DYNAMAC
CORPORATION

FENOXAPROP ETHYL

Final Report

Task 1: Review and Evaluation of Individual Studies

Task 2: Environmental Fate and Exposure Assessment

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Fenoxaprop ethyl

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INTRODUCTION

This report is a scientific evaluation of environmental fate data submitted by American Hoechst Corporation (Acc. Nos. 258976 to 258980 and 073932 to 073948) to support registration of fenoxaprop ethyl as a selective postemergence herbicide for the control of annual and perrenial grasses on field and vegetable crop (soybeans), aquatic food crop (rice), domestic outdoor (residential turf), and terrestrial noncrop (turfgrass including sod farms, commercial turf, and highway right-of-ways) use sites. In addition to the 28 studies reviewed herein, six studies were previously reviewed by EAB. The contribution of all studies that have been reviewed to date toward fulfillment of EPA Data Requirements for Registering Pesticides is considered under Recommendations.

Diagrams of chemical structures included in this report have been redrawn by the reviewer. Tables have been retyped and in many instances reformatted. Data not directly reported by the registrant (i.e., data calculated by the reviewer) are indicated as such either in tables or in the text.

STUDY 1

Gildemeister, H., G. Schuld, and H.J. Jordan. 1985. HOE 033171-14C, photodegradation study in water. American Hoechst Corporation, Somerville, NJ. Acc. No. 258976. Reference J-4.

Procedure

Chlorophenyl-ring-labeled [^{14}C]fenoxaprop ethyl (specific activity 22.85 mCi/g, radiochemical purity 99.0%) in acetone was added to distilled water (pH 7) at 0.85 ppm. Samples of the test solutions were maintained in a photoreactor (25 ± 2 C) equipped with a mercury vapor lamp (Table 1). Additional samples were maintained at an unspecified temperature in darkness. To recover volatile degradates formed during irradiation, adsorption traps (sulfuric acid, methanol, methanol:ethanolamine) were connected to the photoreactor. Trapping solutions and irradiated test solutions were sampled immediately after treatment, and at intervals up to 192 hours of exposure. The dark control was analyzed 192 hours after treatment.

Methodology

Radioactivity in the trapping solutions was quantified by LSC. Samples were extracted three times with hexane, and the extracts were combined, filtered through anhydrous sodium sulfate, and concentrated. The photoreactor was rinsed with acetone. Radioactivity in the acetone rinse, the extracted test solution, and the hexane extract was quantified by LSC. After concentration, aliquots of these solutions were analyzed by HPLC.

Results

Extractable radioactivity declined to ~44% of the applied after 192 hours of irradiation (Table 2). A total of 5.49% of the applied radioactivity was volatilized. Fenoxaprop ethyl degraded with a half-life of 183.4 hours in the irradiated solution (calculated by reviewer, r^2=0.94). In the dark control, fenoxaprop ethyl comprised 62.4% of the applied at 192 hours after treatment (Table 3). Nine degradates were isolated from the irradiated solution, including 2-[4-(6-chloro-2-benzoxazolyloxy)phenoxy]propionic acid, 6-chloro-2,3-dihydrobenzoxazol-2-one, and 4-(6-chloro-2-benzoxazolyloxy)phenol.

Conclusions

[^{14}C]Fenoxaprop ethyl degraded with a calculated half-life of 183.4 hours in distilled water (pH 7) when irradiated with a mercury vapor lamp. 2-[4-(6-Chloro-2-benzoxazolyloxy)phenoxy]propionic acid, 6-chloro-2,3-dihydrobenzoxazol-2-one, 4-(6-chloro-2-benzoxazolyloxy)phenol, and 6 other degradates were isolated; only 2-[4-(6-chloro-2-benzoxazolyloxy)phenoxy]propionic acid was >10% of the applied. In the dark control, 62.4% of the applied radioactivity was identified as parent 192 hours after treatment.

This study does not fulfill data requirements because the distilled water was not buffered, it was not stated that sterile conditions were maintained, the incubation temperature for the dark control was not reported, and the artificial light was not compared to natural sunlight.

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Table 1. Spectral energy distribution of the mercury vapor lamp.

Wavelength (nm)	Radiation flow (W)	Molar quanta per hour x 10^3
297	0.2	2
302	0.5	5
313	2.1	20
326	0.5	5
334	0.4	4
340	0.5	5
346	1.3	14
361	2.5	27
366	5.8	64
390	0.4	5
405/08	1.9	23
436	4.4	58
467	0.5	7
480	1.5	21
492	0.3	4
508	2.9	29
546	4.5	74
577/79	4.6	80

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Table 2. Total radioactivity (% of applied) in irradiated and dark control test solutions.

Sampling interval (hours)	Extracted test solution	Hexane extract	Acetone rinse	Trapping solutions[a]	Total
0	0.76	98.6	--	--	99.36
1	3.04	87.75	10.91	1.12	102.82
2	3.06	91.98	2.04	1.14	98.22
4	5.97	91.41	3.62	2.20	103.20
8	4.06	89.39	2.04	0.74	96.23
24	8.72	78.69	11.24	2.09	100.74
48	14.78	68.75	7.53	3.31	94.37
96	13.34	67.21	6.37	3.31	90.23
192	25.64	44.02	3.79	5.49	78.94
192[b]	46.87	57.67	4.27	--	108.81

[a] Sum of radioactivity in methanol, sulfuric acid, and methanol:ethanolamine trapping solutions.

[b] Dark control.

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Table 3. Distribution of radioactivity (% of applied) in irradiated and dark control test solutions.

Sampling interval (hours)	Fenoxaprop ethyl	M1[a]	M2[b]	M3[a]	M4[c]	M5[a]	M6[a]	M7[d]	M8[a]	M9[a]
0	97.4	--	--	--	1.2	--	--	--	--	--
1	98.4	0.5	--	0.4	1.6	--	--	0.7	--	--
2	94.1	0.4	0.3	--	1.7	--	--	0.2	--	--
4	94.7	2.6	1.0	--	1.1	0.4	--	--	0.5	0.4
8	83.9	--	1.3	0.7	2.2	--	1.0	1.3	--	4.8
24	85.2	--	3.3	2.1	1.6	0.3	1.8	0.6	2.1	1.3
48	69.4	1.6	7.4	3.1	5.2	0.2	0.3	2.8	--	0.6
96	70.3	--	7.5	3.8	4.8	--	0.3	--	--	--
192	44.5	6.1	6.9	9.5	--	--	--	6.4	--	--
192[e]	62.4	--	44.0	--	2.4	--	--	--	--	--

[a] These degradates were not identified because of the small amounts present or their low extractability.

[b] 2-[4-(6-Chloro-2-benzoxazolyloxy)phenoxy]propionic acid.

[c] 6-Chloro-2,3-dihydrobenzoxazol-2-one.

[d] 4-(6-Chloro-2-benzoxazolyloxy)phenol.

[e] Dark control.

