Shaughnessy No.: 128831

DP Barcode: D161426

Date out of EFGWB: 3/16/92

TO: R. Cool/L. Pemberton
Product Manager #41
Registration Division (H7505C)

FROM: Paul Mastradone, Chief
Chemistry Review Section #1
Environmental Fate and Ground Water Branch

THRU: Hank Jacoby, Chief
Environmental Fate and Ground Water Branch
Environmental Fate and Effects Division (H7507C)

Attached, please find the EFGWB review of ...

Reg./File #: 91ORO006 (Reg. No. for chemical is 3125-351)

Chemical Name: Cyano (4-fluoro-3-phenoxyphenyl) methyl-3-(2,2-dichloro-ethenyl)-2,2-dimethyl-cyclopropane-carboxylate

Type Product: Insecticide

Common Name: Cyfluthrin

Company Name: Mobay Corporation

Applying Agency: Oregon Department of Agriculture

Purpose: To review application for an Emergency Exemption Permit for use of cyfluthrin to control pear psylla

Date Received: 19 Feb. 1991 Date Completed:

Action Code: 510

EFGWB #(s): 91-0413

Total Reviewing Time: 0.5 day

Deferrals to: ___Ecological Effects Branch, EFED

___Science Integration and Policy Staff, EFED

___Non-Dietary Exposure Branch, HED

___Dietary Exposure Branch, HED

___Toxicology Branch

1. CHEMICAL:

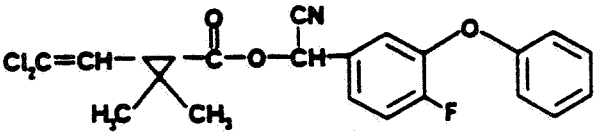
Chemical name: Cyano (4-fluoro-3-phenoxyphenyl) methyl-3-(2,2-dichloroethenyl)-2,2-dimethyl-cyclopropane-carboxylate

CAS no.: 68359-37-5

Common name: Cyfluthrin

Trade name: Baythroid 2EC

Chemical structure:



Formulations: Cyfluthrin.....25.0%
Inert Ingredients.....75.0%

Physical/Chemical properties of active ingredient:

Physical characteristics: Viscous amber oil, partially crystalline

Molecular formula: $C_{22}H_{18}NFO_3Cl_2$

Molecular weight: 434.3

Vapor pressure: 3.3×10^{-8}mm Hg @ 20°C

Solubility: $1\text{-}2 \times 10^{-6}$ g/100 mL at 20°C

Octanol/water partition coefficient: 420,000

2. STUDY/ACTION TYPE:

To review application by the Oregon Department of Agriculture for an Emergency Exemption Permit for use of cyfluthrin to control pear psylla.

3. STUDY IDENTIFICATION:

Wright, B.D. CORRESPONDENCE TO R. COOl - SPECIFIC EXEMPTION FOR USE OF CYFLUTHRIN (BAYTHROID) FOR THE CONTROL OF PEAR PSYLLA IN OREGON. Oregon Department of Agriculture, Salem, OR; Written 4 February 1991; Received by EPA 6 February 1991.

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4. REVIEWED BY:

Gail Maske
Chemist, Review section #1
OPP/EFED/EFGWB

Signature: _____
Date: _____

5. APPROVED BY:

Paul Mastradone
Chief
Review section #1
OPP/EFED/EFGWB

Signature: Paul J Mastradone
Date: _____

6. CONCLUSIONS:

The Oregon Department of Agriculture is requesting an Emergency Exemption for use of cyfluthrin to control pear psylla. This application is in accordance with Section 18 of the Federal Insecticide, Fungicide, and Rodenticide Act.

