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OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: PP# 3G2801. Iprodione on lettuce. Evaluation of analytical methods and residue data.

TO: Henry Jacoby, PM-21
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Rhone-Poulenc, Inc. proposes a temporary tolerance for combined residues of the fungicide iprodione [3-(3,5-dichlorophenyl)-N-(1-methylethyl)-2,4-dioxo-1-imidazolidinecarboxamide], its isomer [3-(1-methylethyl)-N-(3,5-dichlorophenyl)-2,4-dioxo-1-imidazolidinecarboxamide], and its metabolite [3-(3,5-dichlorophenyl)-2,4-dioxo-1-imidazolidinecarboxamide] in or on lettuce at 7.0 ppm.

Tolerances have been established on kiwifruit at 10 ppm and on cherries (sweet and sour), peaches, and nectarines at 20 ppm. Temporary tolerances on apricots and plums (fresh prunes) at 20 ppm and on almonds at 0.05 ppm have been established. Proposed tolerances of 10 ppm on apricots, plums, and prunes are in reject status and an additional petition on those crops is under review. A petition (PP# 3F2840) for a permanent tolerance on lettuce at 7 ppm is awaiting review. Tolerances of 0.8 ppm on meat, fat, and

meat by-products of cattle, goats, hogs, horses, and sheep and 0.15 ppm on milk are pending.

Under the proposed EUP, a total of 76,000 lbs. Rovral (38,000 lb. a.i.) will be shipped for use on a total of 10,000 acres in the states of Arizona, California, Florida, New York, and Wisconsin from April 1983-December 1984.

Conclusions

1a. The metabolism of iprodione in plants is adequately understood. The residues of concern are parent, its isomer (RP30228), and the des-isopropyl metabolite (RP32490).

1b. The metabolism of iprodione in animals has been adequately defined for purposes of this proposed temporary tolerance. Metabolism in animals involves hydrolysis, oxidation, and N-dealkylation reactions. Major extractable residues in animal tissues are the des-isopropyl metabolite RP32490 and parent. Major residues in milk are the hydroxylated metabolite RP36114, RP32490, and parent.

2. Adequate analytical methods are available for enforcement of the proposed temporary tolerance.

3. Residues in lettuce resulting from the proposed use will not exceed the proposed temporary tolerance of 7 ppm.

4. The proposed use falls in Section 3 of 40 CFR 180.6(a) with respect to residues in meat, milk, poultry and eggs since no feed item is involved.

Recommendation

TOX considerations permitting, we recommend that the proposed temporary tolerance be established.

Since a petition for a permanent tolerance for iprodione residues in or on lettuce has already been filed (PP# 3F2840), we will not list any additional requirements for a permanent tolerance.

Manufacturer

The manufacturing process process was reviewed in PP# 8G2087 (A. Rathman, 3/2/79), to which we refer. Technical iprodione is 95% pure with none of the impurities comprising more [REDACTED] the material. None of these impurities is expected to present a residue problem.

SECRET INGREDIENT INFORMATION IS NOT INCLUDED
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Formulation

Rovral is a wettable powder formulation containing 53.16% technical iprodione, [REDACTED]. All inerts are cleared under Section 180.1001(c).

Proposed Use

Apply 1.5-2.0 lb. Rovral/A (0.75-1.0 lb. a.i./A) as a foliar spray in sufficient water to obtain thorough coverage (50-100 gals./A). Apply at the 3 leaf stage in Arizona and California. In Florida, New York, and Wisconsin, apply at the 3 leaf stage, 10 days later, and again 10 days later if conditions are favorable for disease development. The preharvest interval is 14 days.

Nature of the Residue

Plants

A greenhouse study on metabolism of ¹⁴C-iprodione in lettuce is submitted. Previous reviews on the metabolism of iprodione in strawberries and wheat (pp# 8G2087, A. Rathman, 3/2/79) and in peaches (PP# 2F2596, R. Perfetti, 5/13/82) are also available.

A foliar spray of ¹⁴C-benzene ring labeled iprodione was applied to lettuce under glass six weeks after sowing. Thirty-eight days after treatment, 97.4% of the recovered radioactivity was in the aerial parts and 2.6% of the recovered radioactivity was in the roots. Residues 38 days after treatment were determined by thin-layer chromatography. Extracted residues in leaves were 81% iprodione and 9.5% RP30228. Small quantities of RP32490, minor unidentified products, and traces of RP35606 in leaves accounted for a sum of 5.5% of the extracted radioactivity. Unextractable residues accounted for 4.5% of the radioactivity in the leaves. In the roots, extractable residues were more than 94% iprodione and 2-3% RP30228.

