FATE DATA SUMMARY

DP Barcode :D203243, 203251, 203371, 207210
PC Code No.:069001
EFGWB Out :

OCT 24 1994

TO: Bruce Sidwell
Product Manager PM 53
Special Review and Reregistration Division (H7508W)

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

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

for AA

Attached, please find the EFGWB review of..

Reg./File #: 819063

Common Name: Pyrethrins

Product Name: Pyrenone Crop Spray

Company Name: Pyrethrin Joint Venture

Purpose: Review of 161-1, 161-2, 161-3, 163-1, 163-2, and 164-2 studies for reregistration

Type Product :Insecticide Action Code: 627 Review Time: 8.0 days

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

161-1	43188201	Y	162-4			164-4			166-1		
161-2	43096601	N	**163-1**	43096603	Y	164-5			166-2		
161-3	43096602	N	**163-2**	43096604	Y	165-1			166-3		
161-4			163-3			165-2			167-1		
162-1			164-1			165-3			167-2		
162-2			**164-2**	43125701,43195201	N	**165-4**	43302301	Y	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

DP BARCODE: D203243 REREG CASE # 2580

CASE: 819063 DATA PACKAGE RECORD DATE: 05/12/94
SUBMISSION: S465282 BEAN SHEET Page 1 of 1

* * * CASE/SUBMISSION INFORMATION * * *

CASE TYPE: REREGISTRATION ACTION: 627 CORE DATA
CHEMICALS: 069001 Pyrethrins %

ID#: 069001-
COMPANY:
PRODUCT MANAGER: 53 BRUCE SIDWELL 703-308-8078 ROOM: CS1 3J2
PM TEAM REVIEWER: ALAN DIXON 703-308-8043 ROOM: CS1 4E6
RECEIVED DATE: 04/08/94 DUE OUT DATE: 07/07/94

* * * DATA PACKAGE INFORMATION * * *

DP BARCODE: 203243 EXPEDITE: N DATE SENT: 05/12/94 DATE RET.: / /
CHEMICAL: 069001 Pyrethrins
DP TYPE: 999 Miscellaneous Data Package
CSF: N LABEL: N
ASSIGNED TO DATE IN DATE OUT ADMIN DUE DATE: 08/10/94

DP BARCODE: D203251 REREG CASE # 2580

CASE: 819063 DATA PACKAGE RECORD DATE: 05/12/94
SUBMISSION: S465295 BEAN SHEET Page 1 of 1

* * * CASE/SUBMISSION INFORMATION * * *

CASE TYPE: REREGISTRATION ACTION: 627 CORE DATA
CHEMICALS: 069001 Pyrethrins %

ID#: 069001-
COMPANY:
PRODUCT MANAGER: 53 BRUCE SIDWELL 703-308-8078 ROOM: CS1 3J2
PM TEAM REVIEWER: ALAN DIXON 703-308-8043 ROOM: CS1 4E6
RECEIVED DATE: 01/25/94 DUE OUT DATE: 04/25/94

* * * DATA PACKAGE INFORMATION * * *

DP BARCODE: 203251 EXPEDITE: N DATE SENT: 05/12/94 DATE RET.: / /
CHEMICAL: 069001 Pyrethrins
DP TYPE: 999 Miscellaneous Data Package
CSF: N LABEL: N

ASSIGNED TO	DATE IN	DATE OUT	ADMIN DUE DATE: 08/10/94
DIV : EFED	05/17/94	/ /	NEGOT DATE: / /
BRAN: EFGB	/ /	/ /	PROJ DATE: / /
SECT: IO	/ /	/ /	
REVR :	/ /	/ /	
CONTR:	/ /	/ /	

* * * DATA REVIEW INSTRUCTIONS * * *

Please Review the following:

MRID GN
43096601 161-2

1. CHEMICAL: Common name:

Pyrethrin I (single isomer).

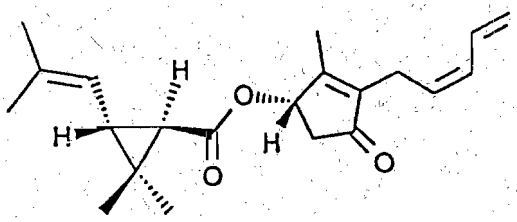
Chemical name (IUPAC):

2,2-Dimethyl-3-(2-methyl-propenyl)cyclopropanecarboxylic acid 2-methyl-4-oxo-3-(2,4-pentadienyl)-2-cyclopenten-1-yl ester.

