


US EPA ARCHIVE DOCUMENT

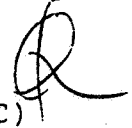
JUL 30 1986

Shaughnessy #: 128850

Date out of EAB: JUL 30 1986

Signature: 

To: Richard F. Mountfort
Product Manager #23
Registration Division (TS-767C)

From: Emil Regelman, Supervisory Chemist
Review Section #3
Exposure Assessment Branch
Hazard Evaluation Division (TS-769C) 

Attached please find the EAB review of:

Reg./File No.: 8340-EUP-10

Chemical: _____
HOE 39866

Type Product: Herbicide

Product Name: Ignite

Company Name: American Hoechst Corporation

Submission Purpose: New chemical EUP for soybeans, noncrop
uses, groundskeeping, and nonbearing tree and vine crops.

Date In: 03/31/86

Action Code: 715

Date Completed: _____

EAB # 6487

Monitoring Requested: _____

TAIS (level II) Days

Monitoring Voluntarily Done _____

 9

Deferrals To:

_____ Ecological Effects Branch

_____ Residue Chemistry Branch

_____ Toxicology Branch

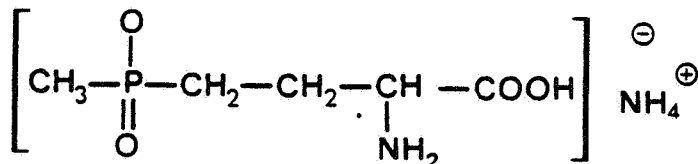
1. CHEMICAL: Monoammonium 2-amino-4-(hydroxymethylphosphinyl)-butanoate or ammonium-DL-homoalanin-4-yl (methyl) phosphinate (IUPAC) or butanoic acid 2-amino-4-(hydroxymethylphosphinyl) butanoate-monoammonium salt (CAS).

Trade Name: Ignite

Company Code: Hoe 039866

Formulation: 1.67 pound ai per gallon (19.38% ai).

Structure:



Molecular Weight: 198.2

Empirical Formula: C₅H₁₅N₂O₄P

Physical/Chemical Properties: See EAB review dated December 20, 1984.
n-Octanol-water partition coefficient: < 0.1.
Water solubility: 1370 g/L + 11% at 22 °C

2. TEST MATERIAL: Various
3. STUDY ACTION/TYPE: Response to EAB review of June 5, 1985. Original application for the herbicide was for an EUP for soybeans, noncrop uses, groundskeeping uses, and nonbearing tree and vine crops.
4. STUDY ID: The following environmental fate studies were submitted under Accession Number 262076. EAB #6487.

Hydrolysis

Gorlitz, G. and Ch. Klockner, Abiotic Hydrolysis as a Function of pH. Report No. (B)277/85, December 16, 1985. Hoechst Anal. Lab., Frankfurt, FRG. (A32265)

Aerobic Soil Metabolism

Gildemeister, H. and H.J. Jordan, Hoe 039866-14C. Aerobic Soil Metabolism Study. Report No. CB066/85, January 14, 1986. Hoeschst Anal. Lab., Frankfurt, FRG. (A32414)

Leaching

Gildemeister, H. and U. Scheinkonig, Hoe 039866-14C Leaching Study. Report No. (B)173/85, September 4, 1985. Hoechst Anal. Lab., Frankfurt, FRG. (A31970)

Confined Rotational Crops

Schwalbe-Fehl, M., M. Steinau and U. Scheinkonig, Hoe 039866-14C Confined Accumulation Study on Rotational Crops Planted 30 Days after Treatment of the Soil. Report No. CM015/85, December 11, 1985. Hoechst Pflanzenschutz-Forschung-Biologie and Analytical Lab., Frankfurt, FRG. (A32585)

5. REVIEWED BY: Therese M. Dougherty, Chemist *Therese M. Dougherty*
Environmental Chemistry Review Section 3
EAB/HED *7/29/86*
6. APPROVED BY: Emil Regelman *Emil Regelman*
Supervisory Chemist
Review Section 3
EAB/HED/OPP
Signature *Emil Regelman*
7. CONCLUSIONS:

Additional supporting information as noted below is required in order to fully evaluate results reported for hydrolysis, aerobic soil metabolism, and leaching. A new crop rotation study is required. Because of the low potential for accumulation in fish as indicated by the low octanol/water partition coefficient, a fish accumulation study is not required.