STUDY 2

Gildemeister, H., and H.J. Jordan. 1984. HOE 033171-14C, photodegradation study on soil. American Hoechst Corporation, Somerville, NJ. Acc. No. 258976. Reference J-5.

Procedure

Soil thin layer plates (5 x 20 cm) were prepared with a loamy sand soil (77.5% sand, 19.9% silt, 2.6% clay, pH 4.1, 1.8% organic matter, CEC 2.9 meq/100 g) from Germany. Chlorophenyl-ring-labeled [^{14}C]fenoxaprop ethyl (specific activity 25.43 mCi/g, radiochemical purity 98%) in acetone, was mixed with nonlabeled fenoxaprop ethyl (99% pure), and aliquots of this solution containing 489.9 µg of fenoxaprop ethyl were applied as spots on the surface of the soil plates. After drying, the treated plates were placed in a photoreactor and irradiated for up to 45 hours. An exposure time of 24 hours in the photoreactor was reported to be equivalent to ~16 days of exposure to natural sunlight (12 hours of light/day). Wavelengths were between 300 and 830 nm; the radiation intensity in this wavelength range was 820 W/m^2. Additional samples were maintained covered in the photoreactor as dark controls.

To recover volatile degradates formed during irradiation, adsorption traps (ethylene glycol, methanol:ethanolamine) were connected to the photoreactor. Trapping solutions and irradiated soil samples were taken at intervals up to 45 hours of exposure. Dark controls were analyzed 8 and 45 hours after treatment.

Methodology

Radioactivity in the trapping solutions was quantified by LSC. Soil samples were transferred to a separatory funnel with several methanol rinses, and then extracted three times with methanol:water (80:20, v:v). A portion of the combined extracts was quantified by LSC. The extracted soil was combusted, and the $^{14}CO_2$ evolved was trapped and quantified by LSC. A separate portion of the soil extract was concentrated and analyzed using HPLC.

Results

Extractable radioactivity declined during the test period, to ~42% of the applied by 45 hours of irradiation (Table 4). Volatiles accounted for <4% of the applied at any sampling interval. Fenoxaprop ethyl degraded with a half-life of <4 hours in irradiated soil samples (<32 hours of exposure to natural sunlight), and at hour 45 had declined to 3.8% of the applied and nondetectable levels in irradiated and dark control soils, respectively (Table 5). 2-[4-(6-Chloro-2-benzoxazolyloxy)phenoxy]propionic acid was the major degradate formed, accounting for a maximum of 64.1% of the applied in irradiated samples and 67.5% in the dark control.

Conclusions

[^{14}C]Fenoxaprop ethyl degraded with a half-life of <4 hours in irradiated loamy sand soil samples, an interval equivalent to <32 hours of natural sunlight. Degradation in the dark control occurred at approximately the

same rate, with <4% of the applied remaining in both irradiated and control samples at hour 45. The major degradate formed was 2-[4-(6-chloro-2-benzoxazolylozy)phenoxy]propionic acid.

This study does not fulfill data requirements because the incubation temperature of both the dark control and treated samples was not reported, no material balance was provided for the dark control soils, and the material balance for irradiated samples declined to <75% of the applied after 32 hours of irradiation.

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Table 4. Total radioactivity (% of applied) in irradiated loamy sand soil.

Sampling interval (hours)	Extractable	Unextractable	Volatiles[a]	Total
0	97.7	0.1	--	97.8
2	94.7	0.2	0.2	95.1
4	99.4	0.3	0.2	99.9
8	83.6	1.0	2.3	86.9
16	76.8	1.2	3.2	81.2
32	52.0	16.7	1.3	70.0
45	41.9	28.0	3.6	73.5

[a] Sum of radioactivity in ethylene glycol and methanol:ethanolamine trapping solutions.

Table 5. Distribution of radioactivity (% of applied) in irradiated and dark control loamy sand soil.

Sampling interval (hours)	Fenoxaprop ethyl	M1	M2	M3	M4[a]	M5[b]
			Irradiated soil			
0	97.7	--	--	--	--	--
2	31.4	--	--	--	50.1	13.1
4	45.7	--	--	--	50.0	3.8
8	14.5	--	--	--	64.1	5.0
16	7.7	--	--	--	62.3	6.8
32	15.0	--	--	1.8	30.0	5.1
45	3.8	--	--	--	24.2	1.7
			Dark control soil			
8	7.7	--	--	--	67.5	7.7
45	--	--	3.5	--	42.5	--

[a] 2-[4-(6-Chloro-2-benzoxazolyloxy)-phenoxy)propionic acid.

[b] 6-Chloro-2,3-dihydrobenzoxazol-2-one.

STUDY 3

Smith, A.E. 1985. Persistence and transformation of the herbicides [^{14}C]fenoxaprop-ethyl and [^{14}C]fenthiaprop-ethyl in two prairie soils under laboratory and field conditions. J. Agric. Food Chem. 33:483-488. American Hoechst Corporation, Somerville, NJ. Acc. No. 258976. Reference J-11.

Procedure

Aerobic soil metabolism studies: Chlorophenyl-ring-labeled [^{14}C]fenoxaprop ethyl (radiopurity >99%, specific activity 28.3 mCi/g) was added at 1 ppm to sandy loam and clay soils (soils not further characterized) that had been moistened to 20, 65, 85, and 100% of field capacity. The soils were mixed and incubated in sealed containers in the dark at 20 ± 1 C. The soils incubated at 20, 65, and 100% of field capacity were analyzed after 24 hours of incubation. The soils, incubated at 85% of field capacity, were remoistened every second day and analyzed after 7, 28, and 49 days of incubation.

Terrestrial field dissipation studies: [^{14}C]Fenoxaprop ethyl, at 0.30 kg ai/ha, was applied to small field plots (10 x 10 cm) of sandy loam and clay soils on June 17, 1983. The upper surface (1-cm depth) of the soils was mixed and then tamped down. After 43 weeks, the upper 10 cm of each plot was removed for analysis.

Methodology

Aerobic soil metabolism studies: The soils sampled after 24 hours of incubation were extracted with 20% aqueous acetonitrile containing 2.5% glacial acetic acid for 1 hour, filtered, and the extract was partitioned with aqueous sodium carbonate and n-hexane. The n-hexane fraction was dried over sodium chloride and analyzed using GC equipped with an electron capture detector. The detection limit was 0.05 ppm.

The soils that were sampled after 7, 28, and 49 days of incubation were extracted with acetonitrile:water:ammonium hydroxide (80:10:10) by shaking for 1 hour, standing for 20 hours, and shaking for an additional 1 hour. The extract was filtered and a portion was analyzed for extractable radioactivity using LSC. The remaining extract was dried, redissolved in methanol and analyzed using TLC on silica gel plates developed in either benzene, benzene:acetone (4:1), or toluene:ethyl acetate:acetic acid:water (50:50:1:0.5). The detection limit was 0.01 ppm.