Trade name(s):

Pyrethrins

Structure:



Formulations:

Physical/Chemical properties:

Molecular formula:	$C_{21}H_{25}O_3$.
Molecular weight:	325.
Physical state:	clear pale yellow viscous liquid.
Boiling point:	136-198 C.
Vapor pressure (20 C):	2×10^{-5}-4×10^{-7}.
Solubility (20 C):	2×10^{-7} ppm in water at 25 °C.
Log K_{ow}:	5.9 @ 20 C

2. TEST MATERIAL:

Studies 1-4, and 7: Pyrethrins I, a single radiolabeled isomer isolated from the naturally occurring mixture of six isomers.
Studies 5 and 6: Pyrenone Crop Spray (6% mixed pyrethrin isomers, 60% piperonyl butoxide, 34% emulsifiers and inerts)

3. STUDY/ACTION TYPE:

Review of hydrolysis, photolysis in water, photolysis on soil, adsorption/desorption, laboratory volatility, aquatic field dissipation, and fish bioaccumulation studies in support of reregistration.

4. STUDY IDENTIFICATION:

161-1: Hydrolysis
Selim, S. 1994b. Hydrolysis of pyrethrin 1 as a function of pH at 25°C. BTC Study No. P1092011. Unpublished study performed by Biological Test Center, Irvine, CA; and submitted by Pyrethrin Joint Venture/Chemical Specialties Manufacturers Association, Washington, DC. (43188201)

DP BARCODE: D207210 - REREG CASE # 2580

CASE: 819063 DATA PACKAGE RECORD DATE: 09/15/94
SUBMISSION: S472927 BEAN SHEET Page 1 of 1

* * * CASE/SUBMISSION INFORMATION * * *

CASE TYPE: REREGISTRATION ACTION: 627 CORE DATA
CHEMICALS: 069001 Pyrethrins %

ID#: 069001-
COMPANY:
PRODUCT MANAGER: 53 BRUCE SIDWELL 703-308-8078 ROOM: CS1 3J2
PM TEAM REVIEWER: ALAN DIXON 703-308-8043 ROOM: CS1 4E6
RECEIVED DATE: 07/15/94 DUE OUT DATE: 10/13/94

* * * DATA PACKAGE INFORMATION * * *

DP BARCODE: 207210 EXPEDITE: N DATE SENT: 09/07/94 DATE RET.: / /
CHEMICAL: 069001 Pyrethrins
DP TYPE: 999 Miscellaneous Data Package
CSF: N LABEL: N

ASSIGNED TO	DATE IN	DATE OUT
DIV : EFED	09/14/94	/ /
BRAN: EFGB	/ /	/ /
SECT:	/ /	/ /
REVR :	/ /	/ /
CONTR:	/ /	/ /

ADMIN DUE DATE: 12/06/94
NEGOT DATE: / /
PROJ DATE: / /

* * * DATA REVIEW INSTRUCTIONS * * *

Please review the following:

MRID 43302301 GN 165-4 Bioaccumulation in fish

* * * DATA PACKAGE EVALUATION * * *

No evaluation is written for this data package

* * * ADDITIONAL DATA PACKAGES FOR THIS SUBMISSION * * *

DP BC	BRANCH/SECTION	DATE OUT	DUE BACK	INS	CSF	LABEL

161-2: Photolysis in water
Selim, S. 1994a. Aqueous photolysis of pyrethrin 1. BTC Study No. P1192006. Unpublished study performed by Biological Test Center, Irvine, CA; and submitted by Pyrethrin Joint Venture/Chemical Specialties Manufacturers Association, Washington, DC. (43096601)

161-3: Photolysis on soil
Testman, R. 1994. Soil surface photolysis of pyrethrin 1. BTC Study No. P1192007. Unpublished study performed by Biological Test Center, Irvine, CA; and submitted by Pyrethrin Joint Venture/Chemical Specialties Manufacturers Association, Washington, DC. (43096602)