Hydrolysis

See Section 10.1E.

Aerobic Soil Metabolism

The half-life of parent in soil under aerobic conditions is estimated as 26 to 77 days. Information supplied is inadequate to support the claimed identification of 3-methylphosphinico-propionic acid (M2) as the major metabolite. M2 increased over time and reached a possible plateau by day 64 at 35 percent of applied ¹⁴C. Two other unidentified metabolites (besides CO₂) were detected at a maximum level of 7.6 percent (day 64). Chain scission, evidenced by CO₂ evolution, represented a minor role (maximum 13%).

Leaching

On soil TLC plates, Hoe 039866 and its aged residues ranged from immobile (class 1, volcanic ash with 46% clay) to very mobile (class 5, sandy soil with 1.9% clay). The leaching fronts for parent and aged residues were similar; however, a greater quantity of parent than aged residues was more mobile (class 4) in low clay and organic matter soils. The latter TLC observations conflict with HPLC results reported for identification of TLC peak areas, which indicate lower mobility of parent compared to the metabolite 3-methyl phosphinico-propionic acid. Confirmation of residue identification is needed. Because of potential ground water contamination, this is particularly essential for mobile residues.

Confined Rotational Crops

Study deficiencies are noted under section 10.4E.

8. RECOMMENDATIONS:

We cannot concur with issuance of the EUP at this time. Additional information required is noted below.

Hydrolysis

- In order to demonstrate that Hoe 039866 and potential hydrolysis products would separate under the HPLC conditions employed, identify potential hydrolysis products which were used as standards and supply chromatograms and retention times.
- Note source of standards and method of identification.
- Supply UV spectra for parent and potential hydrolysis products, and limits of detection for the latter. Note method of air exclusion employed for UV detection below 200 nm.

Aerobic Soil Metabolism

- Standard chromatograms for 3-methylphosphinico-propionic acid (M₂) plus retention time ranges are needed.
- For other than limited experimental use and for full registration, HPLC results for parent and M₂ must be validated through an acceptable method, e.g., GC/MS.
- For full registration, further work may be required to determine the half-life of M₂ in soil. Such information will depend on concern for residues once the identity of M₂ is confirmed.

Leaching

- Indicate specifically which TLC areas were used for the HPLC identification studies.
- Address the apparent discrepancy in the HPLC and TLC results noted under Conclusions.
- For other than limited experimental use, confirmation of residue identification is needed. This is particularly essential for mobile components.
- Storage stability data for samples are required.
- Supply raw data.

Confined Rotation Crops

- A new study using 165-1 Guidelines, is required in order to permit planting of rotated crops for food, feed or fodder.
- Even distribution of herbicide to sandy loam soil should be assured through adequate soil sampling at treatment time. Report data variability for residues.
- Following soil treatment, the pesticide should be aged under aerobic conditions in the soil for a time approximating the anticipated crop rotations. Growing the treated crop in the soil during the aging period is not precluded.
- Residues in wheat husks should be identified. Also, for feed and fodder crop uses, residues in pea leaves and wheat straw should be identified.

- Supporting raw data, including chromatograms, should be provided for crop and soil studies.
- Supply sample storage stability data.

9. BACKGROUND

A. Introduction:

Study deficiencies were noted in EAB reviews of December 20, 1984 and June 5, 1985; therefore, EAB could not concur with the proposed EUP.

B. Experimental Program

None included with March 27, 1986 submission. Proposed June 1985 program attached. (Appendix).

The latter program consisted of four parts: noncrop areas, groundskeeping use, tree and vine crops, and soybeans. The maximum application rate was 2 lb ai/A with repeat applications at 4 to 6 weeks if necessary. During the study period, a maximum total usage of 744 lb ai was requested for 17 States on land ranging from 155 to 345 acres.

