109701

#652BB

Date Out EAB: 22 OCT 1984

TO: T. Gardner
Product Manager 17
Registration Division
TS-767

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

Attached please find the environmental fate review of:

Reg./File No.: 10182-18

Chemical: Permethrin

Type Product: Insecticide

Product Name: Ambush®

Company Name: ICI Americas

Submission Purpose: Add new use on leafy vegetables

ZBB Code: ?

ACTION CODE: 335

Date in: 8/24/84

EFB # 4545

Date Completed: 10/22/84

TAIS (level II) 63

Days 1

Deferrals To:

_____ Ecological Effects Branch

_____ Residue Chemistry Branch

_____ Toxicology Branch

1.0 INTRODUCTION

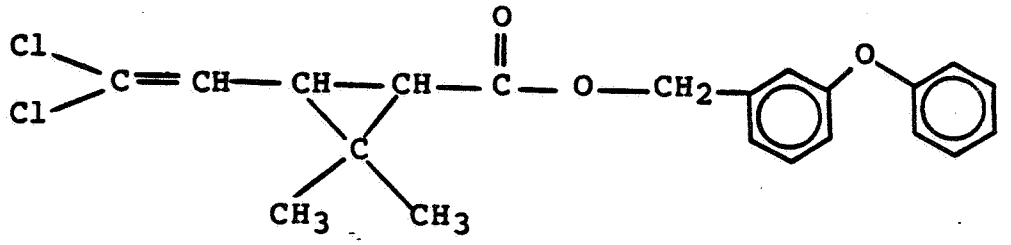
ICI Americas Inc., has submitted an application for the registration of Ambush® Insecticide (permethrin as a. i.) for use on leafy vegetables (kale, turnips and mustard greens, and collards).

1.1 Chemical

Common name: Permethrin

Chemical name: (3-phenoxyphenyl)methyl (±)-cis,trans-3-(2,2-dichloroethenyl)-2,2-dimethyl cyclopropane carboxylate

Chemical structure:



2.0 DIRECTIONS FOR USE

The complete label is attached. Briefly, apply Ambush® at a rate of 0.05 to 0.1 lb a. i. per acre. Apply as needed, do not exceed 9 applications.

3.0 DISCUSSION OF DATA

No additional data were included in the current submission. Previously submitted data were considered in the review dated 7/31/78 for the registration of Ambush® for use on cotton. Also, additional data were considered in reviews dated 5/15/78, 6/9/76, and 4/16/76.

Conclusions of the data were:

Hydrolysis: Permethrin is stable to hydrolysis at expected environmental conditions. At elevated temperature and unlikely pH (>9) the half-life exceeded 50 days. The hydrolysis degradation products are 3-phenoxybenzyl alcohol and cis/trans 3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylic acid (cis/trans-DCVA). Both appear to be stable to further hydrolysis.

Chemical hydrolysis is not expected to be a significant pathway of dissipation of permethrin in the environment.

Photodegrdation- Permethrin is unstable to photolysis, but the rate cannot be extrapolated from the data since the experiments were conducted with activators or inhibitors. The photodegradation on soil showed as much unaccountable losses as degradation. Photolysis of separated isomers leads to isomerization, followed by cleavage of the ester linkage yielding 3-phenoxy-benzyl alcohol and cis/trans-DCVA. A secondary pathway was also apparent.

Metabolism- Permethrin degrades in soil under laboratory conditions with dependency upon soil type, temperature, and oxygen availability. The rate is slower in soils low in organic matter content (<1.5%) and in soils under anaerobic or flooded conditions. The lack of degradation in sterile soils indicate that the degradation is a function of the presence of soil microorganisms.

The degradation products in soil are primarily 3-phenoxy benzoic acid, 3-phenoxybenzyl alcohol and cis/trans-DCVA. All appeared to be transitory in the soil. It was noted that the cis-isomer of permethrin is generally more stable than the trans-isomer.

Note: It appears the half-life(lives) were presented in the study but not recorded by the reviewer. The reviewer notes that the reported half-life was for permethrin only and did not consider the dissipation of the degradates or non-extractable material. In three sandy clay loam and a loamy sand soils, the half-life estimate indicated that 50% of the applied ^{14}C would be evolved as $^{14}CO_2$ within 10 weeks. Under waterlogged conditions, $^{14}CO_2$ evolved less rapidly--approx. 15% in 14 weeks.

