Summary Table: The review in this package contains...

161-1	423432-01,02	Y	162-4		164-4		166-1	
161-2			163-1		164-5		166-2	
161-3			163-2		165-1		166-3	
161-4			163-3		165-2		167-1	
162-1			164-1		165-3		167-2	
162-2			164-2		165-4		201-1	
162-3			164-3		165-5		202-1	

Y = Acceptable (Study satisfied the Guideline)/Concur P = Partial (Study partially satisfied the Guideline, but additional information is still needed)
S = Supplemental (Study provided useful information, but Guideline was not satisfied) N = Unacceptable (Study was rejected)/Non-Concur

1. CHEMICAL: Common name:

Pyriproxyfen.

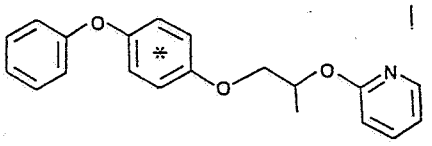
Chemical name:

2-(1-Methyl-2-(4-phenoxyphenoxy)ethoxy)pyridine

Trade name(s):

Sumilarv.

Structure:



Formulations:

N/A.

Physical/Chemical properties:

Molecular formula: $C_{20}H_{19}NO_3$.
Molecular weight: 321.
Physical state: Not provided.

2. TEST MATERIAL:

Study 1: Active ingredient.

3. STUDY/ACTION TYPE:

Review of hydrolysis study for registration.

4. STUDY IDENTIFICATION:

161-1: Hydrolysis

Katagi, T., and N. Takahashi. 1989a. Hydrolysis of S-31183 in buffered aqueous solutions. Laboratory Project ID NNM-90-0015. Unpublished study performed and submitted by Sumitomo Chemical Co. Ltd. Osaka, Japan. (42343201)

Katagi, T., and N. Takahashi. 1989b. Supplement to "Hydrolysis of S-31183 in buffered aqueous solutions." Laboratory Project ID NNM-90-0015. Unpublished study performed and submitted by Sumitomo Chemical Co. Ltd. Osaka, Japan.(42343202)

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ENVIRONMENTAL FATE ASSESSMENT

Pyriproxyfen is an indoor use chemical; only hydrolysis data is required for this use. The study reviewed in this package demonstrated that pyriproxyfen does not hydrolyze or degrade in water. Based on the hydrolysis data, pyriproxyfen residues are expected to persist indoors.

8. RECOMMENDATIONS:

Only the Hydrolysis study (161-1) is required for indoor use chemicals. That data requirement is satisfied with the study reviewed here. However, communication from the registrant indicates that residential outdoor use is being considered. To support this use, hydrolysis, aerobic soil metabolism, leaching/adsorption/desorption, and terrestrial field dissipation data are generally required. A field dissipation protocol was addressed in this review. However, aerobic soil metabolism and mobility data are essential for comprehensive evaluation of the protocol as well as the proper management of the study. In addition, physical and chemical data on pyriproxyfen are required, including: physical state, melting point, boiling point, vapor pressure, octanol/water partition coefficient, and solubility in water.

9. BACKGROUND:

A. Introduction

B. Directions for Use
Sumilarv is a juvenile hormone mimic insecticide. It is registered for non-food use indoors.

10. DISCUSSION OF INDIVIDUAL TESTS OR STUDIES:

Refer to attached review.

11. COMPLETION OF ONE-LINER:

The one-liner has been updated and is attached.

12. CBI APPENDIX:

All data reviewed here are considered "company confidential" by the registrant and must be treated as such.

164-1: Terrestrial field dissipation
ABC Laboratories. 1993. Dissipation of Sumilarv applied to Bare Ground (Georgia). ABC Protocol No. FS-41013.BG. Submitted by Sumitomo Chemical Co. Ltd., Osaka, Japan.