10. DISCUSSION OF INDIVIDUAL TESTS OR STUDIES

10.1 Hydrolysis

A. Study Identification

Gorlitz, G. and Ch. Klockner, Abiotic Hydrolysis as a Function of pH. Report No. (B)277/85, December 16, 1985. Hoechst Anal. Lab., Frankfurt, FRG. (A32265)

B. Materials and Methods

Hydrolysis of Hoe 039866 (unlabeled, 99.5% pure) was studied in buffer solutions of pH 5, 7 and 9 at 230 ppm under sterile conditions in the dark at 25 °C for 30 days and at 50 °C for 5 days.

Samples were taken at 0, 6, 13, 17, 22, 27, and 30 days of incubation and duplicates analyzed by HPLC with UV detection at 195 nm. External standards of parent compound and "hydrolysis products" (unspecified) were used for identification and quantitation.

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EFGWB Reviews of Glufosinate (128850)

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C. Reported Results

During 30 days incubation of Hoe 039866 at 25 °C, less than 2 percent hydrolytic degradation was observed, irrespective of pH (5, 7 and 9). Half-lives were calculated as greater than 300 days. Material balance ranged from 97.1 percent to 103.0 percent. ↗

D. Study Author's Conclusions

At ambient temperature and abiotic conditions, Hoe 03966 is hydrolytically stable within the pH range of 5 to 9. The values given for half-lives (greater than 300 days) were estimated based on much higher calculated time periods.

E. Reviewer's Discussion and Interpretation of Study Results

In order to accept the study author's conclusions, information is needed to demonstrate that potential hydrolysis products of Hoe 039866 could be detected from different retention times under the HPLC conditions employed in the study (including column length as described on next page). Parent compound is the only analytical standard identified in the hydrolysis report.

10.2 Aerobic Soil Metabolism

A. Study Identification

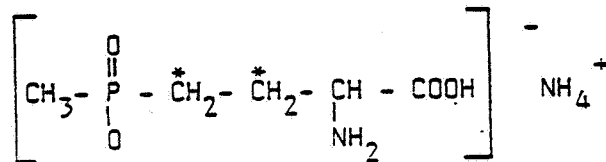
Gildemeister, H. and H.J. Jordan, Hoe 039866 -
14C Aerobic Soil Metabolism Study. Report No.
CB066/85, January 14, 1986. Hoechst Anal. Lab.,
Frankfurt, FRG. (A32414)

B. Materials and Methods

Two U.S. silt loam soils were moistened with water to 40 percent of their moisture capacity and maintained in darkness for two weeks (22 + 2 °C). For the total degradation study, soil replicate samples containing the equivalent of the maximum recommended field application rate (2 kg/ha) were incubated in closed, aerated flasks in the dark at 22 + 2 °C. Ethanolamine and methanol (3:7) was used to collect ¹⁴CO₂. Additional volatile degradation products were absorbed in sulfuric acid and ethylene glycol.

Other replicate soil samples were incubated at 22 ± 2 °C in cotton-plugged flasks in the dark. Distilled water was added at 1 to 3-day intervals to restore the initial moisture.

Hoe-39866 (C_3 , C_4 labeled, 99.5% purity, 49.4 mCi/g) was mixed with unlabeled parent compound (resulting sp. act. of 16.34 mCi/g) and added to 100 g soil samples. At each sampling time (days 0, 1, 2, 4, 8, 16, 32, 64, 96), residues were extracted with water at elevated temperatures (not exceeding 75 °C, 6 hours), and were quantitated by liquid scintillation counting. Residues which persisted in the soil following extraction were measured by combustion and LSC. The soil extracts were examined by radio-HPLC to determine the pattern of degradation products.



C. Reported Results

Each of the soils showed a different influence on the fate of the pesticide. In silt loam soil #1, the amount of extractable radioactivity (RA) decreased over time from 96 percent to 17 percent. Correspondingly, nonextractable residues increased from an initial 2 percent to about 40 percent by day 96. Recovered ^{14}C reached 14 percent by day 96.

