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

Nov 29 1989

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OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: PP#9F3758 & Reg. Nos. 100-617 & 100-702. Propiconazole (Tilt) in or on Wild Rice and Stone Fruit. Evaluation of Residue Data and Analytical Methods. MRID #'s 410638-00 to 410638-03, DEB #'s 5226 to 5228.

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Health Effects Division (HED)/H7509C

TO: Susan Torregroas Lewis, PM #21
Fungicide-Herbicide Branch
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and

Toxicology Branch
Insecticides, Rodenticides Support
Health Effects Division (H7509C)

THRU: P. V. Errico, Section Head
Tolerance Petition Section III
Dietary Exposure Branch
Health Effect Division (H7509C)

Ciba-Geigy Corporation, Agricultural Division, proposes to amend 40CFR§180.434 by establishing a regulation to permit the residues of the fungicide, propiconazole (Tilt), 1-[[2-(2,4-dichlorophenyl)-4-propyl-1,3-dioxolan-2-yl]methyl]-1H-1.2,4-triazole and its metabolites determined as 2,4-dichlorobenzoic acid and expressed as parent compound equivalents in or on wild rice for use in Minnesota at 0.5 ppm and a crop group tolerance of 1.0 ppm in or on stone fruit.

Tolerances are currently established under 40CFR§180.434 for residues of the fungicide, propiconazole (Tilt), 1-[[2-(2,4-dichlorophenyl)-4-propyl-1,3-dioxolan-2-yl]methyl]-1H-1,2,4-

1/10

triazole and its metabolites determined as 2,4-dichlorobenzoic acid and expressed as parent compound equivalents in or on several raw agricultural commodities at 0.05 to 3.00 ppm, including 0.1 ppm for rice grain, 3 ppm for rice straw, 0.1 ppm for the meat, fat, and meat byproducts (except liver and kidney) of cattle, goats, hogs, horses, poultry, and sheep, 0.2 ppm for the liver and kidney of cattle, goats, hogs, horses, poultry, and sheep, 0.1 ppm for eggs, and 0.05 ppm for milk.

A Registration Standard for propiconazole has not been issued.

Conclusions

1(a). The nature of residues in plants is adequately delineated. The residues of concern are the parent fungicide, propiconazole (Tilt), 1-[[2-(2,4-dichlorophenyl)-4-propyl-1,3-dioxolan-2-yl]methyl]-1H-1,2,4-triazole and its metabolites determined as 2,4-dichlorobenzoic acid and expressed as parent compound equivalents.

1(b). DEB has not reached a conclusion as to the nature of propiconazole residues in animals. Additional metabolism study in lactating cow using phenyl labelled ^{14}C-propiconazole, has been requested in connection with PP#'s 8F3654 and 8F3674. Since no feed items are involved in this petition, we are not concerned with secondary residues in animal commodities.

2(a). We conclude that adequate analytical methods are available for enforcement of the proposed tolerance of 0.5 ppm for residues of propiconazole in/on wild rice grown in Minnesota. Method AG-454A, which was submitted to the FDA for publication in PAM II, is the acceptable enforcement method.

2(b). A multiresidue detection test method has been previously reviewed and accepted.

3. The storage stability studies propiconazole in wild rice and stone fruit are adequate. Propiconazole is stable in frozen wild rice grain and stone fruit for a period of up to 25 months.

4. A revised Section B is needed restricting the use of water drained from treated fields to irrigate other crops. Alternatively, residue data must be submitted from crops irrigated with drained water from Tilt-treated wild rice fields.

5(a). Residue data representing aerial applications are needed from Minnesota since, due to the cultural practices of

2

wild rice, use is expected to be solely with aerial equipment.

5(b). For national use of Tilt on wild rice, field residue data must be submitted from California, preferably ground and aerial resiude data. Alternatively, the petitioner can submit a revised Section F proposing amending 40CFR§180.434 to include "Tolerance with regional registration", in a separate subsection, for Wild rice restricting use to Minnesota only.

6(a). With a regional registration restricted to Minnesota only, a final conclusion on the appropriateness of the proposed 0.5 ppm tolerance for residues of propiconazole in/on wild rice awaits submitting the requested additional residue data from Minnesota in which aerial equipment is used [see Conclusion 5(a)].

6(b). For a crop group tolerance in/on stone fruit in accordance with 40CFRS180.34(f)(9)(xii), additional residue data are needed on sour or sweet cherry.

Alternatively, we can conclude that the available residue data are adequate to support the proposed 1.0 ppm tolerance for apricots, nectarines, peaches, plums, and prunes. A revised Section F is needed proposing 1.0 ppm tolerance for residues of propiconazole in/on apricots, nectarines, peaches, plums, and prunes.

7. No feed items are involved in this petition. Therefore, we have no concern for secondary residues in meat, milk, poultry, and eggs for the proposed use.