163-1: Mobility--Adsorption/Desorption
Reynolds, J.L., and R.A. Robinson. 1994. XBL Study No. 93064; XBL Report No. RTP00156. Unpublished study performed by XenoBiotic Laboratories, Inc., Plainsboro, NJ; and submitted by Pyrethrin Joint Venture/Chemical Specialties Manufacturers Association, Washington, DC. (43096603)

163-2: Laboratory volatility
Selim, S. 1994c. Laboratory volatility of pyrethrin 1 from soil. BTC Study No. P0693011. Unpublished study performed by Biological Test Center, Irvine, CA; and submitted by Pyrethrin Joint Venture/Chemical Specialties Manufacturers Association, Washington, DC. (43096604)

164-2: Aquatic field dissipation
Hattermann, D.R. 1994. Field phase for pyrenone crop spray (pyrethrin + piperonyl butoxide) aquatic dissipation study applied post-emergence to barewater in California, Arkansas and Mississippi. Performing Laboratory Project ID: 91190. Submitting Laboratory Project ID: 18021V09. Unpublished study performed by Landis International, Inc., Valdosta GA and submitted by Pyrethrin Joint Venture/Chemical Specialties Manufacturers Association, Washington, DC. (43125701)

Hatterman, D.R. 1994. Pyrethrin analytical phase for Pyrenone Crop Spray (pyrethrin + piperonyl butoxide) aquatic dissipation study applied post-emergence to barewater in California, Arkansas, and Mississippi. Unpublished study performed by Landis International, Inc., Valdosta GA and submitted by Pyrethrin Joint Venture/Chemical Specialties Manufacturers Association, Washington, DC. (43195201)

165-4: Bioaccumulation in fish
Schocken, M.J. 1994. Bioconcentration study with [^{14}C]pyrethrin 1 in bluegill sunfish. Laboratory Study No.: 11572.0993.6125.140. Report No.: 94-5-5258. Unpublished study performed by Springborn Laboratories, Inc., Wareham, MA, and submitted by Pyrethrin Joint Venture/Chemical Specialties Manufacturers Association, Washington, DC. (43302301)

Ancillary Data
Dimenna, G.P. and G.P. Schoenig. 1993. Summary of work performed to determine appropriate storage and handling procedures for [^{14}C]pyrethrin 1. Unpublished study performed by Toxicology/Regulatory Services, Charlottesville, VA and submitted by Pyrethrin Joint Venture/Chemical Specialties Manufacturers Association, Washington, DC.

5. REVIEWED BY:

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

Signature: David Edelstein

Date: Oct. 19/1994

6. APPROVED BY:

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

Signature:

Date: Oct. 19, 1994

7. CONCLUSIONS:

INDIVIDUAL STUDIES:

161-1: Hydrolysis (MRID 43188201; acceptable)
Pyrethrin [Pyrethrin 1; 2,2-dimethyl-3-(2-methyl-1-propenyl)cyclopropanecarboxylic acid 2-methyl-4-oxo-3-(2,4-pentadienyl)-2-cyclopenten-1-yl ester] degraded very slowly in sterile aqueous pH 5 and 7 buffer solutions that were incubated in the dark at 25 C for 30 days, with ≥94.6% of the applied radioactivity identified as pyrethrin at 30 days posttreatment. In pH 9 buffer solutions incubated under similar conditions, pyrethrin comprised 51.1-53.0% of the applied at 14 days posttreatment and 34.3-34.9% at 30 days; chrysanthemic acid, the only degradate identified, comprised 53.9-64.5% at 21 and 30 days.

161-2: Photolysis in water (MRID 43096601; not acceptable at this time)
This study is not acceptable at this time for the following reasons:

The study author "assumed" that the primary degradate was the (E)-Isomer of Pyrethrin I, but did not make any effort to demonstrate that this was the case.

No attempt was made to identify the secondary degradates.

The degradates were not compared to a sample of chrysanthemic acid, although this compound was the primary hydrolytic degradate.

In order for this study to fulfill the 161-2 aqueous photolysis data requirement, additional information on the identities of Degradates A, C, and D observed in this study is required. The registrant should confirm the assumption that the primary degradate is the (E)-Isomer of pyrethrin I. If there are toxiclogical or ecological effects concerns, information may be needed on the photolysis of residues originating from the cyclopentene portion of the molecule.

