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Shaughnessey No. 128850

Date Out EFB: 20 DEC 1984

To: R. Mountfort
Product Manager 23
Registration Division (TS-767)

From: Samuel M. Creeger, Chief
Review Section No. 1
Exposure Assessment Branch
Hazard Evaluation Division (TS-769)

Attached please find the environmental fate review of:

Reg./File No: 8340-EUP-RN

Chemical: HOE-39866

Type Product: Herbicide

Product Name: HOE-39866

Company Name: American Hoechst Co.

Submission Purpose: EUP for use on Soybeans

ACTION CODE: 710

Date in: 10/4/84

EFB # 5023

Date completed: 12/17/84

Tais (level II)	Days
52	4.0

Deferrals To:

X Ecological Effects Branch

____ Residue Chemistry Branch

____ Toxicology Branch

1.0 INTRODUCTION

1.1 American Hoechst Company is requesting and Experimental Use Permit for the use of the new chemical HOE-39866 [monoammonium 2-amino-4-(hydroxymethylphosphinyl)butanoate] in the following areas: 1) non-crop areas, 2) homeowner, 3) non-bearing tree and vine crops, 4) soybeans (no-till, minimum till, and double crop). The EUP request is for a maximum of 2,115 lb ai for use on a maximum of 1,043 acres in all of the United States.

The registrant states that "HOE 039866 is a naturally occuring biosynthetic product excreted by Streptomyces" which "has been found to inhibit glutamine synthetase in leaf tissue of higher plants and thus could be considered a biorational biochemical pest control agent."

1.2 Identity of active ingredient and structure

Chemical Name: monoammonium 2-amino-4-(hydroxymethylphosphinyl)butanoate

CAS Name: Butanoic acid, 2-amino-4-(hydroxymethylphosphinyl)-, monoammonium salt

IUPAC Name: Ammonium-(3-amino-3-carboxy-propyl)-methyl phosphinate

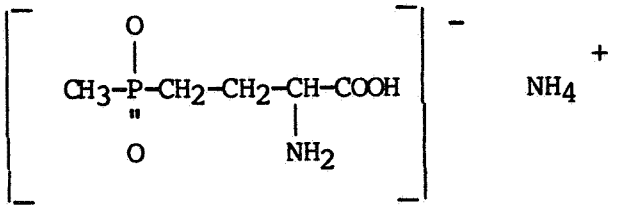
Common Name: none assigned

Company Code: HOE-39866

Molecular Weight: 198.1

Empirical Formula: $C_5H_{15}N_2O_4P$

Structure:



	PURE AI	TECHNICAL
Color:	White	White to light brown
Physical form:	crystalline powder	crystalline powder
Odor:	weakly pungent	odorless to weak pungent
Melting point:	ca. 488 K (215°C) under decomposition	ca. 488 K (215°C) under decomposition

Boiling point: not determinable, because of decomposition of the active ingredient at its melting range.

Vapor pressure: not determinable, because of decomposition of the active ingredient by warming up.

Density: 1.4 g/cm^3 at 20°C 1.4 g/cm^3 at 20°C

n-Octanol-Water Partition Coefficient: <0.1 ←

pH (1% in distilled H_2O: 4.7 ± 1

SOLUBILITY

Water:	ca. 1370 g/l ± 11% at 22°C
Ethyl Alcohol:	ca. 65 mg/100 ml at 20°C
Acetone:	ca. 16 mg/100 ml at 20°C
Toluene:	ca. 14 mg/100 ml at 20°C
N-hexane:	ca. 20 mg/100 ml at 20°C
Ethyl Acetate:	ca. 14 mg/100 ml at 20°C

1.3 Data were contained in accession numbers 072961, 072974, 072975, and 072976.

2.0 DIRECTIONS FOR USE

See the attached labels.

3.0 DISCUSSION OF DATA

3.1 HOE-39866, Stability in Water. Translation of document number A 22668. Dr. C.v. Waldow and C. Klockner. Tab No. D-3-1. Acc. No. 072974.

Procedure:

No detailed procedure was given. According to the data sheet, "the determination of the stability of Hoe 39866 in water at the pH values of 5, 7 and 9 was carried out in accordance with Data Sheet No. 55, Part I, of the Federal Biological Institute of Agriculture and Forestry."