Terrestrial field dissipation studies: The field soil samples were mixed and extracted with the acetonitrile:water:ammonium hydroxide mixture as described previously. Also, the extracted soil was further extracted with 1 N sodium hydroxide, and separated into a soluble fulvic acid fraction and humic precipitate (method not further described). Both fractions were analyzed for total radioactivity using LSC, the fulvic acid fraction was extracted with ether, and the ether extract was analyzed using TLC as described. The detection limit was 0.01 ppm.

Results

Aerobic soil metabolism studies: In the sandy loam soil incubated for 24 hours, 0.75 ppm of fenoxaprop ethyl remained in the samples moistened to 20% of field capacity; no fenoxaprop ethyl was detected (<0.05 ppm) in the samples moistened to 65 and 100% of field capacity. In the clay soil incubated for 24 hours, 0.83 ppm of fenoxaprop ethyl remained in the samples moistened to 65 and 100% of field capacity.

In the sandy loam and clay soils moistened to 85% of field capacity, fenoxaprop ethyl was not detected (<0.01 ppm) at the first sampling interval (7 days posttreatment); 2-[4-(6-chloro-2-benzoxazolyloxy)-phenoxy]propionic acid was the major degradate (Table 6).

Terrestrial field dissipation studies: In the field soils, 50-55% of the applied radioactivity remained at 43 weeks posttreatment (Table 7). No fenoxaprop ethyl was detected (<0.01 ppm); the majority of the radioactivity was associated with the fulvic acid, humic acid, and humin soil fractions. 2-[4-(6-Chloro-2-benzoxazolyloxy)-phenoxy]propionic acid was the major degradate in the extractable fraction.

Conclusions

Aerobic soil metabolism studies: This study is scientifically invalid because the sampling protocol was inadequate to accurately assess the decline of fenoxaprop ethyl in soil. In addition, this study would not fulfill data requirements because there was no immediate posttreatment sample to confirm the application rate, there was no material balance, and the soils were not completely characterized.

Terrestrial field dissipation studies: This study is scientifically invalid because the sampling protocol (one sampling interval) was inadequate to accurately assess the dissipation of fenoxaprop ethyl from soil. In addition, this study would not fulfill data requirements because the test substance was not a typical end-use product, the soil was incompletely characterized, field test data such as air and soil temperatures and rainfall amounts were not reported, there was no immediate posttreatment sample to confirm application rates, and the plots were too small to simulate actual field conditions.

Table 6. [^{14}C]Fenoxaprop ethyl degradates (% of applied) in sandy loam and clay soils treated with [^{14}C]fenoxaprop ethyl (radiopurity >99%) and incubated in the dark at 20 ± 1 C and 85% of field capacity.[a]

Compound	Sampling interval (days)		
	7	28	49
	Sandy loam soil		
2-[4-(6-Chloro-2-benzoxazolyloxy)phenoxy]propionic acid	76	15	10
4-(6-Chloro-2-benzoxazolyloxy)phenetole	ND[a]	ND	ND
4-(6-Chloro-2-benzoxazolyloxy)phenol	ND	1	1
6-Chloro-2,3-dihydro-benzolazol-2-one	4	2	3
	Clay soil		
2-[4-(6-Chloro-2-benzoxazolyloxy)phenoxy]propionic acid	93	19	15
4-(6-Chloro-2-benzoxazolyloxy)phenetole	ND	ND	ND
4-(6-Chloro-2-benzoxazolyloxy)phenol	ND	4	1
6-Chloro-2,3-dihydro-benzolazol-2-one	ND	4	4

[a] Fenoxaprop ethyl was not detected (<0.01 ppm) in any sample.

[b] Not detected; detection limit was 0.01 ppm.

Table 7. [^{14}C]Fenoxaprop ethyl degradates (% of applied) in the top 10 cm of sandy loam and clay field plots (10 x 10 cm) 43 weeks after the application of [^{14}C]fenoxaprop ethyl (radiopurity >99%) at 0.03 kg ai/ha.[a]

Compound	Sandy loam soil	Clay soil
Total radioactivity by combustion	55	50
Extractable radioactivity	10	10
2-[4-(6-Chloro-2-benzoxazolyloxy)phenoxy] propionic acid	6	8
4-(6-Chloro-2-benzoxazolyloxy)phenetole	ND[a]	ND
4-(6-Chloro-2-benzoxazolyloxy)phenol	ND	ND
6-Chloro-2,3-dihydro-benzolazol-2-one	4	2
Radioactivity in fulvic acid fraction	26	23
Radioactivity in humic and humin fractions	24	16

[a] Average of duplicate plots.

[b] Not detected; detection limit was 0.01 ppm.

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STUDY 4

American Hoechst Corporation. 1984b. Dissipation of HOE 33171 residues in soil from Resaca, GA. Hoechst Report No. A29896, A29897, and A28285. American Hoechst Corporation, Somerville, NJ. Acc. No. 258977. Reference J-17.

Procedure

Fenoxaprop ethyl (Acclaim, test substance uncharacterized) was sprayed on June 20, 1984, at 0.2 and 1.0 lb ai/A onto plots (475 feet^2) of loam soil (34.4% sand, 47.6% silt, 18% clay, 2% organic matter, pH 6.0, CEC 10.4 meq/100 g) located near Resaca, Georgia. There were three replicate plots per treatment rate. Soil cores (10 per plot, 0.75 inch diameter; 0- to 3-, 3- to 6-, and 6- to 12-inch depth) were taken up to 90 days post-treatment. Soil samples were kept frozen at 0 C until analysis ~5 months after they were collected.

Methodology

The soil samples were thawed, throughly mixed, and Soxhlet-extracted for 8 hours with 20% ethanol in hydrochloric acid. During the extraction procedure, fenoxaprop ethyl, 2-[4-(6-chloro-2-benzoxazolyloxy)phenoxy]propionic acid, 6-chloro-2,3-dihydro-benyoxazol-2-one, and 4-(6-chloro-2-benzoxazolyloxy)phenol were split to produce 6-chloro-2,3-dihydro-benzoxazol-2-one. The extract was filtered, then pressed through a SEP-PAK C-18 cartridge. The 6-chloro-2,3-dihydrobenzoxazol-2-one was eluted from the cartridge with ethyl acetate, evaporated to dryness, and derivatized (3 hours at 130 C) with acetic anhydride to 3-acetyl-6-chloro-2,3-dihydrobenzoxazol-2-one. The 3-acetyl-6-chloro-2,3-dihydrobenzoxazol-2-one was analyzed using GC equipped with an electron capture detector. Based on 16 samples fortified with fenoxaprop ethyl at 0.02, 0.05, and 0.10 ppm, recoveries ranged from 65 to 125%. The detection limit was 0.02 ppm fenoxaprop ethyl equivalents.

Results

During the study (6/20-9/18), air temperatures ranged from 54 to 95 F and a total of 20.4 inches of rain were received.