Based on the environmental fate data available, there is marginally sufficient data to support the Emergency Exemption request for use of cyfluthrin to control pear psylla in pear trees and reduce pear russeting. EFGWB has no field dissipation data for this use preventing corroberation of laboratory obervation with actual field orchard dissipation. See DISCUSSION

ENVIRONMENTAL FATE ASSESSMENT:

Based on available environmental fate data, cyfluthrin appears not to be persistent when exposed to light and aerobic conditions (hydrolysis-$t_{1/2}$=<2 days at pH 9; photodegradation in water-$t_{1/2}$=≈1 day; photodegradation on soil-$t_{1/2}$= 48 to 72 hours; soil dissipation-$t_{1/2}$=<31 days; and aerobic and anaerobic soil metabolism-$t_{1/2}$= 56-63 days) and immobile (Rf=0.05 on sand, silt loam, and silty clay soils; Rf=0.06 on sandy loam, clay loam, and clay soils). However, under sterile acidic and neutral hydrolytic conditions, cyfluthrin was reported to be persistent (hydrolysis-$t_{1/2}$=stable at pH 5, $t_{1/2}$= 193 days at pH 7). Therefore, the main degradation pathway for cyfluthrin appears to be photodegradation.

In summary, based on cyfluthrin's lack of solubility in water (10^{-3} to $^{-6}$ ppm), ability to bind to soil, and rate of degradation when exposed to light, cyfluthrin is not expected to contaminate ground water. However, surface water contamination under flood conditions may be of concern if aquatic life is present.

7. RECOMMENDATIONS:

See Conclusions.

NOTE TO REGISTRATION SUPPORT:
For the past three years, the state of Oregon has requested emergency exemptions for use of cyfluthrin on pear psylla. Additionally, the state of Washington has requested similar emergency exemptions three times. EFGWB is concerned that the Emergency Exemption (Section 18) is being used in lieu of registration of cyfluthrin for orchard uses. Since this use pattern is not on the LUIS report and the registrant has not shown written intention of registering cyfluthrin for this use, Registration Support may need to discuss with the PM the need to determine the data gaps for the registration of cyfluthrin for orchard use and subsequently request this data. For example, the registrant has not submitted a terrestrial field dissipation in orchards study. Therefore, it will be increasingly difficult for EFGWB to concur with future Emergency Exemptions for use of cyfluthrin in orchards.

8. BACKGROUND:

Cyfluthrin was registered as an unconditional indoor use general pesticide and for use on cotton crops on 30 December 1987. In August 1989 it was registered for use in imported German hops. TEMPO 2 was registered 3 March 1988 for use on trees, ornamentals, and home lawns.

Baythroid 2 (active ingredient is cyfluthrin) is an emulsible concentration herbicide currently registered for use on cotton (classified as a terrestrial food crop) at a single application rate of 0.0125-0.1 lbs ai/acre/application and a maximum total seasonal application of 0.89 lbs ai/acre/season and for use in German hops. An application by the registrant to amend the Baythroid 2 label to allow applications to alfalfa, soybeans, sunflowers, sweet corn, broccoli, brussel sprouts, cabbage, cauliflower, carrots, celery, lettuce, peppers, radish, spinach, and tomatoes was conditionally concurred by EFGWB providing the registrant agrees to satisfy the remaining outstanding data requirements. Single application rates of 0.012-0.050 lbs ai/acre/application with a maximum total seasonal application of 0.13-0.44 lbs ai/acre/season would be used these additional uses.

Cyfluthrin has a toxicological classification of two for human exposure. However, its toxicity to aquatic life and invertebrates appears to be greater.

9. DISCUSSION:

Pear psylla is one of the most serious pear pests worldwide. The pear psylla feeds and reproduces exclusively on pear. Pear psylla over-winters in the adult stage on trees inside and outside pear orchards. In late winter, adults begin to migrate back to pear trees and as temperatures rise, egg laying begins. Nymphs emerge just before bloom as the first green tissue begins to show. These immature pear psylla, nymphs, cause

two types of damage while feeding on the pear tree foliage.

1. A toxin is injected into the tree which in the long run is debilitating and reduces vigor and ultimately yield.

2. A copious amount of "honeydue" is produced by the feeding nymph which causes russeting of the skin and serves as a medium for sooty mold which causes a black appearance and results in increased fruit cullage.

If the pear psylla is not controlled during the pre-bloom season, control is difficult throughout the remainder of the year.

