5 APR 1993

Chemical Code: 128897 Date Out: _____

TO: George LaRocca
Product Manager 13
Registration Division (H7505C)

FILE COPY

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

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

Attached please find the EFGWB review of:

DP Barcode : D177181, D174924, D188714, D175355

Chemical Name: Lambdacyhalothrin

Product Type : Insecticide

Product Name : PP321

Company Name : ICI Americas Inc.

Purpose : Review environmental fate data base to determine if it will support new food crop use on peanuts, bulb onions, garlic, corn (field, pop, seed); increase rate on soybeans; label change; response to registrants response on application limits supported by environmental fate data base.

Date Received: 3/6/92, 2/24/93, 2/18/92, 4/10/92

Action Code: 101, 330, 575 Review Time: 12 days

EFGWB No.: 92-0560, 92-0767, 92-0594, 93-0458

EFGWB Guideline/MRID/Status Summary Table

No new studies reviewed

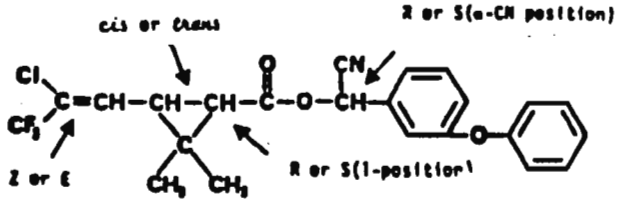
1.0 CHEMICAL:

Common name: PP321

Chemical name: Lambdacyhalothrin , [1α-(S),3α(Z)]-(±)-cyano-(3-phenoxyphenyl) methyl 3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-dimethylcyclopropanecarboxylate

Trade Name: KARATE Insecticide, TROPHY Insecticide

Chemical Structure:



2.0 TEST MATERIAL: NA

3.0 STUDY/ACTION TYPE:

3.1 Review environmental fate data on file for KARATE to support new use on peanuts, bulb onions, garlic, corn (field, pop, seed) and label amendment to increase the use rate on soybeans from 0.05 lb ai/A/season to 0.06 lb ai/A/season.

3.2 Request to change name of "SAMURAI" Insecticide to "SCIMITAR" for use in nurseries, non-bearing ornamentals, landscape plantings, ornamental gardens and Home/Residential lawns at a maximum use rate not to exceed 0.36 lb ai/A per year.

3.3 Registrant response to EFGWB review of the seasonal application rate supported by field dissipation studies.

4.0 STUDY IDENTIFICATION:

5.0 REVIEWED BY:

George Tompkins
Entomologist, Review Section 1
EFGWB/EFED

Signature: George Tompkins
Date: 15 APR 1993

6.0 APPROVED BY:

Paul Mastradone
Section Chief, Review Section 1
EFGWB/EFED

Signature: Paul J Mastradone
Date: 15 APR 93

7.0 CONCLUSIONS:

7.1 Status of Data Requirements:

The following environmental fate studies and their status are required for terrestrial food crop use:

Data requirements	STATUS
Hydrolysis (161-1)	Satisfied
Photodegradation in Water (161-2)	Satisfied
Photodegradation on Soil (161-3)	Satisfied
Aerobic Soil Metabolism (162-1)	Satisfied
Anaerobic Soil Metabolism (162-2)	Satisfied
Leaching/Adsorption/Desorption (163-1)	Satisfied
Soil Field Dissipation (164-1)	Satisfied
Confined Accumulation in Rotational Crops (165-1)	Satisfied
Fish Accumulation (165-4)	Satisfied

The EFGWB files indicate that all of the above environmental fate data requirements for lambdacyhalothrin have been satisfied through previous acceptable submissions in the registration of cotton at a maximum of 0.2 lbs ai/A per season.

