4-29-82

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

APR 29 1982

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

Memorandum

Subject: PP#1F2567: Pendimethalin In Beans. Evaluation of residue data and analytical method.

From: Alfred Smith, Chemist
Residue Chemistry Branch
Hazard Evaluation Division (TS-769)

Thru: Charles L. Trichilo, Chief
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Hazard Evaluation Division (TS-769)

To: Robert J. Taylor, PM #25
Registration Division (TS-767)

and

Toxicology Branch
Hazard Evaluation Division (TS-769)

The American Cyanamid Company proposes a tolerance for residues of the herbicide pendimethalin, N-(1-ethylpropyl)-3,4-dimethyl-2,6-dinitrobenzenamine, and its metabolite 4-[(1-ethylpropyl) amino]-2-methyl-3,5-dinitrobenzyl alcohol in or on beans (dry, lima, snap) and bean foliage and straw at 0.1 ppm.

Tolerances are established for pendimethalin at levels of 0.05-0.25 ppm on field corn, cottonseed, peanuts, rice, potatoes, soybeans, and sunflower seed (§180.361).

A tolerance is pending for pendimethalin in sweet corn at 0.1 ppm (PP#2F2628).

Conclusions

1. The nature of the residue in plants and animals is adequately understood. Pendimethalin and its benzyl alcohol metabolite are the significant components of the residue.

2. Adequate analytical methods are available for enforcement purposes.

3(a) Residues of pendimethalin and its metabolite are not likely to exceed the proposed tolerance in or on beans (dry, lima, snap), bean foliage, and bean straw.

3(b) Residues of Eptam in or on beans are not likely to exceed the established tolerance of 0.1 ppm (§180.117).

4. No residues are likely to result in eggs, milk, meat, fat, and meat byproducts of livestock [§180.6(a)(3)].

Recommendation

Tox and EFB considerations permitting, we recommend for the proposed tolerance on beans (dry, lima, snap).

However, we recommend that the foliage tolerance be expressed as:

beans, forage
beans, hay

Detailed Considerations

Proposed Use

Pendimethalin is formulated as PROWL®, an emulsifiable concentrate containing 44% active ingredient (4 lb a.i./gal), for preplant application to soils to be planted to beans either alone or in tank-mix combination with the herbicide Eptam*.

Lima and Snap Beans; Dry Beans

Apply pendimethalin alone as a preplant broadcast application at rates of 0.5-1.5 lb act/A depending on the soil type. Banded applications are permitted at proportionate rates.

Dry Beans (Tank-mix of pendimethalin + Eptam). Do not use tank-mix on cowpeas (blackeye peas, blackeye beans), soybeans, lima beans, or other flat podded beans. Apply pendimethalin + Eptam as preplant application at rates of (0.5-1.5 lb + 1.88-3.38 lb)/A.

Do not feed bean hay, vines, and forage or graze livestock in tank-mix treated bean fields.

*Eptam, (S-ethyl dipropylthiocarbamate), is formulated as an emulsifiable concentrate containing 6 lbs eptam/gal. and is registered for preplant use on beans (green and dry) at 4 lb act/A and has an established tolerance of 0.1 ppm for the group seed and pod vegetables which includes beans (dry or succulent). It is not to be used on cowpeas, soybeans, lima beans, or other flat pod beans except Romano.

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MANUFACTURING PROCESS INFORMATION IS NOT INCLUDED

The formulation's inert ingredients are cleared for use under §180.1001.

The manufacturing process for technical pendimethalin is included in PP#5F1556. Tech. pendimethalin contains 91-94% pendimethalin. Tech. pendimethalin also contains [redacted] of the nitrosoamine component [redacted] The formulation will contain approximately [redacted] of the nitrosoamine component. When pendimethalin is applied to the soil at the maximum rate of 1.5 lb act/A, the nitrosoamine component will be applied to the soil at a rate of [redacted] For a 0.1 ppm level of pendimethalin residues deposited on beans and bean forage, we would expect a level of [redacted] parts per billion of the nitrosoamine component. (This estimate assumes that the dissipation rates of pendimethalin and the nitrosoamine are similar).

Nature of the Residue

We have considered the plant and animal metabolism of pendimethalin in previous reviews (cf. PP# OF2401). Pendimethalin is absorbed, metabolized, and translocated by rice, beans, potato, corn, cotton, and peanut plants. The significant components in plant residues are the parent compound and its benzyl alcohol metabolite.