Reported results of this study showed that pyrethrin I photodegraded with an observed half-life of approximately 1 hour in sterile aqueous 0.01 M buffer solutions (pH 7; HEPES) that were irradiated with sunlight in Irvine, California (33°41'N, 117°15'W) at 25 C for 71 hours, between 11 AM on October 7 and 10 AM on October 10, 1993. During the first hour of

irradiation, the intensity of the sunlight was 342.3 watt·hours/m^2; during the first 4 hours of irradiation, the intensity of the sunlight ranged from 307.0 to 691.8 watt·hours/m^2. The major degradate was believed to be the (E)-isomer of pyrethrin 1, which reached a maximum 50.7-55.7% of the applied at 2 hours posttreatment. Four unidentified degradates were isolated at maximums of 4.9 to 9.0% of the applied. In the dark control, pyrethrin comprised 91.9-97.3% of the applied radioactivity through 72 hours posttreatment.

161-3: Photolysis on soil (MRID 43096602; not acceptable at this time)
This study is not fully acceptable for the following reasons:

in the "0-hour" irradiated and dark control soil samples, only 66-69% of the applied radioactivity was identified as pyrethrin.

No attempt was made to characterize the degradation products in any way.

No chromatograms were provided for the early phase (1-4 hour post-treatment) of the study.

In order for this study to contribute towards the fulfillment of the photodegradation on soil data requirement, the registrant must provide an explanation for the low concentration of pyrethrin in the immediate posttreatment samples. Also, the soil photolysis degradates should be identified, or a credible explanation provided as to why this cannot be done. In case of concerns about toxicological or ecological effects, information may be needed on the photolysis of residues originating from the cyclopentene portion of the molecule.

Reported results of this study show that pyrethrin I photodegraded with an observed half-life of <24 hours in North Dakota sandy loam soil exposed to sunlight in Irvine, California (33°41'N, 117°15'W) at 24 C for 24 hours in mid-November. During the 24-hour study, the intensity of the sunlight ranged from <0.0007 to 1029 watt·hours/m^2. In the irradiated soil, pyrethrin was 66.0-69.3% of the applied at 0 hours posttreatment, ranged from 42.8 to 59.0% at 1 through 4 hours, and was 11.7-21.1% at 24 hours. In the dark control, pyrethrin comprised 66.7-73.9% of the applied through 4 hours posttreatment, and was 57.6% at 24 hours. Numerous degradates were extracted from the irradiated and dark control soils, each at <10% of the applied.

163-1: Mobility/adsorption/desorption (MRID 43096603, acceptable)
Pyrethrin is immobile; Freundlich K_{ads} values were 198 for the Wakulla sand soil (1/n = 1.098), 268 for the North Dakota sandy loam soil (1/n = 0.9069), 430 for the Dundee silt loam soil (1/n = 1.047), and 310 for the Mahaska silty clay loam soil (1/n = 0.9222); corresponding K_{oc} values were 37847, 12472, 74175, and 16190, respectively.

163-2: Laboratory volatility(MRID 43096604; acceptable)
Pyrethrin displayed limited volatility under the conditions of this experiment. Residues of pyrethrin volatilized at a flux of $\leq$0.002 ug/cm^2·hour from Mutchler sandy loam soil that was adjusted to 50-75% of field moisture capacity, treated at 0.5 lb ai/A with pyrethrin I formulated

as Pyrenone Cropspray (6% pyrethrin, 60% technical piperonyl butoxide, and 34% emulsifiers and other inert ingredients), and incubated for 30 days at 25 C under an airflow of 100 or 300 mL/minute. Volatilized residues totaled an average 10.72-16.17% of the applied by 30 days posttreatment, and were identified as CO_2 (4.42-9.30% of the applied), pyrethrin (≤0.28%), chrysanthemic acid ("Degradate B"; 3.97-10.04%), "Degradate A" (1.33-2.43%), and "Degradate C" (0.18-0.60%). Vapor pressures for the total residues were determined to be 3.3-3.9 x 10^{-7} torr for the samples incubated under an airflow of 100 mL/minute, and 1.6-1.7 x 10^{-7} torr for the samples incubated under an airflow of 300 mL/minute. Maximum mean air concentrations were 5.839-7.316 $\mu g/m^3$ for the samples incubated under an airflow of 100 mL/minute, and 2.960-3.969 $\mu g/m^3$ for the samples incubated under an airflow of 300 mL/minute.