For soil 2 (18.2% clay), only about 73 percent of applied RA was extracted at day 0, and this slowly decreased to 57 percent. The nonextractable ^{14}C remained fairly constant during the study (16 to 23%). Only minor amounts of CO_2 (2%) were evolved. Other volatile RA was only found in negligible amounts in both soils. The total recovery in both soils was between 70 and 100 percent, with most values > 80 percent (Table A).

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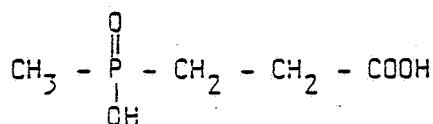
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In both soils, a rather rapid breakdown of the pesticide occurred, leading to a main product (M2) and minor metabolites (M1 and M3). Among these, M3 could only be detected in soil 1 at day 64, while M1 was present in both soils (Tables 3 and 4, Appendix). Metabolite M2 was identified by HPLC as 3-methylphosphinico-propionic acid. Attempts to identify metabolite M1 by GLC/MS failed.

Half-life of Hoe 039866 was estimated by linear regression using first order kinetics as 26 days in soil 1 and 34 days in soil 2. For the latter soil, the semilogarithmic decline graph shows a rapid decline of parent compound up to day 4, then the slope changed and a half-life of 77 days was calculated for the remaining period. (Figure 9).

D. Study Author's Conclusions

During the incubation, one main metabolite, 3-methylphosphinico-propionic acid was formed in both silt loam soils. Half-life of the parent compound was estimated as 26 days in soil 1 and 34 days in soil 2. The results demonstrate a moderate breakdown of Hoe-39866 in soils under aerobic conditions. The differences observed in soil extractable RA for the two soils may result from faster adsorption of the pesticide in soil 2 because of its higher clay content.



E. Reviewer's Discussion and Interpretation of Study Results

The question raised in EAB's review dated June 5, 1985 concerning whether or not foreign soils were representative of United States soils was addressed by conducting a new study using soils from Mississippi.

For soil 1, at days 64 and 96, the relatively low parent and M2 residue levels and high non-extractables could indicate incomplete extraction. This theory is supported by results shown for day

Table A. Results for Aerobic Metabolism Study

Percent of Applied Radioactivity

Sample (days)	Soil Number	Extract	Identified Cpds in Extract			Unidentified M1	¹⁴ CO ₂	Nonextractable Residues	Recoveries
			Parent + M2	Parent	M2				
0	1	96.1	96.1	-	-	-	2.3	98.4	
	2	72.6	72.6	-	-	-	23.3	96.0	
1	1	91.2	91.2	-	-	< 0.01	3.5	94.7	
	2	64.	64.	-	-	< 0.01	22.4	86.4	
2	1	92.6	92.6	-	-	0.2	8.7	101.4	
	2	63.8	63.8	-	-	0.03	21.4	85.2	
4	1	93.6	72.1	21.5	-	0.5	2.1	96.1	
	2	59.5	48.4	11.0	-	0.1	17.6	77.2	
8	1	88.0	63.	25.0	-	1.1	1.9	90.8	
	2	62.4	49.0	13.4	-	0.3	19.9	82.6	
16	1	79.1	49.2	30.0	-	2.1	5.1	86.2	
	2	56.	37.4	18.5	-	0.6	18.6	75.2	
32	1	67.7	33.1	28.2	6.5	5.6	8.5	82.0	
	2	60.9	37.2	23.6	-	1.3	18.5	80.8	
64	1	33.1	16.8	6.4	7.6	11.3	36.2	81.4	
	2	63.8	28.8	35.1	-	1.9	16.2	81.9	
96*	1	17.1	6.6	3.0	7.5	13.3	39.5	71.4	
	2	57.	20.4	34.6	1.9	2.0	18.5	77.5	
96CS**	1	45.8	20.2	19.4	6.2	13.2	9.2	69.8	
	2	58.4	28.0	28.8	1.6	2.0	23.6	84.0	

*HPLC conditions changed

**CS: Closed system

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96 closed system (Figure 1 Appendix and Table A). The soil water extraction was conducted at "elevated temperatures not exceeding 75 °C." It is not clear if the same temperature was used for all samples.