ABC Laboratories. 1993. Dissipation of Sumilarv applied to Bare Ground (California). ABC Protocol No. FS-41014.BG. Submitted by Sumitomo Chemical Co. Ltd., Osaka, Japan.

5. REVIEWED BY:

David M. Edelstein
Soil Scientist
EFGWB/EFED/OPP
Review Section #3

Signature: David M Edelstein
Date: AUG 31 1993

6. APPROVED BY:

Akiva D. Abramovitch
Chief
EFGWB/EFED/OPP
Review Section #3

Signature: Akiva Abramovitch
Date: AUG 31 1993

7. CONCLUSIONS:

161-1: Hydrolysis (MRID #423432-01,02; acceptable)
Pyriproxyfen was stable in sterile aqueous buffer solutions adjusted to pH 5, 7, and 9 that were incubated in the dark at 25 ± 1 °C for 30 days.

164-1: Terrestrial field dissipation (protocol)
The Agency requires terrestrial field dissipation data for the outdoor uses of Sumilarv (pyriproxyfen). The registrant has submitted a protocol with a proposed start date of July, 1993. The protocol was not submitted to the agency until July, 1993.

The registrant has proposed carrying out the study using Sumilarv and two "degradates." In general, the submitted protocol appears to form a sound scientific basis for obtaining this data, but does raise the following concern:

1. The protocol states that two degradates, PYPAC and 4'-OH-PYR, will be monitored along with parent pyriproxyfen. According to the registrant, this choice of analytes was based on "the results of laboratory environmental fate studies, including aqueous hydrolysis [sic], soil photolysis, and soil metabolism." Only the hydrolysis study has been submitted; in that study, pyriproxyfen was stable, and no degradates were identified. It is not possible to state at this time that these are the most appropriate degradates to monitor in this study.

DATA EVALUATION RECORD

STUDY 1

CHEM 129032 Pyriproxyfen §161-1

FORMULATION--00--ACTIVE INGREDIENT

STUDY ID 42343201
Katagi, T., and N. Takahashi. 1989a. Hydrolysis of S-31183 in buffered aqueous solutions. Laboratory Project ID NNM-90-0015. Unpublished study performed and submitted by Sumitomo Chemical Co. Ltd. Osaka, Japan.

STUDY ID 42343202
Katagi, T., and N. Takahashi. 1989b. Supplement to "Hydrolysis of S-31183 in buffered aqueous solutions." Laboratory Project ID NNM-90-0015. Unpublished study performed and submitted by Sumitomo Chemical Co. Ltd. Osaka, Japan.

DIRECT REVIEW TIME = 8

REVIEWED BY: D. Edelstein
TITLE: Soil Scientist
ORG: EFGWB/EFED/OPP
TEL: 703-305-5463

SIGNATURE: D. Edelstein 8/31/93

CONCLUSIONS:

Degradation - Hydrolysis

1. This study can be used to fulfill data requirements.

2. Pyriproxyfen was stable in sterile aqueous buffer solutions adjusted to pH 5, 7, and 9 that were incubated in the dark at 25 ± 1 °C for 30 days.

3. This study is acceptable and fulfills EPA Data Requirements for Registering Pesticides by providing information on the hydrolysis of pyridyl- and phenoxyphenyl-labeled [^{14}C] Pyriproxyfen in sterile aqueous buffer solutions at pH 5, 7, and 9. No additional information on the hydrolysis of Pyriproxyfen at pH 5, 7, and 9 is needed at this time.