Fenoxaprop ethyl residues were not detected (<0.02 ppm) in the soil treated at 0.2 lb ai/A at any sampling interval. In the soil treated at 1.0 lb ai/A, fenoxaprop ethyl residues in the 0- to 3-inch depth were 0.03-0.06 ppm at 0 and 5 days posttreatment and <0.02 ppm at all other sampling intervals; fenoxaprop ethyl residues were not detected at the 3- to 6- or 6- to 12-inch depths at any interval.

Conclusions

This study is scientifically invalid because the analytical methodology was inadequate (recoveries ranged from 65 to 125%) to accurately assess the dissipation of fenoxaprop ethyl. In addition, this study would not fulfill data requirements because the test substance was not characterized,

pretreatment soil samples were not analyzed, the analytical method was nonspecific, and the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed. Also, the concentration of fenoxaprop ethyl residues on the day 0 sampling interval was considerably lower than would be expected for the reported application rates.

STUDY 5

Johnson, J. and J. O'Grodnick. 1985. Analysis of HOE 33171 in soil from Princess Anne, MD. Hoechst Report No. A31374. American Hoechst Corporation, Somerville, NJ. Acc. No. 258978. Reference J-18.

Procedure

Fenoxaprop ethyl (Acclaim, 1 lb/gal EC) was broadcast sprayed on June 9, 1984, at 0.2 and 1 lb ai/A onto plots (13.3 x 18 feet) of loam soil (32% sand, 44% silt, 24% clay, 1.8% organic matter, soil not further characterized) located near Salisbury, Maryland; there were three replicate plots per treatment rate. The plots were also treated with metolachlor (Dual) at 1.5 pints/A, linuron (Lorox) at 1.0 pint/A, naptalam (Dyanap) at 1.0 gallon/A, and carbofuran (Furadan, 15% G) at 7.5 lb/A on May 17, 1984; and with paraquat at 0.5 lb/A on June 5, July 23, and July 27, 1984 (test substances not further characterized). Soil samples (0- to 3-, 3- to 6-, and 6- to 12-inch depth) were taken up to 91 days posttreatment. Soil samples were kept frozen at 0 C until analysis ~5 months after they were collected.

Methodology

The soil samples were analyzed for fenoxaprop ethyl residues using GC as described in Study 4. Recoveries from fortified samples ranged from 65 to 125% and the detection limit was 0.02 ppm fenoxaprop ethyl equivalents.

Results

Fenoxaprop ethyl residues were not detected (<0.02 ppm) in the soil prior to the application of fenoxaprop ethyl. Fenoxaprop ethyl residues decreased with a half-life of 4-8 and 8-14 days in the 0- to 3-inch depths of soil treated at 0.2 and 1.0 lb ai/A, respectively (Table 8). Fenoxaprop ethyl residues were not detected in the 3- to 6-, and 6- to 12-inch depths of soil treated at 0.2 lb ai/A, and were <0.03 ppm in the soil treated at 1.0 lb ai/A.

Conclusions

This study is scientifically invalid because the analytical method was inadequate (recoveries ranged from 65 to 125%) to accurately assess the dissipation of fenoxaprop ethyl from soil. In addition, this study would not fulfill data requirements because the method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, the soil pH and CEC were not reported, field test data including air and soil temperatures and precipitation amounts were incomplete, pesticides other than fenoxaprop ethyl were not characterized, and more than one pesticide was applied to the soil which may have affected the dissipation rate of fenoxaprop ethyl.

Table 8. Fenoxaprop ethyl residues (ppm) in the 0- to 3-inch depth of a loam soil treated with fenoxaprop ethyl (1 lb/gal EC) at 0.2 and 1.0 lb ai/A.[a]

Sampling interval (days)	Treatment rate	
	0.2 lb ai/A	1.0 lb ai/A
0	0.081	0.344
4	0.062	0.391
8	0.033	0.270
14	ND[b]	0.109
30	--	0.037
60	--	ND
91	--	ND

[a] Average of three replicate plots.

[b] Not detected; detection limit was 0.02 ppm.

STUDY 6

Johnson, J. and W. Horton. 1985. Analysis of HOE 33171 in soil from Fishers, IN. Hoechst Report No. A31375. American Hoechst Corporation, Somerville, NJ. Acc. No. 258979. Reference J-19.

Procedure

Fenoxaprop ethyl (Acclaim, 1 lb/gal EC) was sprayed on June 2, 1984, at 0.2 and 1.0 lb ai/A onto plots (15 x 20 feet) of clay soil (10% sand, 40% silt, 50% clay, 3.0% organic matter, soil not further characterized) located near Fishers, Indiana. There were three replicate plots per treatment rate and three control plots. The plots were also treated with glyphosate (Roundup) at 1 lb ai/A on June 3 and August 21, 1984. Soil cores (0- to 3-, 3- to 6-, and 6- to 12-inch depth) were collected up to 90 days posttreatment. The soil samples were kept frozen at 0 C until analysis ~5 months after they were collected.

Methodology

The soil samples were analyzed for fenoxaprop ethyl residues using GC as described in Study 4. Recoveries from fortified samples ranged from 65 to 125% and the detection limit was 0.02 ppm fenoxaprop ethyl equivalents.

Results

Fenoxaprop ethyl residues were not detected (<0.02 ppm) in the soil prior to the application of fenoxaprop ethyl. In the soil treated at 0.2 lb ai/A, fenoxaprop ethyl residues were <0.027 ppm in the 6- to 12-inch depth during the 7 days following the application of fenoxaprop ethyl (Table 9). In the soil treated at 1.0 lb ai/A, fenoxaprop ethyl residues dissipated with a half-life of 14-30 days in the 0- to 3-inch depth and were not detected in the 3- to 6- or 6- to 12-inch depths (Table 10).

Conclusions

This study is scientifically invalid because the analytical method was inadequate (recoveries from fortified samples ranged from 65 to 125%) to accurately assess the dissipation of fenoxaprop ethyl from soil. In addition, this study would not fulfill data requirements because the method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, the soil pH and CEC were not reported, the glyphosate was not characterized, field test data were incomplete, and more than one pesticide was applied to the soil which may have affected the dissipation rate of fenoxaprop ethyl. Meteorological data, including soil and air temperatures and rainfall amounts were provided but were illegible.

Table 9. Fenoxaprop ethyl residues (ppm) in clay soil treated with fenoxaprop ethyl (1 lb/gal EC) at 0.2 lb ai/A.

Sampling interval (days)	Replicate	Sampling depth (inches) 0-3	3-6	6-12
0	I	0.046	ND[a]	--
	II	ND	ND	--
	III	0.065	ND	--
4	I	0.038	ND	--
	II	0.023	ND	--
	III	0.042	ND	--
7	I	0.034	ND	ND
	II	ND	ND	0.027
	III	0.046	ND	ND

[a] Not detected; detection limit was 0.02 ppm.