Residues in strawberries, wheat, and peaches were parent, the isomer 3-(1-methylethyl)-N-(3,5-dichlorophenyl)-2,4-dioxo-1-imidazolidinecarboxamide (RP30228), and a lesser amount of a des-isopropylated metabolite (RP32490).

Studies on strawberries and wheat indicated that iprodione which is applied to soil is taken up by roots and translocated to aerial portions of the plant. After foliar treatment, most of the radioactivity remains at the site of application.

We conclude that the metabolism of iprodione in plants is adequately understood. The metabolic pathway in lettuce,

strawberries, wheat, and peaches is the same. The residues of concern are parent, its isomer (RP30228) and the des-isopropyl metabolite (RP32490).

Animals

No new animal metabolism studies are submitted with this petition. The petitioner refers to ^{14}C metabolism studies which were previously reviewed (M. Kovacs, PP# 2F2728, 10/25/82).

Metabolism of iprodione in the cow and goat involved hydrolysis, oxidation, and N-dealkylation reactions. The major extractable residues in goat liver tissue were the des-isopropyl metabolite (see chemical names below) RP32490 (19.6% of the total extractable ^{14}C residue), parent (13.4% of the total extractable ^{14}C residue), two unidentified metabolites comprising 8.9% and 5.7% of the total extractable ^{14}C , and nine other unidentified metabolites, each comprising no more than 3% of the total extractable ^{14}C . The major extractable residues in goat kidney tissue as a percentage of the extractable ^{14}C residues were RP32490 (11.8%), RP36115 (7.5%), and an unknown (22.7%). Nine other metabolites were identified, each comprising no more than 3.6% of the total extractable residue. In goat muscle, RP32490 comprised 36% of the total extractable ^{14}C residue. In goat fat, RP32490, RP26019, and RP30228 accounted for 68%, 7.6% and 3.2%, respectively, of the total extractable ^{14}C residue. Residues in cow liver were not characterized because of the bound nature of the ^{14}C residue. Residues in cow muscle and fat were not characterized because of the low levels of the ^{14}C activity. The major extractable residues in milk were RP36114, RP32490, and parent.

A summarized study of the rat indicated that the main products excreted by the rat were parent, RP32490, and RP36114.

We conclude that the metabolism of iprodione in animals has been adequately defined for purposes of the proposed temporary tolerance. Metabolism in animals involves hydrolysis, oxidation, and N-dealkylation reactions. Major extractable residues in animal tissues are the des-isopropyl metabolite RP32490 and parent. Major residues in milk are the hydroxylated metabolite RP36114, RP32490, and parent.

RP 26019	iprodione
RP 30228	isomer of iprodione: 3-(1-methylethyl)-N-(3,5-dichlorophenyl)-2,4-dioxo-1-imidazolidine-carboxamide
RP 32490	des-isopropyl metabolite
RP 36114	hydroxylated metabolite: 1-(3,5-dichloro-4-hydroxyphenyl)biuret

RP 36115 N-(3,5-dichloro-4-hydroxyphenyl)-ureido
carboxamide.

Analytical Methods

Rhone-Poulenc Analytical Method No. 151, as reviewed in 1981, was used to determine residues in lettuce. The sample is macerated with 10% water in acetone and filtered. The filtrate is evaporated. A 1% sodium sulfate solution is added to the residue before extraction with 10% ethyl acetate/methylene chloride. The ethyl acetate/methylene chloride solution is dried over sodium sulfate, evaporated, and redissolved in 3:1 ethyl acetate/toluene. The sample is cleaned up on a gel permeation column and then on a Florisil column. Two fractions are eluted from the Florisil column. One fraction contains parent and isomer RP30228. The other fraction contains the des-isopropyl metabolite RP32490. These fractions in benzene were analyzed by GLC using a ⁶³Ni electron capture detector. The limit of detection on lettuce is 0.05 ppm.

Percentage recoveries for RP26019, RP30228, and RP32490 ranged from 60.6-132.9 ppm for lettuce and lettuce wrapper leaves spiked at 0.1-10 ppm and were typically 85-100%. A confirmatory TLC procedure is available.

A GLC interference study on 11 other pesticides was submitted. No interferences were observed.

This Analytical Method No. 151 is similar to that on kiwi fruit. The method on kiwi fruit has undergone a successful method trial.