Feeding studies with animals show that ingested pendimethalin is extensively metabolized and excreted by cows, goats and rats. Some deposition of residues occurs in tissues, but no tendency towards storage or concentration is noted.

The nature of the residue in plants and animals is adequately delineated.

Analytical Methods

Beans

A ground sample is extracted by blending with a methanol/chloroform solvent system and filtered. For the parent, an aliquot of the filtrate is evaporated to dryness, and the residue is taken up in hexane. The hexane extract is cleaned up on a florisil column and eluted with a mixture of benzene and hexane. The eluate is evaporated to dryness, and the residue is taken up with benzene and determined by gas chromatography using an electron capture detection system (ECGC).

For determination of the metabolite, an aliquot of the filtrate is treated with an acetic anhydride solution which forms an acetyl derivative. The acetylated residue is extracted into hexane and evaporated to dryness. The residue is cleaned up on a florisil column and determined as above.

Bean Foliage and Pods

A sample is extracted with aqueous, acidic methanol. For the parent compound, an aliquot of the filtrate is extracted with hexane which is evaporated. The residue is cleaned up on a florisil column and determined as with the beans.

For the metabolite, an aliquot of the initial extract is extracted with chloroform which is evaporated. The residues are derivatized with acetic anhydride and determined as above with ECGC.

Untreated (control) samples of beans, bean foliage, and bean pods had <0.003-0.027 ppm pendimethalin-equivalent residues. Control samples of beans, pods, and foliage were fortified with pendimethalin and its metabolite at levels of 0.05-1.0 ppm. Recoveries were 63-137%.

The methods have been successfully tested by EPA on cottonseed at levels of 0.05 ppm and 0.1 ppm (PP#5F1556).

We believe the results of the trials can be extended to include beans, bean foliage, and straw.

A confirmatory procedure for pendimethalin and its metabolite is available (PP#5F1556).

Adequate analytical methods are available for enforcement purposes.

Residue Data

Samples were obtained from crops grown in Indiana, Oregon, California, Wisconsin, New York, Tennessee, Idaho, Maryland, and North Dakota. The crops were grown in soils which had been treated as proposed and at rates of 0.5-3.0 lb act/A (2X maximum proposed rate). The beans (navy, pink, small white, lima, snap, black eyes, pintos, red mexican) had no detectable residues (<0.05 ppm) of the parent compound pendimethalin or its metabolite at all rates and intervals of 53-129 days after treatment (PH1).

Tank-mix treatments of 0.5-1.5 lb pendimethalin plus 1.3-6.0 lb Eptam per acre showed no detectable residues of pendimethalin of its metabolite (<0.05 ppm). Eptam residues in the beans ranged from none detected (<0.02 ppm) at rates of 1.3-3.0 lb act/A to 0.08 ppm at the 6.0 lb act/A rate (1.7X maximum proposed rate). These data show that neither pendimethalin nor Eptam residues are affected by the tank-mix application.

Bean foliage had no detectable residues (<0.05 ppm) of pendimethalin or its metabolite at PHI's of 35, 67, and 96 days from treatments at 1.5 lb act/A.

Bean straw had no detectable residues (<0.05 ppm) of pendimethalin or its metabolite at PHIs of 111 and 129 days from treatment rates of 0.75-1.5 lb act/A (proposed rates). At a 2X exaggerated rate, the straw had residues of 0.06 ppm and 0.09 ppm at a PHI of 129 days.

Residues of pendimethalin or its alcohol metabolite are not likely to exceed the proposed tolerance of 0.1 ppm in or on beans (dry, lima, snap), bean foliage, and bean straw. The tolerance for beans actually represent the residue method's sensitivities for pendimethalin and its metabolite. Real residues, if any, would be much less than 0.05 ppm.

Residues of Eptam in or on beans are not likely to exceed the established tolerance of 0.1 ppm (§180.117).

Meat, Milk, and Eggs

Livestock feeding studies were submitted in PP#5F1556. Lactating cows and lactating goats were fed pendimethalin daily at dietary levels of 0.5, 1.5, and 20 ppm for periods of 10-21 days. No residues were noted in the milk of cows or goats due to feeding levels of 0.5-1.5 ppm.