METHODOLOGY:

Pyridyl-labeled [^{14}C]pyriproxyfen (radiochemical purity 99.3%, specific activity 257 mCi/g, Sumitomo) or phenyl-labeled

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[^{14}C]pyriproxyfen (radiochemical purity 99.4%, specific activity 181 mCi/g, Sumitomo) in deionized, sterile-filtered water with 1% acetonitrile was added to sterile (autoclaved) aqueous buffer solutions adjusted to pH 5 (0.01 M acetic acid/0.01 M sodium acetate, 1:2, v:v), pH 7 (0.01 M boric acid + 0.01 M KCl) and pH 9 (0.01 M boric acid + 0.01 M NaOH). An 8.0 ml aliquot of each pyriproxyfen solution was added to duplicate 1000 ml Erlenmeyer flasks containing 800 ml of buffer for a final concentration of 0.1 ppm. Duplicate 1.0 ml aliquots were taken immediately from each flask to determine the concentration of ^{14}C, and a 100 ml aliquot was taken for time 0 analysis. The test solutions were kept in a Sanyo Model SHR-200M incubator at 25 ± 1 C in darkness for 30 days. Duplicate 1.0 ml aliquots were taken immediately from each flask to determine the concentration of ^{14}C, then a 100 ml aliquot was taken for analysis at 0, 3, 7, 10, 14, 21, and 30 days posttreatment.

The 100 ml aliquots of each test solution were extracted three times with 100 ml of ethyl acetate. After the volume of the combined organic layers was measured, a 1.0 ml aliquot was taken in duplicate to determine the concentration of ^{14}C. The remaining organic layer was concentrated prior to TLC analysis. A 1.0 ml aliquot of the aqueous layer was also taken to determine the amount of unextractable ^{14}C.

Compounds in the extracts were identified by two dimensional TLC with unlabeled authentic standards. The extracts and the non-labeled authentic compound were applied as a single spot and developed with solvent system A (hexane:ethyl acetate:acetic acid, 10:4:1, v:v:v) and solvent system B (toluene:ethyl formate:formic acid, 5/7/1, v:v:v). Following TLC, radioactive spots were scraped off of the gel plates and eluted with ethyl acetate. 10 l of eluate was combined with non-labeled authentic compound for HPLC analysis.

DATA SUMMARY:

Pyridyl- and phenoxyphenyl-labeled [^{14}C]pyriproxyfen (radiochemical purity ≥99.3%) was relatively stable in sterile aqueous buffer solutions adjusted to pH 5, 7, and 9 that were incubated in the dark at 25 ± 1 °C for 30 days.

In the pH 5 buffer solution, total [Py-^{14}C]pyriproxyfen residues ranged from 103.5-88.3% of the applied, with the lower recoveries occurring at the end of the test period; parent pyriproxyfen comprised 97.6-99.9% of the recovered radioactivity (Table III). Total [Phen-^{14}C]pyriproxyfen residues ranged from 102.0-87.3% of the applied, with no discernible pattern; parent pyriproxyfen comprised 97.5-99.9% of the recovered radioactivity (Table VI). In the pH 7 buffer solution, total [Py-^{14}C]pyriproxyfen residues ranged from 103.4-92.0%% of the applied, with the lower recoveries occurring at the end of the test period; parent pyriproxyfen comprised 97.3-99.9% of the recovered radioactivity (Table IV). Total [Phen-

^{14}C]pyriproxyfen residues ranged from 91.4-102.2 of the applied, with no discernible pattern of decline; parent pyriproxyfen comprised 99.4-99.9% of the recovered radioactivity (Table VII). In the pH 9 buffer solution, total [Py-^{14}C]pyriproxyfen residues ranged from 102.8-95.1% of the applied, with no discernible pattern of decline; parent pyriproxyfen comprised 98.5-99.9% of the recovered radioactivity (Table V). Total [Phen-^{14}C]pyriproxyfen residues ranged from 101.5-87.6 of the applied, with the lower recoveries occurring at the end of the test period; parent pyriproxyfen comprised 99.4-99.9% of the recovered radioactivity (Table VIII).