Conclusion:

Since experimental details, the study cannot be evaluated. This submission does not satisfy the hydrolysis data requirement for HOE-39866. The registrant should submit all of the information requested in §161-1 of the Subdivision N Guidelines to allow for a complete review of the HOE-39866 hydrolysis study.

3.2 Aerobic Soil Metabolism

3.2.1 Aerobic Soil Metabolism Study of the Herbicide Hoe 039866 after application of Hoe 035956, the free acid of Hoe 039866. Dr. H. Gildemeister and H.J. Jordan. Report No. (B)73/83. Tab No. D-3-3. Acc. No. 072974.

3.2.2 Supplement of report (B) 73/83 (Document N. A 27116). Tab No. D-3-3. Acc. No. 072974.

3.2.3 Behavior of the active ingredients of crop protection agents in the soil. Dr. Gildemeister. Report No. (B)126/82. Tab No. D-3-4. Acc. No. 072974.

3.2.4 Hoe 35956-^{14}C, $^{14}CO_2$ evolution in the soil after application. Dr. W. Thier, Fischer, R. and Wagner, U. Report No. (B) 37/79. Tab No. D-3-5. Acc. No. 072974.

The aerobic soil metabolism studies had a number of deficiencies which did not allow for a detailed review and evaluation. They include:

1) The soils used were not completely characterized. The moisture capacity, bulk density, cation exchange capacity and percent sand, silt and clay were not given.

2) Samples were not taken until the patterns of decline of the test substance and patterns of formation and decline of degradation products were established in the soil. The sampling should have continued for at least 1 1/2 to 3 half-lives to obtain accurate rate constants. The soils were sampled and analyzed at only one time (35 days). No indication of the pattern of formation and decline of the degradation products other than CO_2 evolution were given.

3) There was no indication of whether replicate samples were taken.

4) The dates on which the study began and ended and when the samples were analyzed were not given.

5) The axes of the graphs of the decline of the parent compound were not readable.

6) The rates of formation and decline of the degradation products were not given.

7) The degradation rate of the parent was not given and the method of calculation of the half-life estimate was not given.

Because of the deficiency cited in 2 above, the aerobic soil metabolism data requirement may not be able to be satisfied by these studies even if the other deficiencies are addressed. A new aerobic soil metabolism study should be undertaken which will establish the pattern of decline of the active ingredient and the patterns of formation and decline of the degradation products. Since, however, this might be considered a

biorational pesticide, EAB defers to EEB as to the necessity of this study under the requirements of the Subdivision M Guidelines for biorational pesticides.

3.3 Leaching Study of Hoe 035956 (= free acid of the Herbicide Hoe 039866) and its Degradates. Dr. H. Gildemeister and H.J. Jordan. Report No. (B)74/83. Tab No. D-3-6. Acc. No. 072974.

The leaching study had a number of deficiencies which did not allow for a detailed review and evaluation. They include:

1) The soils used were not completely characterized. The moisture capacity, bulk density, cation exchange capacity and percent sand, silt and clay were not given.

2) Only 3 soils were used instead of the required minimum of 4 soils.

3) Values of soil/water relationships (K_d) were not reported for HOE 039866 and its degradates. (Sample calculations used in determining K_d values should also be provided.)

4) There was no indication of whether replicate samples were taken.

5) The dates on which the study began and ended and when the samples were analyzed were not given.

6) The volume of water used to elute the columns was not equal to 20 inches (50.8 cm) times the cross sectional area of the columns and the columns were slightly below the minimum 30 cm height.

3.4 Confined Rotation Crop Studies.

3.4.1 Hoe 039866-^{14}C, Absorption kinetics with soybean plants after soil treatment under field conditions. Dr. E. Dorn, Haberkorn, B. and Thomas, J. Report No. (B) 132/83. Tab No. D-3-7. Acc. No. 072974.

3.4.2 Hoe 039866-^{14}C, Residue Analysis in Rotational Crops from a Confined Study. Dr. E. Dorn, Steinau, M. and Kocher, H. Report No. (B) 88/84. Tab No. D-3-8. Acc. No. 072974.

3.4.3 Hoe 039866, residue analysis in biological material. K. Kunzler and H.A. Eberlein. Report No. AL 16/83. Tab No. D-3-9. Acc. No. 072974.

3.4.4 Hoe 061517, residue determination in biological material. K. Kunzler. Report No. AL 17/83. Tab No. D-3-10. Acc. No. 072974.