8. An International Residue Limit Sheet is appended to this review (Attachment 1). There are no Mexican or Canadian tolerances/limits currently established for residues of propiconazole in wild rice or stone fruit. A codex limit of 1 ppm is currently established for residues of propiconazole, per se in/on stone fruit. No Codex tolerances are currently established for residues of propiconazole in wild rice. The methodology used to establish the Codex residue limit determines propiconazole, per se, whereas the US enforcement method determines parent and metabolites as 2,4-dichlorobenzoic acid and expressed as parent. No US data is available to assess the indicator compound approach.

Recommendations

A favorable recommendation for the proposed tolerances in this petition awaits resolution, by the petitioner, of Conclusions 4, 5(a), 5(b), and 6(b).

Detailed Considerations

Manufacturing Process

The manufacturing processes of propiconazole has been adequately discussed in connection with PP#1G2530 (J. Worthington, 1/7/82) and PP#4F3007 (A Smith, 5/15/84). DEB has previously concluded that no residue problems are expected from the impurities.

Formulations

The formulation proposed for use on wild rice is Tilt 3.6E containing 41.8% propiconazole, equals to 3.6 lbs act/gallon, and 58.2% inerts (Reg. No. 100-617). Tilt is formulated from a technical grade active ingredient containing 88% propiconazole. The formulation proposed for use on stone fruit is Orbit 3.6E, currently registered for use on pecans (Reg. No. 100-702). Orbit 3.6 is identical to Tilt 3.6E except for the differences in the trade name. Clearance of the inerts in pesticide formulations is the purview of the Registration Division.

Proposed Use

Wild Rice - Minnesota Only: For disease control of wild rice in Minnesota, the proposed use would allow one or two ground or aerial applications of Tilt 3.6E using 6 fl oz/A/application (75 g ai/A or 0.168 lb ai/A), once at booting and again at heading, or 8 fl oz/A/application (100 g ai/A or 0.225 lb ai/A), at booting only.

Rice residue data was also submitted in this petition. The currently registered use of propiconazole on rice would allow two aerial applications of Tilt 3.6E at the same rate as that proposed in this petition on wild rice (6 fl oz/A/application, equals to 75 gm ai/A). However, applications are not permitted after the boot split and head emergence.

A revised Section B is needed restricting the use of water drained from treated fields to irrigate other crops. Alternatively, residue data must be submitted from crops irrigated with drained water from Tilt-treated wild rice fields.

Stone Fruit - East of the Rocky Mountains (apricots, peaches, nectarine, and Japanese plums): (a) For control of brown rot blossom blight of stone fruit, the proposed use would allow up to 3 applications of Orbit 3.6E using 4 fl oz/A/application (50 g ai/A or 0.11 lb ai/A), in a minimum of 5-10 gallons of water by air or in sufficient water for thorough and uniform coverage of the fruit by ground equipment. The first

application can be made at early bloom, and a second at 50-75% bloom, and a third at petal fall. (b) For control of fruit brown rot of stone fruit, Orbit 3.6 can be applied as needed using 4 fl oz/ A/application (50 g ai/A or 0.11 lb ai/A), beginning 3 weeks before harvest to the day of harvest.

The proposed use prohibits application of Orbit 3.6E to cherries and prunes grown East of the Rocky Mountains.

- West of the Rocky Mountains (apricots, peaches, nectarine, and plums): (a) For control of brown rot blossom blight of stone fruit, the proposed use would allow two applications of Orbit 3.6E using 4 fl oz/A/application (50 g ai/A or 0.11 lb ai/A), in a minimum of 5-10 gallons of water by air or in sufficient water for thorough and uniform coverage of the fruit by ground equipment. The first application can be made at 5-10% bloom and a second at 80-100% bloom. (b) For control of fruit brown rot of stone fruit, Orbit 3.6E can be applied twice at 4 fl oz/A/application (50 g ai/A or 0.11 lb ai/A), beginning 3 weeks before harvest to the day of harvest. (c) For control of brown rot blossom blight of prunes, the proposed use would allow up to 3 applications of Orbit 3.6E using 4 fl oz/A/application (50 g ai/A or 0.11 lb ai/A), in a minimum of 5-10 gallons of water by air or in sufficient water for thorough and uniform coverage of the fruit by ground equipment. The first application can be made at early bloom, and a second at 50-75% bloom, and a third at petal fall. The proposed label prohibits application of Orbit 3.6E to cherries grown west of the Rocky Mountains.

Nature of Residues

Plants - No new plant metabolism studies were submitted with this petition.

The nature of residues of propiconazole in wheat, peanuts, and grapes has been adequately discussed in connection with PP#4F3007 (A. Smith, 5/15/84). Several metabolites were reported as resulting from beta-oxidation of n-propyl side chain, reductive deketalization of dioxolane ring and cleavage of the alkyl bridge between the phenyl and triazole ring systems. The metabolic pathway of propiconazole in plants is appended to this review in Figure 1.

