0289-C

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUL 22 1985

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: EPA Registration No. 279-3014. Permethrin on Field Corn. Accession No. (not reported). RCB No. 1089.

FROM: Sami Malak, Ph.D., Chemist
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Residue Chemistry Branch
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TO: Timothy A. Gardner, (PM-17)
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THRU: Karl H. Arne, Ph.D., Acting Section Head
Tolerance Petition Section III
Residue Chemistry Branch
Hazard Evaluation Division (TS-769)

FMC Corporation is requesting amended registration of permethrin (Pounce 3.2 EC, Reg. No. 279-3014) to allow extending use on field corn until the "initiation of brown silk."

Pounce 3.2 EC is an emulsifiable concentrate formulation containing 3.2 lbs act permethrin/gallon.

Permanent tolerances are currently established (a) for residues of the insecticide permethrin [(3-phenoxyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate)] in/on cottonseed at 0.5 ppm; (b) for residues of the insecticide permethrin [(3-phenoxyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate)] and its metabolites 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylic acid (DCVA) and (3-phenoxyphenyl)methanol (3-PBA) calculated as parent in/on several raw agricultural commodities at levels of 0.05 to 60 ppm including 0.05 ppm in or on corn grain (field and popcorn) and sweet corn (K + CWHR); and corn forage and fodder at 60 ppm, each; and (c) for residues of permethrin and its metabolites 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylic acid (DCVA) and (3-phenoxyphenyl)methanol (3-PBA) and 3-phenoxybenzoic acid all calculated as parent, in/on several animal commodities

as follows: 2.0 ppm for the fat, 0.15 ppm for the meat and 1.0 ppm for the meat byproducts of cattle, goats, hogs, horses and sheep; 0.05 ppm for the fat, meat and meat byproducts of poultry; 0.05 ppm for eggs; and 3.75 ppm for milk fat, representing 0.15 ppm in whole milk (40 CFR 180.378).

Registered Use:

For insect control in field corn, the federally registered use of permethrin (Pounce 3.2 EC) allows: (a) preemergent application of Pounce 3.2 EC alone or in a tank mix with the herbicide Paraquat CL, from five days prior to planting up to crop emergence, at 0.1 to 0.2 lb act/A using ground equipment in a minimum of 20 gallons of finished spray; and (b) foliar application, prior to ear formation, at 0.1 to 0.2 lb act/A using aerial or ground equipment in a minimum of 1 gallon of finished spray by air and 10 gallons by ground equipment; or by injection into overhead sprinkler irrigation water (Reg. No. 279-3014).

The Proposed Use:

For insect control in field corn, the proposed use of permethrin (Pounce 3.2 EC) allows: (a) preemergent application of Pounce 3.2 EC alone or in a tank mix with any of 11 herbicides (all registered for use on field corn), from five days prior to planting up to crop emergence, at 0.1 to 0.2 lb act/A of Pounce 3.2 EC using ground equipment in a minimum of 20 gallons of finished spray; and (b) foliar application, prior to ear formation which occurs when pollination is completed as evidenced by initiation of brown silk, at 0.1 to 0.2 lb act/A using aerial or ground equipment in a minimum of 1 gallon of finished spray by air and 10 gallons by ground equipment; or by injection into overhead sprinkler irrigation water (Reg. No. 279-3014).

Dr. D. J. Sammons of the University of Maryland (Telecommunication, July 5, 1985), defines the brown silk stage as the stage following completion of pollination which (pollination) normally lasts for about two weeks from the time the silk emerges from developed ears. The term prior to ear formation is a vague term which may mean prior to ear development which occurs as early as 40 to 45 days after planting. For a typical field corn variety under typical cultural conditions, the time span from planting to harvest is 120 days and that from the brown silk stage to harvest is about 45 to 50 days. Since the two stages of crop growth, ear formation and brown silk, described under foliar application above, do not occur simultaneously, we recommend that the applicant revise Section B by deleting the term prior to ear formation and instead use the term "prior to the brown silk stage."

Nature of Residues:

The metabolism of permethrin in plants and animals has been reviewed several times. Detailed information is to be found in PP#7G1891, dated March 10, 1977; PP#8G2029 dated December 27, 1978; PP#8F2034 dated March 14, 1978, by A. Rathman; and PP#0F2389 dated April 10, 1981, by J. H. Onley .

Data indicate that permethrin degrades slowly in plants, apparently via the hydrolysis at the ester site with conjugation of the resulting alcohol and acid to plant constituents. The significant components of plant residues are the parent compound, permethrin [(3-phenoxyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate)] and its metabolites 3-(2,2-dichloroethenyl-2,2-dimethylcyclopropanecarboxylic acid (DCVA) and (3-phenoxyphenyl) methanol (3-PBA). The significant components of animal residues are the same as those listed for plants plus 3-phenoxybenzoic acid as reflected in the expression of the established tolerances (40 CFR 180.378).

Analytical Methodology:

The analytical methods for residue determination of permethrin and its metabolites cis- and trans-dichlorovinyl acid (DCVA) and m-phenoxybenzyl alcohol (MPBA) in/on corn grain are included in this submission. The methods are essentially the same as those listed in PAM II as method I for permethrin determination in/on cottonseed and soybeans; and method III and IIIA for residue determination of permethrin metabolites in/on soybean and soybean fractions.