164-2: Aquatic field dissipation (MRID 43125701, 43195201; unacceptable) This study is scientifically sound. However, it does not fulfill the goals of the 164-2 Aquatic Field Dissipation study, which is to identify the routes and pathways of pyrethrin dissipation in the field. The study only reports that pyrethrin dissipated from the study site, without providing any information about whether degradation, transport or both played any role in that dissipation or where the applied material was distributed at the end of the study. Also, recoveries were poor; the highest recovered concentration of pyrethrins in floodwater, 1 hour after application, was 0.0130 ppm, no more than 5% of the target concentration. This means that 95% of the applied pyrethrins were competely unaccounted for.

An acceptable study of pyrethrin field dissipation should be designed to identify the compound's route(s) of dissipation, how it is transformed, and the locations and relative concentrations of parent and degradates at the end of the study. In short, the study should directly address where the pesticide goes, how it changes, and where it ends up. The primary degradates should be monitored. The unusually high Henry's Law constant for pyrethrins (calculated to be 42.8 atm.-m^3/mol) indicates that pyrethrin at the air-water interface will partition strongly to the air; therefore, volatilization from the water surface should be measured. As the submitted study does not address any of these issues, it appears that a new study will be required.

Reported results of this study suggest that pyrethrins (as Pyrenone Crop Spray, a mixture of all six analogs with piperonyl butoxide and inerts) dissipated rapidly from aquatic field plots located in California, Arkansas, and Mississippi that were treated once at 0.46 lb ai/A (equivalent to 10 normal applications) with pyrethrins. Parent pyrethrins were only detected in the flood water. Half-life estimates were 6.3 hours in California, 2.5 hours in Arkansas, and 4.9 hours for Mississippi.

165-4: Bioaccumulation in fish (MRID 43302301; acceptable) [^{14}C]Pyrethrins 1 residues accumulated in bluegill sunfish continuously exposed to cyclopropane-labeled [^{14}C]pyrethrin 1, at a mean concentration of 74.2 ppt (0.8% of the LC50), for 28 days under flow-through aquarium conditions. Maximum mean bioconcentration factors were 127x for the edible tissues, 873x for the nonedible tissues, and 471x for whole fish. Maximum mean concentrations of total [^{14}C]residues were 9.43 ppb for edible tissues, 64.8 ppb for nonedible tissues, and 34.9 ppb for whole fish. The

metabolite identified in the nonedible tissues was chrysanthemic acid. Depuration was rapid; by day 10, the accumulated [^{14}C]residues were eliminated to below the level of detection in from the edible tissues, and 97.7% eliminated from the nonedible tissues.

ENVIRONMENTAL FATE ASSESSMENT:

Parent pyrethrin is not persistent or mobile. When applied to soil, it is likely to remain near the surface and degrade rapidly without leaching to groundwater or moving overland to surface water. Although pyrethrin is not especially volatile, its extreme insolubility could promote volatility from water surfaces or wet soil. Also, pyrethrins may be applied by air and surface water could become contaminated through spray drift.

The characterization and environmental fate of pyrethrin I degradates are uncertain. Under abiotic hydrolysis at pH 5 and 7, pyrethrin degrades very slowly. Hydrolysis occurs more rapidly at pH 9; the only identified product was chrysanthemic acid. Pyrethrin I photodegrades rapidly in water and on soil, with a half-life of < 1 hour in water and < 24 hours on soil. The primary photolytic degradate is believed to be the (E) isomer of pyrethrin I, but this was not proven in submitted data. Other photodegradates were produced, but have not been characterized. It appears that light shatters the pyrethrin molecules into numerous small fragments, no one of which represents a significant amount of material. Soil metabolism data have not been submitted.

Pyrethrins accumulate only moderately in fish (127x for the edible tissues, 873x for the nonedible tissues, and 471x for whole fish). It appears that fish have the ability to metabolize low concentrations of pyrethrins to water soluble degradates which are then excreted.