The nature of residues in plants is adequately delineated. The residues of concern are the parent fungicide, propiconazole (Tilt), 1-[[2-(2,4-dichlorophenyl)-4-propyl-1,3-dioxolan-2-yl]methyl]-1H-1,2,4-triazole and its metabolites determined as 2,4-dichlorobenzoic acid and expressed as parent compound equivalents.

Animals - No new animal metabolism studies were submitted with

this petition.

The metabolism of propiconazole in the goat and rat has been adequately discussed in connection with PP#4F3007 (A. Smith, 5/15/84). The major metabolites, analogous to the plant metabolism, arise from oxidation of the alkyl side chain, dioxolane ring opening, and cleavage of the alkyl bridge between the phenyl and triazole ring systems.

The metabolic pathway of propiconazole in animals is appended to this review in Figure 2.

DEB has not reached a conclusion as to the nature of propiconazole residues in animals. Additional metabolism study in lactating cow using phenyl labelled ^{14}C-propiconazole, has been requested in connection with PP#'s 8F3654 and 8F3674. Since no feed items are involved in this petition, we are not concerned with secondary residues in animal commodities.

Analytical Method

Residues of propiconazole and metabolites containing the 2,4-dichlorobenzyl moiety were determined by analytical method AG-415 or AG-454A. Method AG-454A, which was submitted for publication in PAM II (S. Malak to Alice Marcotte of FDA, 5/28/87) is the accepted enforcement method. Method AG-415 is an earlier version of Method AG-454A but differs, primarily, from the enforcement method in the oxidation step which converts the parent fungicide and its metabolites containing the 2,4-dichlorobenzyl moiety to 2,4-dichlorobenzoic acid. While a 16-hour reflux with 12N nitric acid is used in method AG-415, the accepted enforcement method utilizes a 1-hour refluxing period with basic potassium permangenate in sodium hydroxide. The change to AG-454A was prompted by the EPA request for a faster enforcement method. The limit of detection of either method is 0.05 ppm.

Representative chromatograms have been provided for the standards, untreated controls, fortified, and treated samples. Method validation was conducted by fortifying wild rice and regular rice samples at 0.1 to 1.0 ppm. Recoveries ranged from 69 to 114%, averaging 92%. At the 0.05 to 0.5 ppm fortification level to various commodities of stone fruit, recoveries ranged from 51 to 142%, averaging 95%.

All control samples of wild rice and stone fruit had no detectable residues (<0.05 ppm).

We conclude that adequate analytical methods are available for enforcement of the proposed tolerance of 0.5 ppm for residues of propiconazole in/on wild rice grown in Minnesota. Method

6

AG-454A, which was submitted to the FDA for publication in PAM II, is the acceptable enforcement method.

A multiresidue detection test method has been previously reviewed and accepted (PP#'s 4F3074, 4F3007, and 4E3026, S. Malak, 4/28/87).

Storage Stability

In this petition, a storage stability study is reported for propiconazole in wild rice and stone fruit. In the study, treated samples were stored in a freezer for periods of up to 31 months for stone fruit and up to 51 months for wild rice. In either case however, storage stability data are not available beyond 25 months. The data show that degradation of residues in wild rice determined as 2,4-dichlorobenzoic acid is unlikely.

The storage stability studies propiconazole in wild rice and stone fruit are adequate. Propiconazole is stable in frozen wild rice grain and stone fruit for a period of up to 25 months.

Residue Data

Wild rice - Data submitted reflect 5 field trials from Minnesota in which Tilt 3.6 was applied by ground equipment. For comparison between the residues resulting from aerial and ground applications, an additional 5 trials were conducted in Texas in which Tilt 3.6 was applied to regular rice using side-by-side, aerial vs. ground applications. Rice grain samples were taken at normal harvest time, 20-58 days following the last application for wild rice and 38-62 days for regular rice. Samples were frozen (-20°C) until analyzed within 15 months from sampling.

The following are the test results:

Rate/application g ai/A	Maximum Propiconazole Residues in ppm			
	1 application		2 applications	
Wild rice	ground	aerial	ground	aerial
75 (1X)	ND[1/]	----	0.14	----
100 (1.3X)	0.25	----	0.79	----
200 (2.67X)	0.09	----	1.3	----
Rice				
75	----	----	0.17[2/]	0.15[2/]
100	----	----	----	0.63
200	0.22	ND	----	----

7

1/ ND = non-detectable (<0.05 ppm)

2/ We note that because Tilt was applied to rice after the boot stage (use is allowed before the boot stage), residue values in the grain are higher than the established 0.1 ppm for rice grain.