Tissue analyses were performed only on the goats. Low levels of total radioactivity were noted. The liver had activity equivalent to 0.03 ppm, 0.04 ppm, and 0.25 ppm corresponding to the 0.5, 1.5, and 20 ppm feeding levels. The kidney had respective residue levels of 0.01, 0.04 and 0.09 ppm. The fat had residue levels of 0.01 ppm, 0.01 ppm, and 0.03 pm from respective feeding levels of 0.5, 1.5, and 20 ppm. All other tissues had no detectable radioactivity (<0.01 ppm, method detection limit) from all feeding levels. Characterization of the urine and feces showed pendimethalin to be extensively metabolized and rapidly excreted. It is therefore probable that pendimethalin and its metabolite represent only a small portion of the total radioactivity noted in some tissues.

Beans, bean vines and straw can be used as livestock feed items. Considering the percentages of the various feed items in the diets of livestock and the proposed tolerance level (0.1 ppm), estimates of the maximum levels of residues likely to be ingested are as follows: cattle (0.037 ppm); poultry (0.015 ppm); hogs (0.025 ppm); horses, goats and sheep (0.020 ppm).

However, these estimates are exaggerated since real residues are likely to be considerably less than the proposed 0.1 ppm. As a result, no residues of pendimethalin or its metabolite are likely to result in eggs, milk, meat, fat, and meat byproducts of livestock [§180.6(a)(3)].

TS-769:RCB:ASmith:vg:CM#2:Rm810:4/28/82
cc: RF, Circ. Smith, Thompson, FDA, TOX, EEB, EFB, PP#1F2567
RDI: Quick, 3/20/82; Schmitt, 4/20/82

[illegible] DIVISION DATA REVIEW RECORD

Confidential Business Information Does Not Contain National Secu / Information (E.O. 12065)

Chemical Name [illegible handwriting]

Identifying Number	3. Action Code	4. Accession Number
11054[illegible]	215	070993

To Be Completed by PM

5. Record Number 47334
6. Reference Number 1
7. Date Received (EPA) 9/17/81
8. Statutory Due Date 12/16/81
9. Product Manager Taylor [illegible]
10. PM Team Number 25

CHECK THE FOLLOWING IF APPLICABLE:

- [ ] Public Health/Quarantine
- [ ] Substitute Chemical
- [ ] Seasonal Concern
- [ ] Minor Use
- [ ] Part of IPM
- [ ] Review Requires Less Than 4 Hrs.

To Be Completed By PCB

11. Date Sent to HED/TSS
12. Priority Number
13. Projected Return Date

INSTRUCTIONS TO REVIEWER

A. HED [x] Total Assessment - 3(c)(5)
[ ] Incremental Risk Assessment - 3(c)(7) and/or S.L. Johnson memo of May 12, 1977.

B. SPRD (Send Copy of Form to SPRD PM)
[ ] Chemical Undergoing Active RPAR Review
[ ] Chemical Undergoing Active Registration Standards Review

C. [ ] BFSD D. [ ] TSS/RD E. [ ] Other

F. Instructions Request for tolerance [illegible] forage, [illegible] beans, [illegible]

16. Related Actions: 241-243

17. 3(c)(1)(D)

[x] Use Any or All Available Information [ ] Use Only Attached Data

[ ] Use Only the Attached Data for Formulation and Any or All Available Information On the Technical or Manufacturing Chemical.

18. Reviews Sent To: [x] TB [x] RCB [ ] EEB [ ] EFB [ ] IS [ ] CB [ ] PL [ ] BFSD

19.	TO	TYPE OF REVIEW	RECIS.	PETIT.	EUP	SLN	SEC. 18	INERT	EMER. US	OTHER
HED		TOXICOLOGY								
		ECOLOGICAL EFFECTS								
	✓	RESIDUE CHEMISTRY		1						
		ENVIRONMENTAL FATE								
RD/TSS		CHEMISTRY								
		EFFICACY								
		PRECAUT. LABELING								
BFSD		ECONOMIC ANALYSIS								

20. [x] Label Submitted With Application Attached. 21. [ ] Confidential Statement of Formula Attached.

22. [ ] Representative Labels Showing Accepted Uses Attached.

23. Date Returned to RD (to be completed by HED)

24. Include an Original and 4 (four) Copies of This Completed Form for Each Branch Checked for Review.

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Revised 2/81 Previous Editions Obsolete