3.4.5 Determination of Residues of Hoe 039866 and Hoe 061517 in Soil. Dr. H. Lind, Aeschlimann, H.U., Macko, S.L., and Blaser, A. RCC Research and Consulting Company AG Postfach. Switzerland. RCC Project 021925. Tab No. D-3-11. Acc. No. 072974.

3.4.6 Hoe 039866, residue determination in soil. K. Kunzler and H.A. Eberlein. Report No. AL 20/83. Tab No. D-3-12. Acc. No. 072974.

3.4.7 Hoe 061517, residue determination in soil. K. Kunzler. Report No. AL 19/83. Tab No. D-3-13. Acc. No. 072974.

3.4.8 Summary of Residues of HOE 39866 and its Major Metabolite HOE 61517 in Soil. Tab No. D-3-14. Acc. No. 072974.

3.4.9 Residue Data from Macon, MO; Leland, MS; Decatur, AL; Resaca, GA; Whitstown, IN; College Park, MD; Princess Anne, MD; Brandon, MS; Cary, NC; Burlington, WI; Belleville, IL; Georgetown, DE; and Hattersheim, FRG. Tab Nos. D-3-15 through D-3-32. Acc. Nos. 072974, 072975, 072976.

Since the aerobic soil metabolism studies were not reviewable and the hydrolysis data requirement is not acceptable, these studies were also not evaluated. They should be resubmitted with the hydrolysis and aerobic soil metabolism studies for review and evaluation.

4.0 CONCLUSIONS

4.1 The hydrolysis data requirement for HOE-39866 has not been satisfied because adequate experimental details were not submitted. The registrant should submit all of the information requested in §161-1 of the Subdivision N Guidelines to allow for a complete review of the HOE-39866 hydrolysis study.

4.2 The aerobic soil metabolism studies had a number of deficiencies which did not allow for a detailed review and evaluation. They include:

4.2.1 The soils used were not completely characterized. The moisture capacity, bulk density, cation exchange capacity and percent sand, silt and clay were not given.

4.2.2 Samples were not taken until the patterns of decline of the test substance and patterns of formation and decline of degradation products were established in the soil. The sampling should have continued for at least 1 1/2 to 3 half-lives to obtain accurate rate constants. The soils were sampled and analyzed at only one time (35 days). No indication of the pattern of formation and decline of the degradation products other than CO_2 evolution were given.

4.2.3 There was no indication of whether replicate samples were taken.

4.2.4 The dates on which the study began and ended and when the samples were analyzed were not given.

4.2.5 The axes of the graphs of the decline of the parent compound were not readable.

4.2.6 The rates of formation and decline of the degradation products were not given.

4.2.7 The degradation rate of the parent was not given and the method of calculation of the half-life estimate was not given.

4.2.8 Because of the deficiency cited in 4.2.2 above, the aerobic soil metabolism data requirement may not be able to be satisfied by these studies even if the other deficiencies are addressed. A new aerobic soil metabolism study should be undertaken which will establish the pattern of decline of the active ingredient and the patterns of formation and decline of the degradation products.

4.3 The leaching study had a number of deficiencies which did not allow for a detailed review and evaluation. They include:

4.3.1 The soils used were not completely characterized. The moisture capacity, bulk density, cation exchange capacity and percent sand, silt and clay were not given.

4.3.2 Only 3 soils were used instead of the required minimum of 4 soils.

4.3.3 Values of soil/water relationships (K_d) were not reported for HOE 039866 and its degradates. (Sample calculations used in determining K_d values should also be provided.)

4.3.4 There was no indication of whether replicate samples were taken.

4.3.5 The dates on which the study began and ended and when the samples were analyzed were not given.

4.3.6 The volume of water used to elute the columns was not equal to 20 inches (50.8 cm) times the cross sectional area of the columns and the columns were slightly below the minimum 30 cm height.

4.4 The confined rotational crop studies were not reviewed. They should be resubmitted with the hydrolysis and aerobic soil metabolism studies for review and evaluation.

5.0 RECOMMENDATION

The hydrolysis and soil metabolism studies which are required for an EUP have not been satisfied. See §4.1 through §4.2.8 above.

Since this might be biorational pesticide, EAB defers to EEB as to the necessity of these studies under the requirements of the Subdivision M Guidelines for biorational pesticides.

Norma Kay Whetzel
December 17, 1984
Review Section No. 1
Exposure Assessment Branch
Hazard Evaluation Division