Based on the registrants response and in reviewing all previous acceptable and, additionally, four supplemental field dissipation studies (conducted at an application rate of 1.0 lb ai/A) it is concluded that because the statistically sound supplemental field dissipation studies had half lives similar to those of the acceptable field dissipation studies and that in both cases leaching was not a dissipation route, the field dissipation data supports an application rate of up to 1.0 lb ai/A per season. It appears that conducting new field dissipation studies would provide no new additional information but would provide only confirmation of higher levels of parent and the degradates expected at higher application rates.

7.2 ENVIRONMENTAL FATE ASSESSMENT

The information provided from acceptable environmental fate data indicate that PP321 reaching the soil surface appears to be moderately persistent (half-lives varied from <30 days to 40 days). PP321 was shown to be immobile in soil with reported Freundlich K_{ad} values ranging from 261-2492 (sandy loam soil) to 1121-4649 (silt soil). The disssipation of PP321 appears to be from binding to soil particles and then degradation primarily from biotic processes (aerobic soil metabolism $t_{1/2}$=1 week to <30 days; anaerobic soil metabolism $t_{1/2}$=30 days) and to a lesser extent by abiotic processes (photodegradation on soil $t_{1/2}$=34 days; stable to hydrolysis at pH 5.0 and 7.0 but at pH 9.0 a reported $t_{1/2}$=7 days). The major degradates reported were CO_2 and several nonvolatile degradates (see Environmental Fate Summary) all in lesser amounts (none >12.1% at any sampling interval).

PP321 was immobile in four soils with Freundlich K_{ad} values ranging from 261-2492 in an England sandy loam soil to 1121-4649 in a silt soil. In column leaching studies no radioactivity was detected in the leachate of any column and no radioactivity was detected below the 5-10 cm depth in any of the four soils tested. In acceptable plastic cylinder field dissipation studies, at an application rate of 0.13 lb ai/A, PP321 dissipated from the upper 10 cm of soil with reported half-lives of 12 and 33 days. All degradates and unknowns detected comprised <7% of applied at any sampling interval and <1% of the applied was detected below the 10 cm soil depth at any sampling interval. Supplemental field dissipation studies conducted at four sites at an application rate of 1.0 lb ai/A had reported half-lives from 26 to 40 days and no detection of parent or its epimerization product (R157836) were made below the 6-12 inch soil layer at any sampling time.

PP321 bioaccumulated in fish and appeared to stabilize within two weeks of exposure. Maximum concentrations reached were 1660-2240X in whole fish, 4250-7340X in viscera, and 490-850X in the remaining tissues with ≥77% being eliminated in each of the tissues. The confined rotational crop data indicates that low levels of residue (0.05 ug/g or less) accumulated in the rotational crops (cotton, lettuce, wheat, and sugarbeet) planted at 30, 60, and 120 days after application.

7.3 ENVIRONMENTAL FATE SUMMARY

Lambdacyhalothrin (PP321) is stable to hydrolysis at pH 5.0 and 7.0 but does hydrolyze at pH 9.0 with a reported half-life of 7 days. Hydrolytic degradation and isomerization occurred concurrently in the solutions. Approximately 50% of the PP321 was immediately isomerized in the pH 9.0 solution and the hydrolytic product was (1RS)-cis-3-(Z-2-chloro-3,3,3-trifluoroprop-1-enyl)-2,2-dimethylcyclopropanecarboxylic acid. The aqueous photolysis half-life was approximately 30 days with three major degradates reported, each being <10% of the applied: (1RS)-cis-and (1RS)-trans-3-(ZE-2-chloro-3,3,3-trifluoroprop-1-enyl)-2,2-dimethylcyclopropanecarboxylic acid (degradates Ia and Ib) and (RS)-α-amido-3-phenoxybenzyl-(1RS)-cis,trans-3-(ZE-2-chloro-3,3,3-trifluoroprop-1-enyl)-2,2-dimethylcyclopropanecarboxylate (degradate II). The soil photolysis half-life was calculated to be equivalent to 34-35 days of Florida summer sunshine when exposed to a xenon arc lamp for 166 hrs. Degradate II comprised 5% of the applied radioactivity after 166 hrs of irradiation.