8. RECOMMENDATIONS:

1) Inform the registrant that the hydrolysis, unaged mobility, laboratory volatility and bioaccumulation in fish studies are acceptable. Of these, only the 163-2 laboratory volatility requirement can be considered satisfied. If there are concerns about toxicological or ecological effects, additional 161-1 hydrolysis and 165-4 bioaccumulation in fish data may be needed for the cyclopentene portion of the molecule, and additional 163-1 data may be needed for any pyrethrin degradate mobility.

2) The 161-2 and 161-3 photolysis studies are not acceptable because of the lack of degradate identification. Because photolysis has the potential to be the major field dissipation route, it is important to identify the photolytic degradates so that they may be monitored during field studies.

3) The 164-2 aquatic field dissipation study is not acceptable because recoveries were poor and the dissipation/degradation route was not identified. The field study is not simply an attempt to get a parent half-life, but rather an effort to define the important processes leading to pesticide degradation and transport. As recoveries were very low, it does not appear that reanalysis of the original samples will provide useful information, and a new study will be required.

4) A summary of pyrethrin data requirements is attached.

9. BACKGROUND:

A. Introduction

Pyrethrum extract contains six analogs: pyrethrin 1 and 2, cinerin 1 and 2, and jasmolin 1 and 2. The plants chrysanthemum and cinerariaefolium and their flowers are the sources of the active ingredients. Pyrethrum is used widely indoors and outdoors on several target pests, but is primarily used as an insecticide. It is almost always formulated with the synergist piperonyl butoxide, a microsomal enzyme inhibitor. The maximum application rate is not included in EFGWB files, but a reported maximum ULV application to cotton is 0.2 lb. a.i./A/year. There are many application methods, depending on the use and target pest.

10. DISCUSSION OF INDIVIDUAL TESTS OR STUDIES:

Refer to attached DER's for discussion of studies.

11. COMPLETION OF ONE-LINER:

One-liner has been completed and is attached.

12. CBI APPENDIX:

No claim of confidentiality is made for any of the data reviewed in this package.

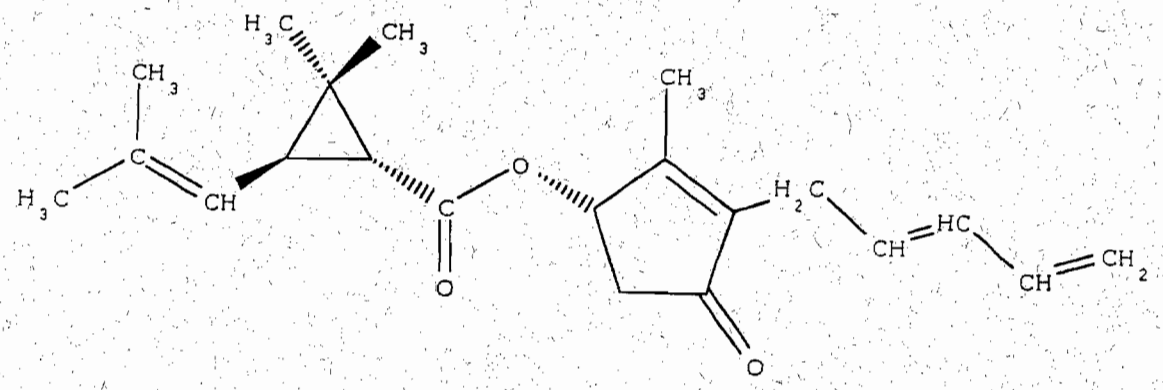
DATA REQUIREMENT STATUS: PYRETHRINS (TERRESTRIAL AND AQUATIC FOOD CROPS)