We conclude that adequate analytical methods are available for enforcement of the proposed temporary tolerance on lettuce.

Residue Data

Fourteen studies on lettuce were conducted in the states of Wisconsin (4), New York (4), California (2), Florida (2), and New Jersey (2). Rovral was applied at rates of 1 or 2 lb. a.i./A/application.

Residues of RP26019, RP30228, and RP32490 in lettuce leaves in California 33 days after 1 application at the rate of 1.0 lb. a.i./A (1X) were 5.89 ppm. Residues in California lettuce leaves 33 days after 1 application at the rate of 2.0 lb. a.i./A (2X) were 10.29 ppm. No residues were found in California lettuce heads 33 days after 1 application at the rate of 1 or 2 lb. a.i./A or 61 days after 2 applications at the rate of 1 or 2 lb. a.i./A.

Residues of RP26019, RP30228, and RP32490 in lettuce leaves in Florida after 3 applications at the rate of 1.0 lb. a.i./A were 40.91 ppm (0-day PHI), 1.60 ppm (7-day PHI), 0.53 ppm (14-day PHI), and 0.37 ppm at harvest (34-day PHI). Residues in lettuce leaves in Florida after 3 applications at the rate of 2 lb. a.i./A (2X) were 55.41 ppm (0-day PHI), 2.64 ppm (7-day PHI), and 0.59 ppm (30-day PHI). In another study in Florida, residues in lettuce leaves 29 days after 3 applications were 0.14 ppm (1X rate) and 0.27 ppm (2X rate). Residues in lettuce heads in Florida after 3 applications at 1.0 lb. a.i./A were 0.0 ppm (29-day PHI) and 0.06 ppm (34-day PHI). No residues were found in lettuce heads in Florida 29 days after 3 applications at the rate of 2 lbs. a.i./A.

Residues of RP26019, RP30228, and RP32490 in lettuce leaves in several studies in New York after 3 applications at 1.0 lb. a.i./A were 37.18 ppm (0-day PHI), 1.58 (7-day PHI), 0.52 ppm (16-day PHI), 0.66-0.83 ppm (21-day PHI), and 1.37 ppm (22-day PHI). Residues in lettuce leaves in New York after 3 applications at 2.0 lb. a.i./A were 61.76 ppm (0-day PHI), 5.76 ppm (7-day PHI), 2.1 ppm (16-day PHI), 0.21-2.6 ppm (21-day PHI), and 1.07 ppm (22-day PHI). Residues in lettuce heads in New York after 3 applications at the rate of 1.0 lb. a.i./A ranged from 0.0-0.12 ppm (16-22 day PHI's). Residues in lettuce heads in New York after 3 applications at the rate of 2.0 lb. a.i./A ranged from 0.0-0.17 ppm (16-22 day PHI's).

Residues of RP26019, RP30228, and RP32490 in lettuce leaves in several studies in Wisconsin after 2 applications at 1.0 lb. a.i./A were 0.65 ppm (9-day PHI), 0.33 ppm (13-day PHI), 0.15 ppm (15-day PHI), and 0.0 ppm (17-day PHI). Residues in lettuce leaves in Wisconsin after 2 applications at 2.0 lb. a.i./A were 1.47 ppm (9-day PHI), 0.07 ppm (13-day PHI), 0.09 ppm (15-day PHI), and 0.29 ppm (17-day PHI). No residues were found in lettuce heads in Wisconsin after 2 applications at rates of 1 or 2 lb. a.i./A and PHI's of 9-17 days.

No residues of RP26019, RP30228, and RP32490 in lettuce leaves in New Jersey after 3 applications at rates of 1 or 2 lb. a.i./A were found at a 51-day PHI. Residues in lettuce heads in New Jersey after 3 applications at the rate of 1 lb. a.i./A were 0.06 ppm (29-day PHI) and 0.05 ppm (51-day PHI). Residues in lettuce heads in New Jersey after 3 applications at 2 lb. a.i./A were 0.08 ppm (29-day PHI) and 0.09 ppm (51-day PHI).

We conclude that residues in lettuce resulting from the proposed use will not exceed the proposed temporary tolerance of 7 ppm.

Meat, Milk, Poultry and Eggs

No feed items are involved in this use. Therefore, we conclude that this use falls in Section 3 of 40 CFR 180.6(a) with respect to residues in meat, milk, poultry and eggs.

cc: R.F.
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FDA
TOX
EEB
EFB

PP# No. 3G2801

Robert E. Thompson (Res. Triangle Park)

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