The 1987 Minnesota Agriculture Statistics and University of California Cooperative Extension Service lists Minnesota and California as two major wild rice growing states producing about equal amounts.

The comparability data between aerial versus ground applications are insufficient to allow a conclusion as to the magnitude of residues in wild rice treated using aerial equipment.

No residue data were submitted from Minnesota in which aerial equipment were used on wild rice. These data are needed since, due to the cultural practices of wild rice, use is expected to be solely with aerial equipment. According to E. A. Oelke, et al (1982) "Wild Rice Production in Minnesota, University of Minnesota, Agricultural Extension Service, Extension Bulletin 464, 38 pp"; wild rice fileds should be flooded with 6-14 inches from germination to 3-4 weeks before harvest. Therefore, ground applications seems to be impractical.

Due to the differences in climate conditions and cultural practices (yields are twice as high in California), field residue data are also needed from California, preferably ground and aerial resiude data. Alternatively, the petitioner can submit a revised Section F proposing amending 40CFR§180.434 to include "Tolerance with regional registration", in a separate subsection, for Wild rice restricting use to Minnesota only.

With a regional registration restricted to Minnesota only, a final conclusion on the appropriateness of the proposed 0.5 ppm tolerance for residues of propiconazole in/on wild rice awaits submitting the requested additional residue data from Minnesota in which aerial equipment is used.

No residue data on the possible byproducts of wild rice, hulls, glumes and debris, as well as straw were submitted. A teleconference with Dr. Jim Percich, a wild rice specialist with the University of Minnesota, indicated that wild rice straw is turned under in the soil, and because of the high silicone content of the hulls and glumes, they are not palatable for animal consumption. These two commodities along with wild rice debris are burned [(612)625-6240]. Accordingly, no additional data on these commodities are needed.

Stone fruit

Data submitted reflect 21 field trials from the major stone fruit growing areas of the US (CA, GA, MI, PA, NY, VA, and WA). In these tests, Orbit 3.6E was applied 3-5 times by air or ground using 50 or 100 g ai/A/application (1 or 2X, respectively). Fresh samples of apricots, nectarines, peaches, and plums were taken at various harvest intervals of 0, 3, and 7 days after the last application. Fresh and dried prunes were taken at normal harvest, 120 days after last application. All samples were then frozen (-20°C) for 6 to 31 months until analyzed. Test results show that residue values ranged from non-detectable (<0.05 ppm) to a maximum level as indicated below:

Fruit	Maximum Residues in ppm at PHI's					
	1X			2X		
	0-day	3-day	7-day	0-day	3-day	7-day
Apricots	0.49	0.83	0.4	0.56	0.38	0.31
Nectarines	0.54	0.67	0.62	0.32	0.12	0.11
Peaches	0.78	0.97	0.69	0.4	0.21	0.71
Plums	0.58	0.36	0.19	ND[1/]	ND	ND

	120-day		120-day	
	fresh	dried	fresh	dried
Prunes	ND	0.07	0.27	ND

1/ ND = non-detectable (<0.05 ppm).

Data summary above show maximum propiconazole residues of 0.78 ppm in/on stone fruit reflecting the proposed use.

No residue data were submitted on cherries. For a crop group tolerance in/on stone fruit in accordance with 40CFRS180. 34(f)(9)(xii), additional residue data are needed on sour or sweet cherry.

Alternatively, we can conclude that the available residue data are adequate to support the proposed 1.0 ppm tolerances for apricots, nectarines, peaches, plums, and prunes. A revised Section F is needed proposing 1.0 ppm tolerance for residues of propiconazole in/on apricots, nectarines, peaches, plums, and prunes.

Meat, Milk, Poultry, and Eggs

No feed items are involved in this petition. Therefore, we have no concern for secondary residues in meat, milk, poultry, and eggs for the proposed use.

Other Considerations

An International Residue Limit Sheet is appended to this review (Attachment 1). There are no Mexican or Canadian tolerances/limits currently established for residues of propiconazole in wild rice or stone fruit. A codex limit of 1 ppm is currently established for residues of propiconazole, per se in/on stone fruit. No Codex tolerances are currently established for residues of propiconazole in wild rice. The methodology used to establish the Codex residue limit determines propiconazole, per se, whereas the US enforcement method determines parent and metabolites as 2,4-dichlorobenzoic acid and expressed as parent. No US data is available to assess the indicator compound approach.

Attachment 1: Codex Sheet (one page).

cc: S. Malak, **PP#9F3758 & Reg. Nos. 100-617 & 100-702 (for propiconazole or Tilt).** RS File, propiconazole SF, E. Eldredge (ISB/PMSD), RF, and Circulation.

RDI: P. V. Errico: 11/27/89: Richard D. Schmitt: 11/28/89.
H7509C:DEB/HED:CM#2:RM814A:S.Malak:X557-4379:s.m.:11/1/89.

10