GUIDELINE	MRID #	DATE	STATUS
HYDROLYSIS	43188201	9/94	SATISFIED FOR CYCLOPROPANE MOIETY[1]
AQUEOUS PHOTOLYSIS	43096601	9/94	NOT SATISFIED[1]
PHOTOLYSIS ON SOIL	43096602	9/94	NOT SATISFIED[1]
AEROBIC SOIL METABOLISM			NOT SATISFIED[1]
ANAEROBIC AQUATIC METABOLISM			NOT SATISFIED[1]
AEROBIC AQUATIC METABOLISM			NOT SATISFIED[1]
LEACHING/ ADSORPTION/ DESORPTION	43096603	9/94	SATISFIED FOR PARENT ONLY
LABORATORY VOLATILITY	43096604	9/94	SATISFIED FOR SOIL SURFACE
TERRESTRIAL FIELD DISSIPATION			NOT SATISFIED
AQUATIC FIELD DISSIPATION	43125701, 43195201	9/94	NOT SATISFIED
BIOACCUMULATION IN FISH	43302301	9/94	SATISFIED FOR CYCLOPROPANE MOIETY[1]
DROPLET SIZE SPECTRUM			RESERVED[2]
DRIFT FIELD EVALUATION			RESERVED[2]

1/ If there are concerns about toxicological or ecological effects, additional data may be needed for the cyclopentene moiety.
2/Reserved pending results of spray drift task force

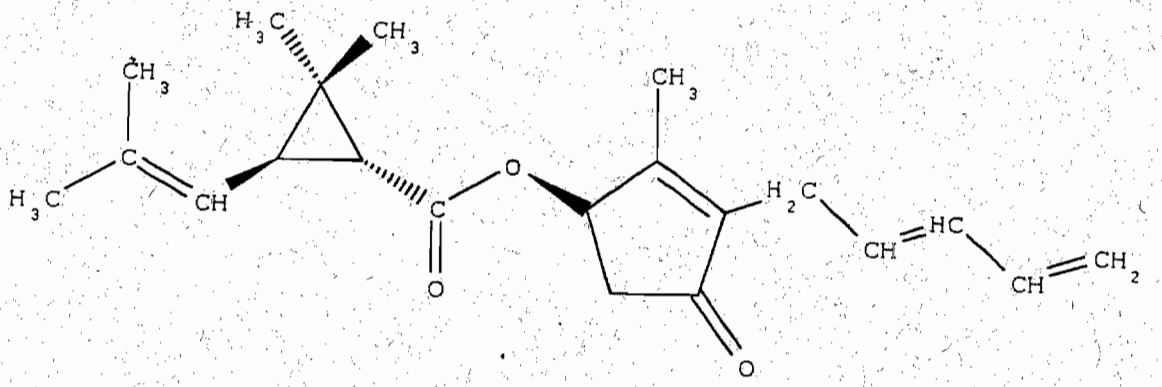
APPENDIX

PYRETHRIN 1 AND ITS DEGRADATES



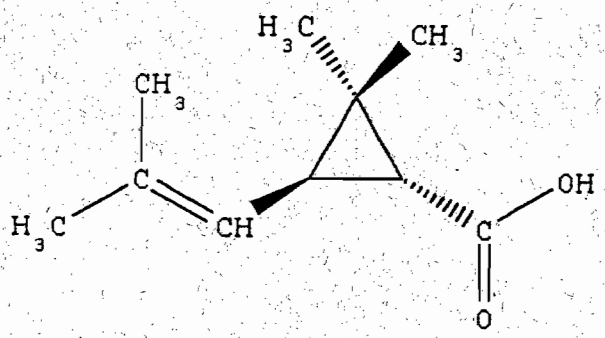
2,2-Dimethyl-3-(2-methyl-1-propenyl)cyclopropanecarboxylic acid
2-methyl-4-oxo-3-(2,4-pentadienyl)-2-cyclopenten-1-yl ester

(Pyrethrin 1)



(E)-isomer of Pyrethrin 1

("formed by the cis to trans isomerization at the 2-position of the 2-pentadienyl side chain of the alcohol moiety")



Chrysanthemic acid

INTRODUCTION

Pyrethrin 1 (one of six insecticidal constituents used under the collective term pyrethrins) is a contact insecticide registered for use to control a wide range of insects and mites on terrestrial food (fruit, vegetable, field) and nonfood (ornamental) crops, greenhouse food and nonfood crops, domestic outdoor (household and ornamental plants), and indoor (house plants, public health, pets, stored products, animals and their man-made premises) use sites. Pyrethrin is usually combined with synergists, as insecticidal activity is markedly increased. Single active ingredient formulations include dust, emulsifiable concentrate, ready-to-use liquid (foggers and aerosols), and impregnated collar/tag. Multiple active ingredient formulations include lindane, resmethrin, pirimiphos-methyl, piperonyl butoxide, bendiocarb, dichlorvos, tetramethrin, diazinon, chlordane, rotenone, and chlorpyrifos-methyl. Pyrethrins are highly toxic to fish; and although toxic to bees, exhibit a repellent effect.