Table 10. Fenoxaprop ethyl residues (ppm) in clay soil treated with fenoxaprop ethyl (1 lb/gal EC) at 1.0 lb ai/A.[a]

Sampling interval (days)	Sampling depth (inches)		
	0-3	3-6	6-12
0	0.127	ND[b]	--
4	0.120	ND	--
7	0.119	ND	ND
14	0.090	ND	ND
30	0.029	ND	ND
60	0.022	ND	ND
90	ND	ND	ND

[a] Average of three replicate plots.

[b] Not detected; detection limit was 0.02 ppm.

STUDY 7

O'Grodnick, J. and J. Grande. 1984. Comparison of total extractable versus dislodgeable pesticide residues in turf grass after application of HOE 33171. Report No. A30857. American Hoechst Corporation, Somerville, NJ. Acc. No. 258979. Reference J-20.

Procedure

Fenoxaprop ethyl (50 g/l EC) was sprayed on September 1, 1983, at 0.25 and 0.50 lb ai/A onto plots (33 x 5 feet) of perennial ryegrass located near Pittstown, New Jersey. There were three plots per treatment and three control plots. After the application of fenoxaprop ethyl, the grass was allowed to dry 15-30 minutes before sampling. Grass samples (1 x 3 foot area) were manually clipped at ground level for total extractable residue analysis. For dislodgeable residue analysis, a separate area (1 ft^2) was vigorously rubbed with dry sterile gauze pads. Each area sampled was marked to prevent resampling. Samples for total extractable residues were taken up to 8 days posttreatment, and for dislodgeable residue samples were taken up to 3 days posttreatment.

Methodology

The grass and gauze wipe samples were analyzed for fenoxaprop ethyl residues using GC as described in Study 4, with the exception that the grass extracts were filtered twice through silicic acid columns for adequate clean-up. Recoveries from fortified grass samples ranged from 74 to 93%; the detection limits were 0.1 ppm for the total extractable residues and 0.5 ppm for the dislodgeable residues.

Results

No rainfall occurred during the study; the air temperature was 80 F at the time of treatment.

No significant concentrations of fenoxaprop ethyl residues were detected in the control plots during the study (Table 11). Dislodgeable fenoxaprop ethyl residues dissipated with a half-life of <3 hours at both application rates, while total extractable residues dissipated with a half-life of 1-3 days.

Conclusions

In plots sprayed with fenoxaprop ethyl (50 g/l EC) at 0.25 and 0.50 lb ai/A, dislodgeable fenoxaprop ethyl residues dissipated with a half-life of <3 hours, while total extractable residues dissipated with a half-life of 1-3 days.

The major deficiency with this study is that the analytical method was nonspecific; the pattern of decline of fenoxaprop ethyl and pattern of formation and decline of fenoxaprop ethyl degradates were not addressed individually. In addition, air temperatures throughout the study were not provided.

Table 11. Total extractable and dislodgeable fenoxaprop ethyl residues (ppm) in turf grass treated with fenoxaprop ethyl (50 g/l EC) at 0, 0.25, and 0.50 lb ai/A.[a]

Application rate (lb ai/A)	Sampling interval	Total extractable residues	Dislodgeable residues
0	15 minutes	--	ND[b]
	3 hours	--	ND
	0 days	ND	--
	1 day	ND	ND
	3 days	<0.1	ND
	8 days	ND	--
0.25	15 minutes	--	11.4
	3 hours	--	1.3
	0 days	18.1	--
	1 day	16.2	<0.76
	3 days	4.3	<0.59
	8 days	4.2	--
0.50	15 minutes	--	10.5
	3 hours	--	1.8
	0 days	25.0	--
	1 day	27.4	1.1
	3 days	10.4	<1.4
	8 days	11.8	--

[a] Average of 3 replicate plots; values reported as < indicate that fenoxaprop ethyl residues were not detected in at least one of the three plots.

[b] Not detected; the detection limit was 0.1 ppm for the total extractable residues and 0.5 ppm for the dislodgeable residues.

STUDY 8

McAllister, W.A., and L. Franklin. Oct., 1984. Uptake, depuration and bioconcentration of HOE 033171 OH ZE99 0001 (chlorophenyl-^{14}C) and HOE 033171 OH ZE99 0002 (dioxyphenyl-^{14}C) by bluegill sunfish (Lepomis macrochirus). American Hoechst Corporation, Somerville, NJ. Acc. No. 258980. Reference J-21 and J-22.

Shaffer, S.R., J.A. Ault, and M. Williams. Apr., 1985. Characterization of ^{14}C-residues of HOE-033171 in water and fish tissue taken from a flow-through bioconcentration study (plus addendum). American Hoechst Corporation, Somerville, NJ. Acc. No. 258981. Reference J-23 and J-24.

Procedure

Bluegill sunfish (Lepomis macrochirus; average length and weight of 64 ± 3.7 mm and 8.0 ± 0.95 g, respectively) were held in culture tanks for >14 days prior to the initiation of the study. Flow through aquatic exposure systems were prepared using three 100-l aquaria equipped with continuous-flow proportional dilution apparatus, as described by Mount and Brungs (1967. Water Res. 1:21). Aerated well water (pH 7.8-8.3, total hardness ($CaCO_3$) 255-275 ppm, dissolved oxygen 9.2-10.2 ppm, alkalinity ($CaCO_3$) 325-375 ppm, conductivity 700 µmhos/cm) was provided to each aquarium at a rate of ~6.9 turnovers/day. Test aquaria were maintained at 22 ± 2 C during the study.

Bluegill (125) were placed in each aquarium. One aquarium was treated with chlorophenyl-ring-labeled [^{14}C]fenoxaprop ethyl (specific activity 26.8 mCi/g, 99.0% pure) and the second was treated with dioxyphenyl-ring-labeled [^{14}C]fenoxaprop ethyl (specific activity 11.35 mCi/g, 99.0% pure), both in acetone, at 0.01 ppm. The third aquarium was a control receiving acetone only.

Water and fish were sampled at 1, 3, 7, 10, 14, 21, and 28 days of exposure. After the exposure period, water in the test aquaria was replaced with untreated water; water and fish were sampled at 1, 3, 7, 10, and 14 days of depuration.

Methodology

Radioactivity in water samples was quantified by LSC. Additional water samples (days 14, 21, and 28 of exposure and 3 and 14 of depuration) were extracted three times with diethyl ether, and the combined extracts were concentrated and spotted onto silica gel TLC plates along with known standards. The plates were developed with toluene:ethyl acetate:water: acetic acid (50:50:0.5:1) and autoradiographed. Radioactive areas were removed from the plates and quantified by LSC.

Fish were dissected into fillet (body, muscle, skin, skeleton) and viscera (fins, head, internal organs), and separate portions were quantified by LSC following combustion. Additional fish samples (days 7 and 21 of exposure, and days 3 and 14 of depuration) were homogenized and extracted three times with acetonitrile. The extracted tissue was air-dried and analyzed by combustion. The acetonitrile extracts were combined, evaporated, and extracted with hexane. The hexane extract was further extracted twice with acetonitrile, and the hexane and all acetonitrile

fractions were analyzed by TLC as previously described. Solvent systems used were toluene:ethyl acetate:water:acetic acid (50:50:0.5:1) and ethyl acetate:isopropyl alcohol:water (65:23:12).