For soil 2, the calculations used to indicate degradation of parent compound from day 0 to day 4 are based on 100 percent recoveries; however, recoveries during this initial period decreased from 96 percent to 77 percent. Therefore, most of the decline in soil residues reported for days 1 to 4 ($t_{1/2} = 7.2$ days) actually reflect failure to correct for recoveries.

One major metabolite, 3-methylphosphinopropionic acid (M2), was reported; however, no supporting documentation (standard chromatogram) was provided. Also, HPLC results were not validated by use of another method.

For soil 2, M2 increased over time, with a possible plateau (35% of applied radioactivity) by day 64. Unidentified metabolite M1, detected from days 32 through 96, did not exceed 7.6 percent (day 64). Evolution of $^{14}\text{CO}_2$, up to 13.3 percent and 2.0 percent, was observed for soil 1 and 2, respectively, indicating a minor degree of chain scission.

10.3 Leaching Study

A. Study Identification

Gildemeister, H. and U. Scheinkonig, Hoe 039866- ^{14}C Leaching Study. Report No. (B)173/85, September 4, 1985. Hoechst Anal. Lab., Frankfurt, FRG. (A31970)

B. Materials and Methods

For soil TLC studies, two silt loam soils (I, II, US), one sand (III, FRG), and one volcanic ash (IV, Japan) were used in the study. Hoe 039866 (C_3 , C_4 radiolabeled), 98.2% purity, 21.87 mCi/g was added to duplicate soil I samples (previously adjusted to 40 percent moisture capacity) and aged for 30 days at 22 + °C in darkness. During the incubation, distilled water was added periodically to restore the 40 percent moisture capacity level.

In order to observe mobility of parent and degradates, the incubated soil samples were extracted with distilled water, extracts concentrated, and applied to duplicate soil TLC plates. In addition, solutions of Hoe 039866 and two reference compounds (chloridazon and buturon) were applied to the plates. Water was used for development. Radioactivity was determined using a Linear Analyzer.

Degradation of parent compound was studied by adding water and emulsifier to the silt loam I aged samples and dialyzing for 24 hours. Extract I consisted of dialzate plus supernatant water, while extract II was supernatant obtained 24 hours after a second water addition. Radioactivity in extracts was determined by LSC and in soil by combustion and LSC. The pattern of degradates in the soil extracts was determined by HPLC with radioactivity monitor.

C. Reported Results

Thirty days after application of parent compound to the soil, the results noted below were observed.

<u>Fraction</u>	<u>Peak</u>	<u>% of RA in Extract</u>	<u>% of Total Applied RA</u>	<u>Total Recovery</u>
Extract I	A	45.5	15.7	
	B	54.5	18.7	
Extract II	A	45.6	9.8	
	B	54.4	11.7	
Soil			29.3	85.2

By comparison with a HPLC-chromatogram containing the test substance and its soil metabolite, Hoe 061517 (3-methylphosphinico-propionic acid), A was identified to be unchanged test substance (4m00) and B to be the metabolite (ret. 7m22).

Properties of the soils:

	SILT LOAM	SILT LOAM	SAND	VOLCANIC ASH
	I	II	III	IV
bulk density	1.37*	1.41*	1.70*	0.96*
pH-value	6.4	6.5	6.9	5.8
cation exchange capacity	21.3**	12.1**	2.7	18.3**
organic matter	1.6%	0.8%	0.7%	4.3%
sand	7.2%	25.2%	91.8%	23.3%
silt	70.4%	62.4%	6.3%	30.6%
clay	22.4%	12.4%	1.9%	46.1%
moisture capacity	45.8***	30.4***	30.0***	53.3***
aerobic bacterial ¹⁾	1.1x10 ⁶ /g	2.4x10 ⁵ /g	2.4x10 ⁵ /g	5.9x10 ⁴ /g
soil fungi ¹⁾	3.0x10 ² /g	1.1x10 ³ /g	2.6x10 ³ /g	2.4x10 ³ /g
actinomycetes ¹⁾	30/g	1.5x10 ² /g	4.0x10 ³ /g	60/g