Under aerobic soil conditions cyclopropane-labeled [^{14}C]PP321, at 0.46 ug ai/g, degraded with a half-life <30 days in a sandy loam soil. The major nonvolatile degradates were (1RS)-cis-3-(Z-2-chloro-3,3,3-trifluoroprop-1-enyl)-2,2-dimethylcyclopropanecarboxylic acid (6.2% of applied on day 30) and (RS)-α-cyano-3-(4-hydroxyphenoxy) benzyl-(1RS)-cis-3-(Z-2-chloro-3,3,3-trifluoroprop-1-enyl)-2,2-dimethylcyclopropanecarboxylate (12.1% of applied on day 63). $^{14}CO_2$ accounted for 35.6% of the

applied by day 92 and [^{14}C]PP321 did not isomerize in the soil during the study. Benzene ring labeled [^{14}C]cypermethrin, at 0.2 and 2.0 kg ai/ha, degraded with a reported half-life of <1 week in a clay loam soil, 1-3 weeks in a loamy coarse sand, and 1-3 weeks in a peat soil. The major degradates were 3-phenoxybenzaldehyde (up to 6.4% of recovered), 3-phenoxybenzoic acid (up to 9% of recovered), and (RS)-α-cyano-4'-hydroxy-3-phenoxybenzyl-(1RS)-cis,trans-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate (up to 4.5% of recovered). By 25 weeks posttreatment, 60-70% of the applied radioactivity had been evolved as $^{14}CO_2$. Because the alcohol half of the molecule of PP321 and cypermethrin is identical, this information was acceptable to being used to provide information on the alcohol half of the PP321 molecule in the soil.

Under anaerobic soil conditions PP321 degraded with a reported half-life of about 30 days. The major degradates produced were 3-phenoxybenzaldehyde and 3-phenoxybenzoic acid. After 25 weeks, $^{14}CO_2$ under aerobic and anaerobic conditions accounted for up to 70% of the radioactivity recovered.

A column leaching study indicated that aged benzene ring-labeled [^{14}C]cypermethrin residues were immobile in columns of clay loam, loamy sand, coarse sand, and peat soils. No radioactivity was detected in the leachate of any column. In the coarse sand and peat soils ~0.4% of applied was detected in the 5-10 cm depth but none in the 10-15 cm depth. In batch equilibrium studies the reported Freundlich (K_{ad}) values varied from 477 to 3064 in a sandy clay loam, 1121 to 4649 in a silt soil, 261 to 2492 for an England sandy loam soil, and 911 to 4008 for a North Carolina sandy loam soil. These values indicate that PP321 and its degradates have very low mobility in soil.

In supplemental field dissipation studies, with an application rate of 1.0 lb ai/A conducted at four locations, the reported half-lives ranged from 26 to 40 days. Analyses made for PP321 and its opposite enantiomer pair formed by epimerization (R157836) showed that materials were primarily in the 0-6 inch soil layer at all sites and times except for a detection in one trial in the 6-12 inch soil layer at day 0 and 7 posttreatment. The results indicated that the formation of R157836 was not a significant dissipation route or it degraded rapidly in the soil. In acceptable plastic cylinder field dissipation studies, with an application rate of 0.13 lb ai/A in two locations, PP321 dissipated from the upper 10 cm of soil with reported half-lives of 33 days (Champaign, IL) and 12 days (Vicksburg, MI). All degradates and unknowns detected comprised <7% of the applied at any sampling interval. Less than 1% of the applied was detected below the 10 cm soil depth in either trial at any sampling interval.

The concentration of cyhalothrin in fish appeared to stabilize within two weeks of exposure and maximum bioconcentrations reported were 1660-2240X in whole fish, 4250-7340X in viscera, and 490-850X in the remaining tissues. During the depuration phase the radioactivity eliminated from the tissues was 79% from muscle, 77%

from viscera, and 78% from the remainder. The confined rotational crop (application rate 1.0 kg ai/ha) data indicates that low levels of residue (0.05 ug/g or less) accumulated in the rotational crops (cotton, lettuce, wheat, and sugarbeet) planted at 30, 60, and 120 days after application.