Results

Total radioactivity in water during the exposure period ranged from 0.0060 to 0.013 ppm (Tables 12 and 13). Radioactivity declined to nondetectable levels (<0.00024 ppm) by day 7 of the depuration period. Maximum levels of radioactivity occurred in visceral tissue at 3 days of exposure for both label positions; bioconcentration factors were ~840x and 867x for dioxyphenyl- and chlorophenyl-ring-labeled [^{14}C]fenoxaprop ethyl, respectively. Radioactive residues accumulated in edible tissue with a maximum bioconcentration factor of 40x (chlorophenyl-label, day 21). Accumulated residues were depurated rapidly, with >47% eliminated by day 1 and >83% by day 14.

In water samples, the major component was the free acid of the parent ranging from 67.5 to 84.6% of the total radioactivity in the sample. The free acid of the parent was also the major component of fish tissue samples (~19-32% in fillet and ~46-57% in viscera). 6-Chloro-benzoxazol-2-one accounted for ~15-25% of the radioactivity recovered from viscera, and <6.2% of the radioactivity in fillet.

Conclusions

Chlorophenyl-ring-labeled [^{14}C]fenoxaprop ethyl, at 0.01 ppm, accumulated in bluegill sunfish exposed in a flow-through system. During a 28-day exposure period, bioconcentration factors ranged from 20 to 40x in edible tissue, from 254 to 866x in viscera, and from 112 to 527x in whole fish. Accumulated residues were depurated rapidly, with >47% elimination by day 1 and > 83% by day 14. The major component of the residues accumulated in tissue was the free acid of the parent. Smaller amounts of 6-chloro-benzoxazol-2-one were also present. Comparable results were obtained using dioxyphenyl-ring-labeled [^{14}C]fenoxaprop ethyl.

This study fulfills data requirements by providing information on the accumulation and depuration of chlorophenyl- and dioxyphenyl-ring-labeled [^{14}C]fenoxaprop ethyl in bluegill sunfish.

Table 12. Total radioactivity (ppm) in water and fish tissue during 29 days of exposure to dioxyphenyl-ring-labeled [^{14}C]fenoxaprop ethyl and 14 days of depuration.

Sampling interval (days)	Water	Fillet	Viscera	Whole fish
		Exposure period		
0	0.0085	--	--	--
1	0.0060	0.14	3.7	2.0
3	0.0094	0.21	7.9	4.2
7	0.013	0.26	4.3	2.1
10	0.011	0.28	5.5	3.4
14	0.013	0.29	3.1	2.0
21	0.013	0.20	2.7	2.0
28	0.012	0.17	2.2	1.2
		Depuration period		
1	0.0016	0.052	0.34	0.19
3	0.00024	0.058	0.29	0.12
7	ND[a]	0.035	0.10	0.051
10	ND	0.026	0.093	0.087
14	ND	0.023	0.077	0.047

[a] Not detected; detection limit for water is 0.00024 ppm.

Table 13. Total radioactivity (ppm) in water and fish tissue during 29 days of exposure to chlorophenyl-ring-labeled [^{14}C]fenoxaprop ethyl and 14 days of depuration.

Sampling interval (days)	Water	Fillet	Viscera	Whole fish
		Exposure period		
0	0.0086	--	--	--
1	0.0063	0.24	3.8	2.2
3	0.0090	0.28	7.8	3.4
7	0.012	0.24	6.2	1.7
10	0.010	0.32	7.6	3.5
14	0.013	0.26	4.0	3.0
21	0.013	0.52	5.3	1.9
28	0.013	0.38	3.3	2.8
		Depuration period		
1	0.0022	0.20	1.5	0.42
3	0.0003	0.11	0.44	0.30
7	ND[a]	0.066	0.20	0.19
10	ND	0.077	0.23	0.12
14	ND	0.065	0.15	0.11

[a] Not detected; detection limit for water is 0.00018 ppm.

STUDY 9

Asshauer, J. and C. Klockner. 1982. Partition coefficient between soil and water. American Hoechst Corporation, Somerville, NJ. Acc. No. 258976. Reference J-15.

Procedure

Versuchsfeld sand (0.8% organic carbon, pH 7.0), Neuhofen sand (2.58% organic carbon, pH 6.8), and Hatzenbuhl sandy loam (1.0% organic carbon, pH 5.2) soils were mixed with water to produce 1:10 soil:water slurries (soils not further characterized, water uncharacterized). The slurries were sterilized and treated with fenoxaprop ethyl (98.8% pure) at 0.096-0.719 µg/g. After 24 hours of equilibrating, the soil and water fractions were separated by centrifugation.

Methodology

The water phase was acidified to pH 2 and extracted four times with methylene chloride. The extracts were combined, evaporated to dryness, and redissolved in methanol. The extracts were analyzed for fenoxaprop ethyl using liquid chromatography with UV detection.

Results

Adsorption K values were 24-29 in the Versuchsfeld sand, 180-210 in the Neuhofen sand, and 31-40 in the Hatzenbuhl sandy loam soil. Adsorption appeared to be correlated with the organic carbon content of the soil.

Conclusions

K_{ads} values for fenoxaprop ethyl (98.8% pure) in a water:soil slurry (100:10) were ~26 in a Versuchsfeld sand (0.8% organic carbon), ~36 in a sandy loam soil (1.0% organic carbon), and 188 in a Neuhofen sand (2.58% organic carbon).

This study partially fulfills data requirements for soil mobility by providing information on the adsorption of fenoxaprop ethyl to two sand soils and one sandy loam soil.

STUDY 10

Gildemeister, H. and E. Schmidt. 1984. Anaerobic aquatic metabolism study of the herbicide HOE 033171. Report No. A28731. American Hoechst Corporation, Somerville, NJ. Acc. No. 073932. Reference J-4A.

Procedure

Chlorophenyl ring-labeled [^{14}C]fenoxaprop ethyl (specific activity 4.88 mCi/g, radiopurity 96.3%) in ethanol was added at ~4 mg ai/kg to flasks of loamy sand (2.6% organic carbon, pH 6.8, soil not further characterized) and sandy loam (1.0% organic carbon, pH 5.8, soil not further characterized) soils that had been previously flooded with water and peptone (90:10) and incubated until anaerobic conditions were established (redox potential <140 mV for several days). The flasks were sealed and incubated in the dark at 22 ± 2 C. Entire flasks were removed for analysis 0, 1, 2, 4, 8, 16, and 32 days posttreatment.

Methodology

The samples were extracted with acetonitrile:water (80:20, v:v). A portion of the extract was analyzed for total extractable radioactivity using LSC; the remainder was analyzed using TLC on silica gel plates developed in toluene:ethyl acetate:acetic acid:water (50:50:1:0.5, v:v:v:v). The plates were scraped in 5 mm zones and measured using LSC. Radioactive compounds were identified using GLC/MS. Recovery of fenoxaprop ethyl from fortified samples averaged 92-95%.