* g/cm³
 ** meq/100 g soil
 *** g/100 g soil

The results of the soil TLC are shown in Tables 1 and 2 and briefly summarized as follows:

- a. The leaching behavior of the pure test substance Hoe 039866 and that of the aged residues from a soil extract are slightly different. In soil I-III the aged residues were distributed over the soil plate to a greater extent than the test substance. However, their leaching front did not differ significantly from that of the parent compound. Only in soil IV (volcanic ash) was there a rather similar mobility.

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- b. In soils I-III the test substance as well as the aged residues generally reached higher Rf-values than the reference compounds. Only soil IV behaved in a different manner, with lower mobility of the test substance and its aged residues compared to that of the reference compounds.
- c. The different soil types showed a remarkable influence on the leaching behavior of Hoe 039866 and its aged residues as well as on that of the reference compound chloridazon. This can be expressed by mobility classes (as noted below) for the main portion of radioactivity.

Table 2. Soil TLC Mobility (163-1 Classifications)

	soil I	soil II	soil III	soil IV
Hoe 039866:	81.3-82.5% class 2-3	89.4-92.2% class 3-4	88.8-93.3% class 3-4	96.2-97.0% class 1
aged residues of Hoe 039866:	97.6-98.1% class 1-4	93.8-94.0% class 2-4	90.9-94.8% class 3-5	84.3-89.1% class 1
chloridazon:	95.6-95.7% class 1-2	89.9-90.6% class 2-3	93.7-95.1% class 2-3	97.9-99.6% class 1-2

- d. The TLC chromatograms of the aged residues of Hoe 039866 on the two silt loam soils showed two distinct peaks of radioactivity. Investigation of extracts of the peak layers by radio-HPLC demonstrated that the radioactivity (RA) with lower mobility consisted mainly of parent compound, while the RA of higher mobility was principally metabolite Hoe-61517 (3-methylphosphinicpropionic acid).

D. Study Author's Conclusions

According to the results of the leaching study on soil TLC plates, the range of mobility classes of Hoe 039866 and its aged residues reaches from immobile (class 1, soil IV) to very mobile (class 5, soil III), probably depending on the clay content of the soils. In two of the soils (nos. I and II) the metabolite Hoe

061517 revealed a higher mobility than the parent substance, possibly due to the high cation exchange capacity of these soils. The results of the soil TLC study correspond to those of other mobility studies performed in the laboratory.

On the other hand, mobility studies performed under field conditions showed rather different results. In these trials the radioactivity was mainly found in the upper soil layer (0-5 cm), whereas in lower layers (e.g., 10-15 cm) considerably smaller amounts of radioactivity (at least tenfold smaller) could be detected (see report (B) 138/83; lit. 7.3.4.). (The latter study summary was not included with this submission and no further information was provided.)

"Therefore, under field conditions, not only the mobility of the test substance and its aged residues is of importance, but also their ecological stability. There is an indication that Hoe 039866 and its aged residues are degraded before they reach lower soil layers. Hence, the relatively high mobility in soil under laboratory conditions should not be overestimated."

E. Reviewer's Discussion and Interpretation of Study Results

Mobility of Hoe 039866 and its aged residues appears to depend on the soil clay and organic matter content, with highest mobility (class 4) of most residues detected in low clay and organic matter sandy soil III (1.2% clay) and silt loam II (12.4% clay). Radioactive residues of parent and aged metabolites were also found (up to 7 and 15%, respectively) at class 5 mobility in sandy soil. Very little residue mobility was observed in high clay (46.1 %) volcanic ash. This is expected because of the surface charge on clay particles. Soil containing 50.4% clay and 2.0 percent organic matter was used in a field study previously submitted by the firm (B132/83, EPA No. 4G3156), in which RA was mainly found in the upper 5 cm of soil. It appears that this is the study referenced (Summary Report B138/83) under Study Author's Conclusions above.