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
PYRETHRIN 1
Last Update on October 12, 1994
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

LOGOUT	Reviewer: DMB	Section Head: FDK	Date: 10/12/94

Common Name: PYRETHRIN 1
Smiles Code:
PC Code # : 69001 CAS #: Caswell #:

Chem. Name : PYRETHRIN 1

Action Type: Insecticide

Trade Names: Pyrenone
(Formul'tn): 6% pyrethrins, 60% piperonyl butoxide, 34% inerts
Physical State: clear, pale yellow viscous liquid

Use Patterns (% Usage) :

Empirical Form: $C_{21}H_{25}O_3$
Molecular Wgt.: 325.00 Vapor Pressure: 2.00E -5 Torr
Melting Point : °C Boiling Point: 136-198 °C
Log Kow : 5.9 pKa: @ °C
Henry's : E Atm. M3/Mol (Measured) 4.28E 1 (calc'd)

Solubility in ...					Comments
Water	2.00E -7	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	
alkanes	E	ppm	@	°C	freely soluble
ketones	E	ppm	@	°C	freely soluble

Hydrolysis (161-1)
[V] pH 5.0: nearly stable
[V] pH 7.0: nearly stable
[V] pH 9.0: t1/2 = 14-21 d.
[ ] pH :
[ ] pH :
[ ] pH :

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
PYRETHRIN 1
Last Update on October 12, 1994
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Photolysis (161-2, -3, -4)
[S] Water:t1/2 = 1 hr.
[ ] :
[ ] :
[ ] :

[S] Soil :t1/2 < 24 hr.
[ ] Air :

Aerobic Soil Metabolism (162-1)
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

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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Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
PYRETHRIN 1
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Soil Partition Coefficient (Kd) (163-1)
[V] sand: Kd = 198, K oc = 37847
[V] sandy loam: kd = 268, Koc = 12472
[V] silt loam: Kd = 430, Koc = 74175
[V] silty clay loam: Kd = 310, Koc = 16190
[ ]
[ ]

Soil Rf Factors (163-1)
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Laboratory Volatility (163-2)
[V] Rate <0.002 ug/cm2-hr; Max. mean air conc. = 7.316 ug/m3
[ ] Max. vapor pressure = 3.9 x 10-7 torr

Field Volatility (163-3)
[ ]
[ ]

Terrestrial Field Dissipation (164-1)
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]
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[ ]

Aquatic Dissipation (164-2)
[ ] reported field half lives 2.5-6.3 hrs.; study unacceptable
[ ]
[ ]
[ ]
[ ]
[ ]

Forestry Dissipation (164-3)
[ ]
[ ]

Long-Term Soil Dissipation (164-5)
[ ]
[ ]

Accumulation in Rotational Crops, Confined (165-1)
[ ]
[ ]

Accumulation in Rotational Crops, Field (165-2)
[ ]
[ ]

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

Bioaccumulation in Fish (165-4)
[V] 127x edible tissue, 873x nonedible tissues, 421x whole fish
[ ] rapid depuration

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

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

Ground Water Monitoring, Small Scale Retrospective (166-2)
[ ]
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Field Runoff (167-1)
[ ]
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Surface Water Monitoring (167-2)
[ ]
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[ ]
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[ ]

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

Degradation Products

chrysanthemic acid
(E)-isomer of pyrethrin 1 (not confirmed)

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Comments

Pyrethrin degrades rapidly in sunlight and appears to be immobile in soil. Few degradates have been identified. Appears likely to degrade in place under most circumstances; major off-target risk is possibility of acute toxicity to fish in waters exposed to spray drift. Exposure to surface water through runoff and leaching to ground water highly unlikely. Volatility extremely limited from soil, may volatilize from water. In case of volatility, rapid photodegradation will prevent long distance transport.

References: DER's
Writer :

PYRETHRIN 1

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