Results

[^{14}C]Fenoxaprop ethyl degraded with a half-life of <1 day in both the sandy loam and loamy sand soil under anaerobic conditions (Table 15). The major degradate was 2-[4-(6-chloro-2-benzoxazolyloxy)phenoxy]propionic acid (76.4% of applied on day 2); 6-chloro-2,3-dihydro-benzoxazol-2-one (10.7% on day 2) and 4-(6-chloro-2-benzoxazolyloxy)phenol (1.9% on day 1) were also identified. By day 32, 38.6% of the [^{14}C]residues were unextractable from the soil. The material balance ranged from 83 to 102%.

Conclusions

[^{14}C]Fenoxaprop ethyl (radiopurity 96.3%), at ~4 mg ai/kg, degraded with a half-life of <1 day in flooded sandy loam and loamy sand soils incubated in the dark at 22 ± 2 C. The major degradates were 2-[4-(6-chloro-2-benzoxazolyloxy)phenoxy]propionic acid (76.4% of applied), 6-chloro-2,3-dihydro-benzoxazol-2-one (10.7%), and 4-(6-chloro-2-benzoxazolyloxy)phenol (1.9%).

This study fulfills data requirements by providing information on the anaerobic aquatic metabolism of fenoxaprop ethyl in two West German soils. Minor deficiences that were noted in the study were that the soil textural analyses, the soil CEC, and the detection limit of the method were not reported.

Table 15. [^{14}C]Fenoxaprop ethyl and its degradates (% of applied) in loamy sand and sandy loam soils treated with [^{14}C]fenoxaprop ethyl (radiopurity 96.3%) at ~4 mg ai/kg and incubated under anaerobic conditions (flooded soil) in the dark at 22 C.[a]

Sampling interval (days)	Fenoxaprop ethyl	2-[4-(6-Chloro-2-benzoxazolyloxy) phenoxy]propionic acid	6-Chloro-2,3-dihydro-benzoxazol-2-one	4-(6-Chloro-2-benzoxazolyloxy)-phenol	Un-extractable residues
0	61.0	26.0	3.6	1.9	2.2
1	2.6	74.4	2.2	1.9	8.8
2	0.9	76.4	10.7	ND[b]	8.6
4	1.0	73.8	4.2	ND	15.3
8	0.4	62.1	1.6	ND	18.2
16	0.5	62.4	2.2	ND	34.8
32	0.3	47.7	3.3	ND	38.6

[a] Average of the loamy sand and sandy loam soil data.

[b] Not detected; detection limit not specified.

STUDY 11

Dorn, E., B. Haberkorn, and K. Kunzler. 1983. HOE 033171-14C, aerobic aquatic metabolism in a surface water/sediment system. Report No. A27833. American Hoechst Corporation, Somerville, NJ. Acc. No. 073932. Reference J-5.

Procedure

Chlorophenyl ring-labeled [^{14}C]fenoxaprop ethyl (radiopurity 96%, specific activity 25.4 mCi/g) in acetone was added at 2.8 mg ai/l to a system containing 180 ml of water (pH 6.4) and 20 g of silt loam soil (7.2% sand, 70.4% silt, 32.2% clay, 1.6% organic matter, pH 6.4). The flasks of treated samples were attached to a continuous air flow system in which moistened air moved over the samples then through a Carbosorb CO_2 trap; the samples were gently agitated on a regular basis. Aerobic conditions were monitored with an oxygen electrode. Entire flasks were removed for analysis 24 hours, and 6, 14, 21, and 29 days posttreatment.

Methodology

The soil and water fractions were separated by centrifugation; total radioactivity in each fraction was determined using LSC. The remaining samples were extracted with acetonitrile:water (80:20, v:v), and the extracts were analyzed for total radioactivity by LSC and for specific compounds by TLC and GLC/MS as described in Study 10.

Results

[^{14}C]Fenoxaprop ethyl degraded with a half-life of <6 days in the aerobic water:silt loam soil system (Table 16). The major degradate in both the soil and water fractions was 2-[4-(6-chloro-2-benzoxazolyloxy)phenoxy]propionic acid (60.4 and 48.0% of applied, respectively); 6-chloro-2,3-dihydrobenzoxazol-2-one was identified at ≤9.3% of the applied in the water fraction and ≤3.8% in the soil fraction. By day 29, ~2.3% of the applied ^{14}C was evolved as $^{14}CO_2$. The unextractable residues increased to 25% of the applied by day 29; these residues included quinone-like intermediates formed after cleavage of the heterocycle and biosynthetic products formed from degradates.

Conclusions

[^{14}C]Fenoxaprop ethyl (radiopurity 96%), at ~2.8 mg ai/l, degraded with a half-life of <6 days in an aerobic water:silt loam soil (180:20) system. Fenoxaprop ethyl was recovered only from the soil fraction. The major degradate in both the soil and water fractions was 2-[4-(6-chloro-2-benzoxazolyloxy)phenoxy]propionic acid (60.4 and 40.8% of applied at maximum, respectively); the only other degradate was 6-chloro-2,3-dihydrobenzoxazol-2-one (≤9.3% of applied). By day 29 posttreatment, 25% was evolved as $^{14}CO_2$.

This study fulfills data requirements by providing information on the aerobic aquatic metabolism of fenoxaprop ethyl in a typical Mississippi rice field soil. Minor deficiencies noted in the study were that the temperature of incubation and analytical methods for measuring $^{14}CO_2$ were not provided.

Table 16. [^{14}C]Fenoxaprop ethyl and its degradates (% of applied) in a water:silt loam soil (180:20) aerobic system treated with [^{14}C]fenoxaprop ethyl (radiopurity 96%) at ~2.8 mg ai/l.

Fraction	Compound	Sampling interval (days) 1	6	14	21	29
Soil						
	Fenoxaprop ethyl	39.0	3.5	5.5	ND[a]	ND
	2-[4-(6-Chloro-2-benzoxazolyloxy)-phenoxy]propionic acid	1.6	37.8	25.3	26.2	60.4
	6-Chloro-2-3-dihydrobenzoxazol-2-one	ND	2.2	3.8	2.0	ND
	Unextractable	7.0	8.0	22.0	20.0	25.0
Water						
	Fenoxaprop ethyl	ND	ND	ND	--	--
	2-[4-(6-Chloro-2-benzoxazolyloxy)-phenoxy]propionic acid	47.0	48.0	42.1	42.3	13.0
	6-Chloro-2,3-dihydrobenzoxazol-2-one	5.2	ND	ND	9.3	ND
CO_2		--	0.2	0.7	0.8	2.3

[a] Not detected; detection limit not specified.

STUDY 12

Richards, S. and L. Wilkes. 1985. Storage stability study for HOE 33171 in soil (2 years). ADC Project No. 697-G. American Hoechst Corporation, Somerville, NJ. Acc. No. 073932. Reference J-8.