In silt loam and sandy soils, a major portion of residues (including Hoe 039866) exhibited greater mobility on the TLC plates compared to the reference compounds, chloridazon and buturon. The leaching fronts for parent and aged residues were similar; however, aged residues of Hoe 039866 showed slightly more RA at lower mobility classes (1 and 2) than pure test substance ai in both silt loam soils (Table 3). This observation contrasts

with the HPLC results. The latter indicate that the major metabolite, 3-methylphosphinico-propionic acid, represented the predominant component in the aged residues TLC peak with the higher mobility, and parent compound that with lower mobility. At least one other degradate (unidentified) was evident in the HPLC chromatograms, and represented 7.6 percent of the TLC peak with low Rf-value. It is not clear which TLC areas were used for the HPLC studies. Hence, we cannot determine whether additional components were present in the soil extracts. The HPLC results were not confirmed. Study deficiencies are discussed under Conclusions and Recommendations.

Table 3. Soil TLC Mobility Studies

		<u>Silt Loam 1</u>		<u>Silt Loam 2</u>		
	Mobility Class	Pure Hoe 039866 % RA	Aged Residues % RA	Mobility Class	Pure Hoe 039866 % RA	Aged Residues % RA
Total	1	12.0	43.2	1	2.0	5.1
	2	38.2	15.8	2	6.4	24.0
		50.2	59.		8.4	29.1
Total	3	43.8	20.9	3	29.9	25.6
	4	5.5	18.0	4	60.9	44.3
		49.3	38.9		90.8	69.9

10.4 Confined Rotational Crops

A. Study Identification

Schwalbe-Fehl, M., M. Steinau and U. Scheinkonig, Hoe 039866-¹⁴C. Confined Accumulation Study on Rotational Crops Planted 30 Days After Treatment of Soil. Report No. CM015/85, December 11, 1985. Hoechst Pflanzenschutz-Forschung-Biologie and Analytical Lab., Frankfurt, FRG. (A32585)

B. Materials and Methods

Hoe 039866 (C₃, C₄ radiolabeled), 49.41 mCi/g, 98 percent purity, was mixed with nonlabeled Hoe, 039866 and blank formulation (inert ingredients not

listed) to a resulting concentration of 18.0 percent ai (w/w), 7.3 mCi/g. The potential metabolite noted below (3-methylphosphinico-propionic acid) was used as a reference compound.

The application mixture was applied to clay silt (silt loam, 1.63% organic matter) soil in a greenhouse (avg. temperature day and night of 27 °C and 14 °C, respectively) at 1.5 kg/ha by means of a glass watering can. Crops (carrots, wheat, spinach, and peas) were sown into the test container (0.7 m x 1.0 m, soil depth of 0.5 mm) 30 days after application of the test substance to the soil.

For determination of radioactivity, duplicate soil samples were taken with plastic tubes at treatment, crop planting, and harvest (maturity) times of spinach, carrots, and wheat (days 64, 104 and 138, respectively). At day 104 after application, an additional soil sample (soil layer: 0-2 cm, area where carrots and peas were harvested) was taken with a small shovel for characterization of the radioactivity.

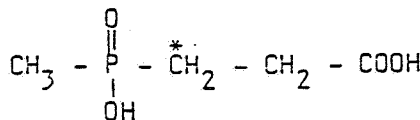
Portions of the solid samples (soil and crops) were combusted and radioactivity was measured by LSC. Also, 1 kg of soil was extracted three times with water, extracts combined, concentrated and analyzed by radio-HPLC.

C. Reported Results

Crops

At harvest, radioactivity concentrations in the edible plant parts were as noted below.

<u>Crop</u>	<u>Harvest (days)</u>	<u>Concentration Active Ingredient Residues (ppm, fresh plant material)</u>
Spinach leaves	64	0.012
Pea seeds	96	0.020
Carrot roots	104	0.007
Wheat grains	138	0.013



Soil

On day 0 of treatment, radioactivity equivalent to 4.4 ppm active ingredient was found in the upper 0 to 5 CM soil layer. Later (30-138 days), the radioactivity remained at about 1 to 2 ppm in the upper 5 cm soil layer throughout the study.