Mobility- Permethrin does not leach significantly in soil. Adsorption (K) values were 0.386 for a fine sand soil (1.7% organic matter) to 633 for a clay loam soil (5.2% organic matter). Permethrin is strongly adsorbed to soil with adequate amounts of organic matter. Desorption was not investigated.

The reviewer concluded the degradates of permethrin are somewhat more leachable than the parent compound but do not appear to be a problem. Slower degradation in coarse soils may lead to more leaching of residues. Runoff of permethirn has been shown to be a problem and was probably due to physical transport of permethrin-adsorbed soil particles by soil erosion.

Field Dissipation- The reviewer concluded that all the submitted field dissipation data are inadequate. The applicant failed to determine the possible presence of degradation products. Also, the difference in apparent rate of dissipation in various soil types as shown in the laboratory metabolism studies has not been verified (or denied) by the field data.

Accumulation: Catfish, in a static accumulation study, had a maximum bioaccumulation factor of 12-13X (muscle tissue) and 147X (viscera) reached over a period of 10 days and 14 days exposure, respectively, then declined afterward. During the 14 day depuration period, there was a 66% decline in residues in muscle tissue and 90% decline in viscera.

In a dynamic study flow-through using both catfish and bluegill sunfish, the maximum bioaccumulation factors were 21X and 715X for residues in bluegill edible and non-edible tissue, respectively, after 21 to 28 days exposure. In catfish, the maximum bioaccumulation factors were 91 and 703 in edible and non-edible tissues, respectively, after 28 days exposure. During the 14 day depuration period, residues declined 92 and 97% in bluegill edible and non-edible tissues, respectivley. In catfish, residues declined 64 and 84% in edible and non-edible tissues, respectively, during the depuration period.

In another study, it was noted that the female fathead minnow accumulated significantly more permethrin residues than the males in the non-edible tissues. The possibility of reproductive problems in fish may be of concern.

The reviewer concluded that the extremely low water solubility of FMC 33297 (permethrin) could lead to accumulation hazard in fish. The chemical identity of the residues in fish was not examined.

Rotational crops- The laboratory study showed that after four months (longest period tested) residues were still present in rotated crops:

Crop	PPM $^{14}C^{\dagger}$ Present as Permethrin Equivalents (Days After Treatment)		
	30	60	120
Lettuce	0.08	0.08	0.03
Sugarbeets			
Foliage	0.35	0.14	0.10
Roots	0.21	0.14	0.04
Wheat straw (Mat.)	-	0.57	0.08
" Chaff	-	0.51	0.08
" grain	-	0.22	0.09

†Cyclopropane-^{14}C-labeled Permethrin

The field rotational crop study did not identify a time interval at which subsequent crops will not contain permethrin residues. Rotational crops were planted 30 and 60 days after soil was treated with a single application of Pounce® 3.2EC at rate of 1 lb ai/A (equivalent to 5 to 20X label rate). However, the analytical method used to analyze crops had been reviewed and found inadequate for determining permethrin and its degradates in field rotational crop samples. Thus, the data on rotational crops are considered incomplete.

4.0 RECOMMENDATION

4.1 Adequate data are not available to define the environmental fate of Ambush Insecticide (permethrin) for the proposed use on leafy vegetables (kale, turnip and mustard greens, and collards).

4.2 The field dissipation studies are deficient in that soil was not analyzed for residues of the degradation products, namely 3-phenoxybenzoic acid and cis/trans-DCVA. These data are now needed to support registration of additional uses of permethrin even though previous registration applications were approved.

4.3 An in-depth reconsideration of the rotational crop data shows the current 60 day rotational interval to be inadequate. At this time, the rotational crop data do not support any rotational interval wherein residues of permethrin and/or its degradation products are not taken up by rotational crops.

Clinton Fletcher
Review Section No. 1
Exposure Assessment Branch
Hazard Evaluation Division

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS

WARNING

HARMFUL IF SWALLOWED OR ABSORBED THROUGH SKIN. MAY CAUSE EYE IRRITATION.

Avoid contact with eyes, skin or clothing. Avoid breathing vapor or spray mist. Wash thoroughly after handling.