Briefly, the method for permethrin involves hexane:2-propanol blend, aqueous dilution, hexane partition, gel permeation (GPC) cleanup, Florisil cleanup, and analysis by gas-liquid chromatography using a packed column and an electron capture detector (ECD).

The method for DCVA involves water blend, pH 8.3 adjustment, hexane partition, acid hydrolysis, reverse-phase cleanup, pentafluorobenzyl bromide derivatization, Florisil cleanup, and quantitation using gas liquid chromatography equipped with a capillary column and a mass selective detector.

The method for MPBA involves methanol:water blend, pH 8.3 adjustment, hexane partition, acid hydrolysis, reverse-phase cleanup, Florisil cleanup, heptafluorobutyric anhydride derivatization, Florisil cleanup, and quantitation using gas liquid chromatography equipped with a capillary column and a mass selective detector.

Method sensitivity for permethrin and its metabolites, DCVA and MPBA was reported at 0.05 ppm; and method detectability was reported at 0.01 ppm.

Samples of corn grain fortified at levels from 0.05 to 0.1 ppm had average recoveries of 75 and 71 percent for cis- and trans-permethrin, respectively; 97 and 94 percent for cis- and trans-DCVA, respectively; and 82 percent for MPBA.

Sample chromatograms are included.

Residue Data:

Data submitted reflect 4 field trials from Illinois, New Jersey, Colorado, and Nebraska in which permethrin (Pounce 3.2 EC) was applied once to field corn at the brown silk stage using exaggerated rate of 2 lbs act/A (10x). Field corn was planted during May-June 1984; applications were made during August 1984; and sampling of corn grain was made at normal harvest time during October-November 1984; i.e., at 63, 70, and 87 days PHI's. Sample analyses were effected during January-February 1985; i.e., after the samples were kept in storage for a maximum of 110 days.

The results of duplicate sample analyses from each plot showed no detectable residues (< 0.01 ppm) of cis, trans-permethrin; cis, trans-DCVA; or MPBA.

Although harvesting was delayed for a period of one month and the PHI's do not conform to a typical norm of 45 days, it is RCB's assessment since the dosage applied was 10x, that the current tolerance of 0.05 ppm for residues of permethrin in/on field corn grain will not be exceeded as a result of the proposed use.

No data were submitted for field corn forage and fodder reflecting the proposed use. Data submitted in connection with PP#2F2624 (J. Onley, March 31, 1982), in which field corn received 1 to 7 applications of permethrin up to "prior to ear formation," using 0.1 to 0.2 lb act/A/application, showed maximum total permethrin residues of 10.8 ppm in the forage reflecting 16-day PHI, and that in the fodder at a maximum of 1.74 ppm reflecting 30-day PHI.

In a previous memo, we concluded that permethrin residues are not expected to concentrate in corn oil or soapstock reflecting "preemergent" and "prior to ear formation" treatments at a maximum of 0.2 lb act/A/application (PP#1F2476, J. Onley, April 23, 1984).

From the available data we conclude that the present tolerances of 0.05 and 60 ppm for residues of permethrin in/on field corn grain and field corn forage/fodder, respectively, will not be exceeded as a result of the proposed used.

Meat, Milk, Poultry, and Eggs:

The feed items involved are corn grain, corn forage, corn fodder, and corn silage. Since RCB concluded, under Residue Data above, that the current tolerances for residues of permethrin in/on the aforementioned feed items will not be exceeded, therefore, it is our judgment that the current tolerances for residues of permethrin in/on livestock commodities will not be exceeded.

Conclusions:

1. The metabolism of permethrin in plants and animals is adequately understood. The residues of concern in plants are the parent compound, permethrin [(3-phenoxyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate)] and its metabolites 3-(2,2-dichloroethenyl)-2,2-dimethyl-cyclopropanecarboxylic acid (DCVA) and (3-phenoxyphenyl) methanol (3-PBA). The significant components of animal residues are the same as those listed for plants plus 3-phenoxybenzoic acid as reflected in the expression of the established tolerances (40 CFR 180.378).

2. Adequate analytical methods are available for enforcement.

3. a. From the available data we conclude that the present tolerance of 0.05 ppm for residues of permethrin in/on field corn grain will not be exceeded as a result of the proposed use.

   b. From the available data we conclude that the present tolerance of 60 ppm for residues of permethrin in/on field corn forage and fodder will not be exceeded as a result of the proposed use.

4. The current tolerances for residues of permethrin in/on livestock commodities will not be exceeded as a result of the proposed use.

Recommendations:

RCB has no objections to the proposed amended registration of permethrin on field corn.

Note to PM

The applicant is advised to revise Section B by deleting the term "prior to ear formation" and to instead use the term "prior to the brown silk stage" since both stages do not occur simultaneously as defined in the proposed use. This change would make the directions for use more precise with respect to timing of applications.

cc: R.F., Circu, Reviewer, Permethrin (Pounce 3.2 EC) S.F., Amended Use File (Permethrin or Pounce 3.2 EC), PMSD/ISB/ Director's Office (Melone). (KHA):Date:7/16/85:RDSchmitt: Date:7/17/85 TS-769:Reviewer initials (S.M.) Typist initials (dkd) KENDRICK CONTRACT TYPING: DATE: 7/17/85 PHONE NUMBER 898-1270