At all sampling dates, deeper soil layers contained .01 ppm or less equivalents active ingredient residues.

The aqueous soil extract of day 104 after treatment contained 71.1 percent of the total radioactivity of the soil. HPLC analysis of the soil extract demonstrated the following results:

<u>Compound</u>	<u>% of RA in Extract</u>	<u>% of Total Soil RA</u>
Hoe 039866	41.5	29.5
3-methylphosphinico- propionic acid	58.5	41.6
Total	100.0	71.1

Observation

Plants did not emerge in about one-quarter of the container area. Therefore, sowing was repeated in that area at day 40 after application, but again, no plants emerged. Also, during the entire study, no weeds were observed in that area. It was concluded that soil of that container area was not suited for plant growth.

Plants in the remaining container area seemed to develop normally. However, there was not sufficient plant material for characterization of radioactive residues. The amount of lost plants was almost identical for all crops.

D. Study Author's Conclusions

The data indicate insignificant total ¹⁴C-residues present in edible plant parts, harvested at maturity, even when crops are sown 30 days after application of Hoe 039866 at 1.5 kg ai/ha to soil. The latter corresponds to an increased application rate, which is only used for fields overgrown with weeds. The normal application rate is expected to be 1.0 kg ai/ha.

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- Identity of product impurities.
- Description of the product manufacturing process.
- Description of quality control procedures.
- Identity of the source of product ingredients.
- Sales or other commercial/financial information.
- A draft product label.
- The product confidential statement of formula.
- Information about a pending registration action.
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E. Reviewer's Discussion and Interpretation of Study Results

A watering can was used to apply the herbicide. We question whether uniform dispersion of Hoe 039866 on soil was attained. The possibility of uneven application is indicated by the failure of crops to develop in one-quarter of the treated area and by the erratic nature of soil residue results over time for the upper 5 cm layer: 4.4, 0.96, 1.49, 2.13, and 1.44 ppm equivalents at posttreatment days 0, 30, 64, 104, and 138, respectively.

At maturity, residue levels in human food portions of rotated crops (planted 30 days following soil treatment) were highest in wheat husks (0.114 ppm) and pea seeds (0.02 ppm). The study author did not include wheat husks as edible plant material. Although spinach leaves contained only 0.012 ppm residues, pea leaves, carrot leaves and wheat straw contained 0.139, 0.096 and 0.453 ppm, respectively. In the report, no indication was given regarding concern for forage residues. At present, a tolerance for Hoe 039866 residues on primary crops has not been established. For rotated crops planted at intervals exceeding 30 days following pesticide application, crop residues could exceed those found in the study submitted because of changes in the nature of soil residues and crop uptake over time.

Apparently, no attempt was made to identify rotated crop residues. Soil characterization studies were conducted on only the upper 2 cm of soil. No supporting information was provided to demonstrate the claim that parent compound and 3-methylphosphinico-propionic acid were detected in day 104 soil at levels of 29.5 percent and 41.6 percent, respectively, of the total soil radioactivity. About 29 percent of soil residues were not water soluble under the conditions employed and were unidentified.

Studies were conducted on silt loam, rather than sandy loam soil, which is recommended in the Guidelines. Storage stability data were not provided.

11. COMPLETION OF ONE-LINER

No additional information was added to the existing One-Liner.

12. CBI APPENDIX

No CBI Appendix attached.

13. REFERENCES

Report (B)138/83. Hoe 039866, Summary of the behavior in soil. Hoechst Aktiengesellschaft.

APPENDIX

RECEIVED
6/17/85

Revised June 13, 1985

SECTION G

PROPOSED

1985

EXPERIMENTAL USE PERMIT PROGRAM

FOR

HOE-39866 SOLUBLE CONCENTRATE HERBICIDE

IN THE FOLLOWING USE AREAS:

1. NON-CROP AREAS
2. GROUNDSKEEPING
3. TREE AND VINE CROPS
4. SOYBEANS (NO-TILL, MINIMUM TILL AND DOUBLE CROP)

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