The dilution plate method with two nutrient media showed that the buffer solutions were sterile throughout the experiment

COMMENTS:

1. The registrant-calculated half-lives for [^{14}C]pyriproxyfen were 147-604 days at pH 5, 241-1292 days at pH 7, and 164-511 days at pH 9 (Table IX). These statistical estimates are of limited value because the calculations involve extrapolation considerably beyond the experimental time limits of the study. Data are often incapable of accurately predicting trends outside their range because reactions which are linear within the scope of the experiment may become curvilinear over time. In addition, it is not even clear that the decline of parent pyriproxyfen can be considered statistically significant in comparison with the reduced recovery of ^{14}C observed at the end of several of the test runs.

2. The study authors stated that the recovery data in Tables III-VIII demonstrate that the compound did not significantly adsorb to the sides of the test flask. However, there did appear to be a trend toward lower recoveries of the applied ^{14}C in the day 21 and/or day 30 samples. It is possible that the unusual sampling scheme used in this study did cause some adsorption of the test compound to the walls of the flask, and may explain the lower recoveries at later times.

   According to the study report, 800 ml of labeled pyriproxyfen in aqueous buffer solution was prepared, and seven 100 ml samples removed for analysis. With each withdrawal of 100 ml, some of the test solution would be expected to adhere to the walls of the flask, resulting in a small cumulative loss of ^{14}C. Also, the samples cannot be considered truly random. While the time 0 sample was 100 ml out of a total of 800 ml available, the day 30 sample would necessarily be 100 out of less than 200 ml available. These considerations suggest that the sampling scheme may have imposed a slight declining pattern on recoveries over the study period.

3. It was not stated that samples were analyzed immediately, nor was any data provided to demonstrate that pyriproxyfen was stable in the buffered test solutions when stored. However, as no pyriproxyfen

degradation was reported, it appears that pyriproxyfen was stable under the analytical conditions of the study.

4. The test solutions were maintained within a deviation of ± 0.1 pH unit throughout the experiment.

5. The method detection limits were not reported.

6. The study author stated that pyriproxyfen was soluble in water to a concentration of 0.54 ppm at 20 °C. No additional data was provided to support this assertion.

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
PYRIPROXYFEN
Last Update on August 20, 1993
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

LOGOUT	Reviewer:	Section Head:	Date:

Common Name:PYRIPROXYFEN
Smiles Code:
PC Code # :129032 CAS #: Caswell #:

Chem. Name :2-(1-Methyl-2-(4-phenoxyphenoxy)ethoxy)pyridine

Action Type:Insceticide

Trade Names:Sumilarv
(Formul'tn):
Physical State:

Use :Indoor (100%)
Patterns :
(% Usage) :
:

Empirical Form: $C_{20}H_{19}NO_3$
Molecular Wgt.: 321.00 Vapor Pressure: E Torr
Melting Point : °C Boiling Point: °C
Log Kow : pKa: @ °C
Henry's : E Atm. M3/Mol (Measured)

Solubility in ...					Comments
Water	E	ppm	@	°C	
Acetone	E	ppm	@	°C	
Acetonitrile	E	ppm	@	°C	
Benzene	E	ppm	@	°C	
Chloroform	E	ppm	@	°C	
Ethanol	E	ppm	@	°C	
Methanol	E	ppm	@	°C	
Toluene	E	ppm	@	°C	
Xylene	E	ppm	@	°C	
	E	ppm	@	°C	
	E	ppm	@	°C	

Hydrolysis (161-1)
[V] pH 5.0:stable
[V] pH 7.0:stable
[V] pH 9.0:stable
[ ] pH :
[ ] pH :
[ ] pH :

Environmental Fate & Effects Division
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Photolysis (161-2, -3, -4)
[ ] Water:
[ ] :
[ ] :
[ ] :

[ ] Soil :
[ ] Air :