Commercially planted pear varieties have very little useful levels of resistance to pear psylla. There are several cultural practices employed to reduce psylla damage.

1. Summer pruning to reduce vigor and removal of lush growth which is preferred by pear psylla.

2. Use of overhear irrigation to wash psylla honeydew off the pears.

However, these are not sufficient to keep psylla population under control. Other methods are available but not adequate to keep population at sub-economic levels or economically practical.

1. Use of nitrogen fertilizer increases tree susceptibility to psylla. However, ceasing to fertilize would reduce the yields and quality.

2. Biological control is not adequate to keep the pear psylla under control.

3. Pear psylla can quickly develop resistance to pyrethroids which is the other registered possibility. The pyrethroids reduced populations only by 85 to 95%.

4. Spray oil is not effective by itself and does not control the pear psylla sufficiently.

5. Heavy oil and large amounts of lime sulfur is not acceptable since it greatly reduces yield.

6. The pear psylla has developed resistance against the organo-phosphates and endosulfan.

7. Carbamates insecticides are ineffective against pear psylla.

8. Morestan, oxythioquinox, is not effective against psylla adults. Furthermore, morestan cannot be used in some locations because of phytotoxicity.

9. Amitraz and mancozeb do not have adequate control the psylla adults. In addition, the use of amitraz to control pre-bloom psylla can accelerate resistance development to amitraz since it is used very heavily to control summer pear psylla.

It is estimated that 50% of the yearly pear cullage is due to pear psylla damage. The Oregon State University Extension Service estimates psylla damage could cause losses well in excess of 1 million dollars. In addition to the immediate and direct effect on the fruit, uncontrolled psylla populations will cause tree decline and dramatic yield decreases within one or two years.

An emergency exemption for use of cyfluthrin to control pear psylla in Oregon was approved in Oregon in 1989 and 1990. Cyfluthrin was used primarily as a dormant plus oil or as a pink spray in combination with Morestan. During the two year period, there were very few second applications required and performed very well. Cyfluthrin definitely resulted in less total psylla pesticide usage and a higher quality product. In 1990, single sprays of cyfluthrin provided a 98 to 100% reduction of over-wintering adults.

The state of Oregon is proposing to use cyfluthrin on 15,000 acres of pears using a maximum application rate of 0.05 ai/A, two times. Therefore, a total 750 gallons of product (1500 lbs. active ingredient) will be used under this emergency exemption. Applications will be made between 20 February 1991 until bloom. There will be no applications after 20 April 1991.

10: COMPLETION OF ONE-LINER:

See attached one-liner.

11: CBI APPENDIX:

N/A

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
CYFLUTHRIN
Last Update on March 16, 1992
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

LOGOUT	Reviewer:	Section Head:	Date:

Common Name:CYFLUTHRIN
PC Code # :128831 CAS #:68359-37-5 Caswell #:

Chem. Name :CYANO (4-FLUORO-3-PHENOXYPHENYL) METHYL-3(2,2-DICHLORO-ETHENYL)-2,2-DIMETHYL-CYCLOPROPANECARBOXYLATE
Action Type:PYRETHROID; INSECTICIDE

Trade Names:BAYTHROID
(Formul'tn):WATER-SOL. CONC.; EMULSIFIABLE CONC.; ULV FORMULATION;
Physical State:

Use :FOLIAR INSECTICIDE FOR CONTROL OF CHEWING INSECTS ON A
Patterns :VARIETY OF CROPS SUCH AS CORN, COTTON, PEANUTS
(% Usage) :
:

Empirical Form: $C_{22}H_{18}NFO_3Cl_2$
Molecular Wgt.: 434.27 Vapor Pressure: 3.30E -8 Torr
Melting Point : °C Boiling Point: °C
Log Kow : 5.62 pKa: @ °C
Henry's : E Atm. M3/Mol (Measured) 1.57E -5 (calc'd)

Solubility in ...					Comments
Water	1.20E -3	ppm	@20.0	°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 7.0:193 DAYS
[V] pH 9.0:< 2 DAYS
[ ] pH :
[ ] pH :
[ ] pH :