STATEMENT OF PRACTICAL TREATMENT: IF SWALLOWED: Do not induce vomiting. Call a physician. Vomiting should be supervised by a physician or the professional staff because of the possible pulmonary damages via aspiration of the solvent. IF IN EYES: Flush with plenty of water. Get medical attention if irritation persists. IF ON SKIN: Wash with plenty of soap and water.

For 24-hour emergency assistance call 302/575-3000.

ENVIRONMENTAL HAZARDS: This pesticide is extremely toxic to fish. Use with care when applying in areas adjacent to any body of water. Do not apply directly to water. Do not apply when weather conditions favor drift from treated areas. Do not contaminate water by cleaning of equipment or disposal of wastes. This product is highly toxic to bees exposed to direct treatment or residues on crops or weeds. Do not apply AMBUSH, or allow it to drift to crops or weeds on which bees are actively foraging. Additional information may be obtained from your Cooperative Extension Service. Apply this product only as specified on this label.

In case of a significant spill, call CHEMTREC 800/424-9300.

PHYSICAL OR CHEMICAL HAZARDS: Do not use or store near heat or open flame.

STORAGE AND DISPOSAL

Keep container closed when not in use. Do not store near feed or food. Protect from freezing. In case of spill or leak on floor or paved surfaces, soak up with sand, earth, or synthetic absorbent. Remove to chemical waste area and dispose of in accordance with State and local regulations.

Do not reuse container. Triple rinse residue from empty container and add rinse to mixture in spray tank. Pesticide, spray mixture, or rinse water that cannot be used according to label instructions must be disposed of according to applicable Federal, State, or local procedures. Then offer empty container for recycling or reconditioning, or puncture and dispose of in a sanitary landfill or by other approved State and local procedures.

CD 766-4-303

RESTRICTED USE PESTICIDE. For retail sale to and use only by Certified Applicators, or persons under their direct supervision and only for those uses covered by the Certified Applicator's certification.

AMBUSH®
INSECTICIDE

Keep Out of Reach of Children

WARNING

See Side Panel For Additional Precautionary Statements and Statement of Practical Treatment

EPA Est. No. 6805-AR-1
EPA Reg. No. 10182-16

Net Contents:
ONE U.S. GALLON
(3.79 LITERS)
Batch No.

ICI Americas Inc.

U.S. Patent No. 4,024,163

ACTIVE INGREDIENT:

Permethrin*	
(3-Phenoxyphenyl)methyl (±) cis,trans-3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate*	25.6%
INERT INGREDIENTS	74.4%
TOTAL	100.0%

*Cis/trans ratio: Min. 35% (±) cis and max. 65% (±) trans.
AMBUSH contains 2 pounds active ingredient per gallon

SPECIMEN

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Apply AMBUSH® as indicated in the Supplemental Pamphlet. For all use directions refer to the Supplemental Pamphlet.

RATE CONVERSION CHART

Pounds Active/ Acre	Fluid Ounces/ Acre	Pints/ Acre	Acres Treated/ Gallon
0.05	3.2	0.2	40.0
0.10	6.4	0.4	20.0
0.125	8.0	0.5	16.0
0.15	9.6	0.6	13.3
0.175	11.2	0.7	11.4
0.20	12.8	0.8	10.0

NOTICE TO BUYER AND USER: Seller warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in accordance with directions under normal conditions of use. This warranty does not extend to the use of the product contrary to label instructions, or under abnormal use conditions, or under conditions not reasonably foreseeable to Seller and Buyer and User assumes the risk of any such use. SELLER DISCLAIMS ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF FITNESS OR MERCHANTABILITY. SELLER SHALL NOT BE LIABLE FOR CONSEQUENTIAL, SPECIAL OR INDIRECT DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT AND SELLER'S SOLE LIABILITY AND BUYER'S AND USER'S EXCLUSIVE REMEDY SHALL BE LIMITED TO THE REFUND OF THE PURCHASE PRICE.

Crop	Target Pest(s)	Dosage (lb ai/A)	Comments
Leafy Vegetables (Kale, turnips and mustard greens, collards)	Cabbage Looper Imported Cabbageworm Diamondback Moth Cabbage Aphid	0.05-0.1	Apply by ground equipment using sufficient wate to obtain uniform coverage. Apply as needed, d not exceed 9 applications. Can be applied up t the day of harvest. Do not graze treated areas or feed crop refuse to livestock.

LABEL-A-82/AMB