Aerobic Soil Metabolism (162-1)
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Anaerobic Soil Metabolism (162-2)
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Anaerobic Aquatic Metabolism (162-3)
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Aerobic Aquatic Metabolism (162-4)
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Soil Partition Coefficient (Kd) (163-1)
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Soil Rf Factors (163-1)
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Laboratory Volatility (163-2)
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Field Volatility (163-3)
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Terrestrial Field Dissipation (164-1)
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Aquatic Dissipation (164-2)
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Forestry Dissipation (164-3)
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Long-Term Soil Dissipation (164-5)
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Accumulation in Rotational Crops, Confined (165-1)
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Accumulation in Rotational Crops, Field (165-2)
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Accumulation in Irrigated Crops (165-3)
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Bioaccumulation in Fish (165-4)
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Bioaccumulation in Non-Target Organisms (165-5)
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Ground Water Monitoring, Prospective (166-1)
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Ground Water Monitoring, Small Scale Retrospective (166-2)
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Ground Water Monitoring, Large Scale Retrospective (166-3)
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Ground Water Monitoring, Miscellaneous Data (158.75)
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Environmental Fate & Effects Division
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PYRIPROXYFEN
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[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Field Runoff (167-1)
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Surface Water Monitoring (167-2)
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Spray Drift, Droplet Spectrum (201-1)
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Spray Drift, Field Evaluation (202-1)
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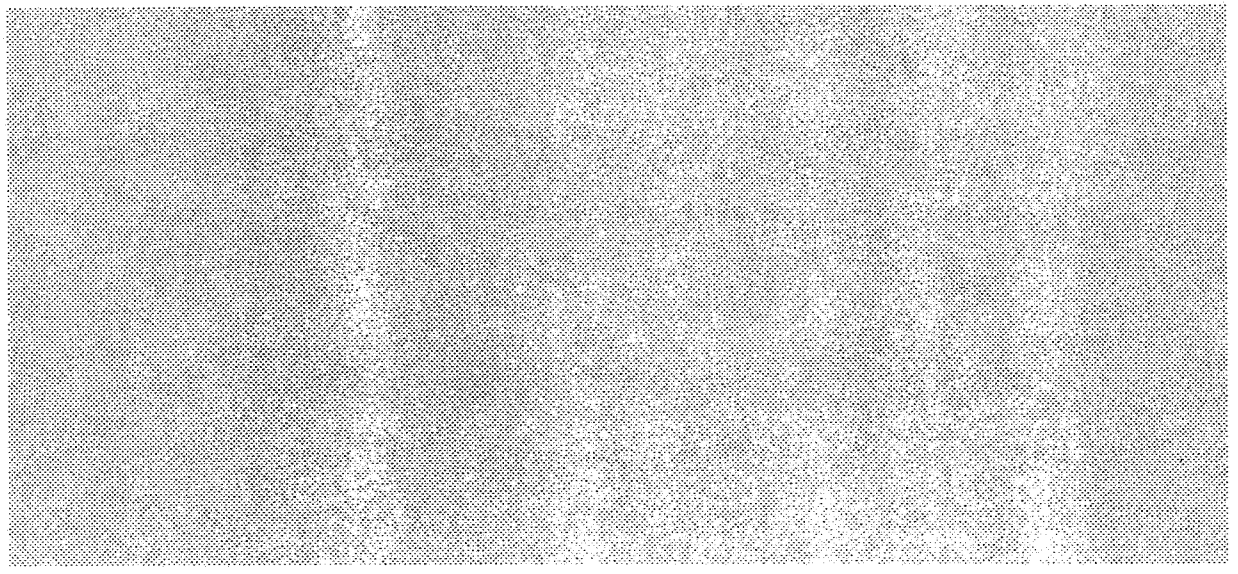
Degradation Products



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PYRIPROXYFEN
Last Update on August 20, 1993
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Comments

Pyriproxyfen is a juvenile hormone mimic insecticide. At present, it is indoor use only. Communication from the registrant suggests that outdoor use will be sought. Pyriproxyfen is stable to hydrolysis. No physical or other chemical data has been provided.

References: DER's
Writer : DME

Pyriproxyfen

RIN 4445-96 P.C. 129032

Page____ is not included in this copy.

Pages 15 through 23 are not included.

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.