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Environmental Fate & Effects Division
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CYFLUTHRIN
Last Update on March 16, 1992
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Photolysis (161-2, -3, -4)
[V] Water:ABOUT 1 DAY IN NATURAL SUN
[ ] :
[ ] :
[ ] :

[V] Soil :48-72 HRS; SdLm, Hg LAMP
[ ] Air :

Aerobic Soil Metabolism (162-1)
[V] 56 DAYS IN GERMAN LOAM SOIL
[V] 63 DAYS " " SANDY LOAM
[ ]
[ ]
[ ]
[ ]
[ ]

Anaerobic Soil Metabolism (162-2)
[V] SAME AS WITH AEROBIC SOILS
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Anaerobic Aquatic Metabolism (162-3)
[ ]
[ ]
[ ]
[ ]
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[ ]

Aerobic Aquatic Metabolism (162-4)
[ ]
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[ ]

Environmental Fate & Effects Division
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CYFLUTHRIN
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Soil Partition Coefficient (Kd) (163-1)
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Soil Rf Factors (163-1)
[V] AGED AND UNAGED RESIDUES
[ ] IMMOBILE IN AGRIC SAND (FL),
[ ] SdLm (OR), SdClLm (IN), SiLm
[ ] (NB), SiCl (MD)
[ ]
[ ]

Laboratory Volatility (163-2)
[ ]
[ ]

Field Volatility (163-3)
[ ]
[ ]

Terrestrial Field Dissipation (164-1)
[V] <31 DAYS IN UPPER 6" IN EIGHT DIFFERENT STUDIES; DEGRADATES
[ ] WERE NOT PERSISTENT AND DID NOT ACCUMULATE SIGNIFICANTLY
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Aquatic Dissipation (164-2)
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Forestry Dissipation (164-3)
[ ]
[ ]

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
CYFLUTHRIN
Last Update on March 16, 1992
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Long-Term Soil Dissipation (164-5)
[ ]
[ ]

Accumulation in Rotational Crops, Confined (165-1)
[V] WITH .72 PPM IN SOIL AT DAY 0, CONC. DROPPED TO
[ ] .10 PPM BY DAY 359; RESIDUE MOSTLY PARENT COMPD.

Accumulation in Rotational Crops, Field (165-2)
[V] WHEAT STALKS MAY CONTAIN RESIDUES IF PLANTING IS
[ ] DONE LESS THAN 9 MONTHS AFTER TREATMENT.

Accumulation in Irrigated Crops (165-3)
[ ]
[ ]

Bioaccumulation in Fish (165-4)
[V] BLUEGILL SUNFISH BCF: 550-850 X; WITH DEPURATION, T/12 FOR
[ ] RESIDUES = ABOUT 9 DAYS.

Bioaccumulation in Non-Target Organisms (165-5)
[ ]
[ ]

Ground Water Monitoring, Prospective (166-1)
[ ]
[ ]
[ ]
[ ]

Ground Water Monitoring, Small Scale Retrospective (166-2)
[ ]
[ ]
[ ]
[ ]

Ground Water Monitoring, Large Scale Retrospective (166-3)
[ ]
[ ]
[ ]
[ ]

Ground Water Monitoring, Miscellaneous Data (158.75)
[ ]
[ ]
[ ]

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
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Field Runoff (167-1)
[ ]
[ ]
[ ]
[ ]

Surface Water Monitoring (167-2)
[ ]
[ ]
[ ]
[ ]

Spray Drift, Droplet Spectrum (201-1)
[ ]
[ ]
[ ]
[ ]

Spray Drift, Field Evaluation (202-1)
[ ]
[ ]
[ ]
[ ]

Degradation Products

CO2
4-fluoro-3-phenoxybenzaldehyde (FCR 1260)
4-fluoro-3-phenoxybenzoic acid (FCR 3191)