8.0 RECOMMENDATIONS:

The environmental fate data requirements for both terrestrial nonfood and terrestrial food crop use listed in the Conclusion Section (7.1) for lambdacyhalothrin have all been satisfied through previous submissions at a rate of up to 1 lb ai/A per year.

9.0 BACKGROUND:

Lambdacyhalothrin is currently registered for use on cotton (at a maximum rate of 0.2 lb ai/A per season) and as a cattle ear tag. The registrant previously submitted an application for registration of TROPHY Insecticide for use on broccoli, cabbage, tomatoes, sweet corn (maximum rate of up to 0.48 lb ai/A per season), head lettuce (maximum rate of 0.3 lb ai/A/season), and wheat (0.06 lb ai/A/season). A request for registration of SAMURAI (lambdacyhalothrin) for use on trees, turf, nurseries, and ornamental gardens (terrestrial nonfood use) has been previously made (10 Sept 91) but with no listing of the maximum application per season. In the present request for a name change of "SAMURAI" to "SCIMITAR" the maximum use rate was listed not to exceed 0.36 lb ai/A per year.

10.0 DISCUSSION OF INDIVIDUAL STUDIES:

In reviewing all previously submitted supplemental and acceptable field dissipation studies the supplemental field dissipation studies, with an application rate of 1.0 lb ai/A, had reported half-lives ranging from 26 to 40 days. These were statistically sound studies and were considered supplemental only because reported analyses were made only for parent and its opposite enantiomer pair formed by epimerization (R157836) and none for any of the other degradates identified in the aerobic soil metabolism, anaerobic soil metabolism, and hydrolysis studies. These reported half-lives coincided with those reported in the acceptable plastic cylinder field dissipation studies having half-lives of 12 and 33 days that were conducted with an application rate of 0.13 lb ai/A. In both cases leaching was not a dissipation route. In the acceptable field dissipation studies with an application rate of 0.13 lb ai/A the maximum amount of individual degradates reported were: compound Ia ((1RS)-cis-3 (Z-2-chloro-3,3,3-trifluoroprop-1-enyl)-2,2-dimethylcyclopropanecarboxylic acid) at 5.5% and 3.3% in the two study sites; compound V (3-

phenoxybenzoic acid) at 0.7 and 2.5%; compound VII ((3-4'-hydroxyphenoxy)benzoic acid at 0.5 and 1.0%; and compound XV ((RS)-α-cyano-3(4-hydroxyphenoxy)benzyl-cis-3-(Z-2-chloro-3,3,3,-trifluoroprop-1-enyl)-2,2-dimethylcyclopropanecarboxylate) at 2.0 and 3.9% (Table 1).

In laboratory studies it was reported that in hydrol;ysis studies at pH 9.0 the half-life was 7 days with degradation and isomerization occurring concurrently in the solutions. The main hydrolytic product was compound Ia. Under aerobic soil conditions ($t_{1/2}$=<30 days) the major nonvolatile degradates were compound Ia (6.2% of applied on day 30), and compound XV (12.1% of applied on day 63). Under anaerobic soil conditions ($t_{1/2}$=~30 days) the major nonvolatile degradates were compound V and 3-phenoxybenzaldehyde. After 25 weeks $^{14}CO_2$, under aerobic and anaerobic soil conditions, accounted for up to 70% of recovered radioactivity.

Because the degradation rates in the acceptable and supplemental field dissipation studies appear to be similar, and the parent and degradates did not appear to be mobile, it appears that conducting new field dissipation studies at higher application rates would provide no new additional information but would provide only confirmation of higher levels of parent and the degradates expected at higher application rates.

11.0 COMPLETION OF ONE-LINER: NA

12.0 CBI APPENDIX: NA

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Page _____ is not included in this copy.

Pages 8 through 11 are not included in this copy.

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.

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