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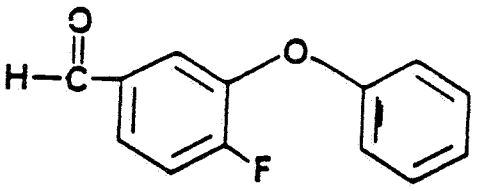
Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
CYFLUTHRIN
Last Update on March 16, 1992
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Comments

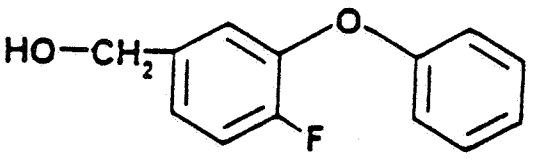
Soil Koc = 10,000.
Rat toxicity studies indicate that the FPB acid is much less toxic than the parent compound.
The technical grade of cyfluthrin consists of four isomers, all having roughly the same solubility and vapor pressure.

References: FARM CHEMICALS HANDBOOK; EPA REVIEWS
Writer : WGM



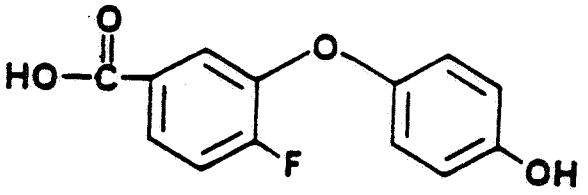
4-Fluoro-3-phenoxybenzaldehyde

(FCR 1260)



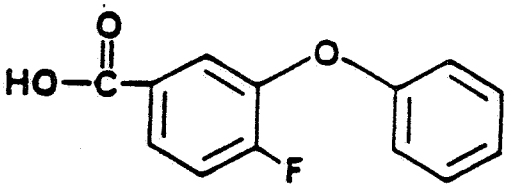
4-Fluoro-3-phenoxybenzenemethanol

(FCR 1261)



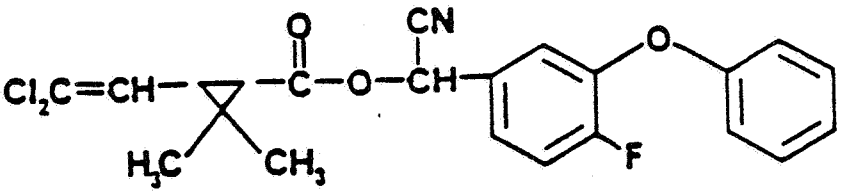
4-Fluoro-3-(4-hydroxyphenoxy)benzoic acid

(FCR 3145)



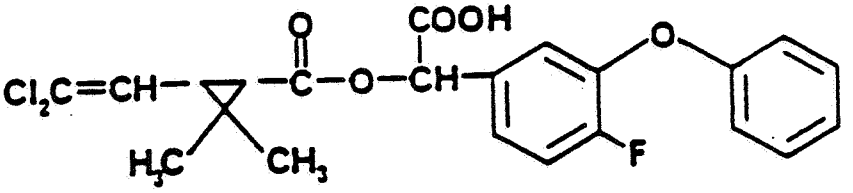
4-Fluoro-3-phenoxybenzoic acid

(FCR 3191; COE 538/78)



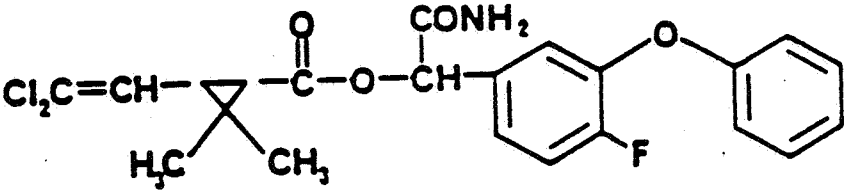
Cyano(4-fluoro-3-phenoxyphenyl)methyl-3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate

(Cyfluthrin, FCR 1272)



a-[[[3-(2,2-Dichloroethenyl)-2,2-dimethylcyclopropyl]carbonyl]oxy]-4-fluoro-3-phenoxybenzeneacetic acid

(FCR 2728)



2-Amino-1-(4-fluoro-3-phenoxyphenyl)-2-oxoethyl-3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropane-carboxylate

(FCR 2978)