Procedure

Fenoxaprop ethyl (test substance uncharacterized), at 0.20 and 0.50 ppm, was added to uncharacterized soil and stored under unspecified conditions for up to 734 days. Samples were taken for analysis after 0, 27, 70, 114, 174, 276, 358, 566, and 734 days of storage.

Methodology

The soil samples were Soxhlet-extracted for 16 hours with 20% ethanol in hydrochloric acid. The extract was cooled, partitioned three times with ethyl acetate, and the combined ethyl acetate extracts were concentrated by evaporation. The extract was refluxed for 1 hour with acetic anhydride, then partitioned three times with hexane. The hexane extract was filtered through a silica acid column and the eluate analyzed for fenoxaprop ethyl residues using GC equipped with a ^{63}Ni electron capture detector. The detection limit was 0.05 ppm. Recovery from fortified soil samples ranged from 80 to 120%.

Results

The recovery of fenoxaprop ethyl residues from stored samples ranged from 72 to 149% of the applied with no discernable pattern.

Conclusions

This study is scientifically invalid because the analytical methodology was inadequate (it was nonspecific and recovery from fortified samples was too variable) to accurately access the concentration of fenoxaprop ethyl in soil. Major deficiencies with the study were the test substance was not characterized, the soil was not characterized, and storage conditions were not defined.

STUDY 13

Strachan, F., J. Johnson, and J. O'Grodnick. 1984b. Analysis of HOE 33171 in soil from Rosa, LA. American Hoechst Corporation, Somerville, NJ. Acc. No. 073933. Reference J-9.

American Hoechst Corporation. 1984a. Analysis of HOE 33171 in water samples. American Hoechst Corporation, Somerville, NJ. Acc. No. 073939. Reference J-18.

Procedure

Fenoxaprop ethyl (0.75 lb/gal EC), at 0.2 and 0.4 lb ai/A, was applied as a postemergent herbicide to rice plots (3000 ft^2) containing silt loam soil (18% sand, 68% silt, 14% clay, 0.9% organic matter) located near Rosa, Louisiana, on June 28, 1983. There was one plot per treatment rate and one control plot. Soil samples (0- to 3-, 3- to 6-, and 6- to 12-inch depth) were taken 0 and 80 days posttreatment; irrigation water samples were taken from the plots 4, 18, and 70 days posttreatment.

Methodology

The soil and water samples were analyzed for fenoxaprop ethyl residues using GC as described in Study 4. The detection limit was 0.05 ppm in soil and 0.02 in water.

Results

Fenoxaprop ethyl residues were not detected (<0.05 ppm) in the control and the soil treated at 0.2 lb ai/A at both sampling intervals. In the soil treated at 0.4 lb ai/A, residues were 0.172 ppm in the 0- to 3-inch depth immediately after treatment, but were not detected in deeper samples or at the 80 day sampling interval.

Fenoxaprop ethyl residues were not detected (<0.2 ppm) in the irrigation water at any sampling interval.

Conclusions

This study is scientifically invalid because the sampling protocol and analytical methodology (recoveries ranged from 65 to 125%) were inadequate to accurately assess the dissipation of fenoxaprop ethyl. In addition, this study would not fulfill data requirements because pretreatment soil samples were not analyzed, the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, the soil was incompletely characterized, and field test data such as temperature, rainfall, and irrigation amounts, were not provided.

STUDY 14

Kinney, D., J. Johnson, and J. O'Grodnick. 1984. Analysis of HOE 33171 in soil from Steele, MO. American Hoechst Corporation, Somerville, NJ. Acc. No. 073933. Reference J-10.

American Hoechst Corporation. 1984a. Analysis of HOE 33171 in water samples. American Hoechst Corporation, Somerville, NJ. Acc. No. 073939. Reference J-18.

Procedure

Fenoxaprop ethyl (0.75 lb/gal EC), at 0.2 and 0.4 lb ai/A, was applied as a postemergent herbicide to rice plots (uncharacterized) containing Dundee clay loam soil (10% sand, 34% silt, 56% clay, 2.2% organic matter) located near Steele, Missouri, on July 1, 1983. There was one plot per treatment rate and one control plot. Soil samples (0- to 3-, 3- to 6-, and 6- to 12-inch depth) were taken and 0 and 106 days posttreatment; irrigation water samples were taken from the plots 5, 18, and 82 days posttreatment.

Methodology

The soil and water samples were analyzed for fenoxaprop ethyl residues using GC as described in Study 4. The detection limit was 0.05 ppm in soil and 0.02 ppm in water.

Results

Fenoxaprop ethyl residues were not detected (<0.05 ppm) either in the control and the soil treated at 0.2 lb ai/A at both sampling intervals. In the soil treated at 0.4 lb ai/A, residues were 0.173 ppm in the 0- to 3-inch depth immediately after treatment, but were not detected in deeper samples or at the 106 day sampling interval.

Fenoxaprop ethyl residues were not detected (<0.2 ppm) in the irrigation water at any sampling interval.

Conclusions

This study is scientifically invalid because the sampling protocol and analytical methodology (recoveries ranged from 65 to 125%) were inadequate to accurately assess the dissipation of fenoxaprop ethyl. In addition, this study would not fulfill data requirements because pretreatment soil samples were not analyzed, the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, the soil was incompletely characterized, and field test data such as temperature, rainfall, and irrigation amounts, were not provided.

STUDY 15

Strachan, F., J. Johnson, and J. O'Grodnick. 1984a. Analysis of HOE 33171 in soil from Choctaw, MS. American Hoechst Corporation, Somerville, NJ. Acc. No. 073933. Reference J-11.

Procedure

Fenoxaprop ethyl (0.75 lb/gal EC), at 0.2 and 0.4 lb ai/A, was applied as a postemergent herbicide to rice plots (190 ft^2) containing clay soil (soil not further characterized) located near Choctaw, Mississippi, on June 7, 1983. There were two plots per treatment and one control plot. Soil samples (0- to 3-, 3- to 6-, and 6- to 12-inch depth) were taken 107 days posttreatment.

Methodology

Soil samples were analyzed for fenoxaprop ethyl residues using GC as described in Study 4. The detection limit was 0.05 ppm.

Results

Fenoxaprop ethyl residues were not detected (<0.05 ppm) in any sample.

Conclusions

This study is scientifically invalid because the sampling protocol (one sampling interval) and analytical methodology (recoveries ranged from 65 to 125%) were inadequate to accurately assess the dissipation of fenoxaprop ethyl. In addition, this study would not fulfill data requirements because pretreatment and immediate posttreatment soil samples were not analyzed, the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, the soil was incompletely characterized, and field test data such as temperature, rainfall, and irrigation amounts, were not provided.

STUDY 16

Thomas, J., J. Johnson, and J. O'Grodnick. 1984a. Analysis of HOE 33171 in soil from Leland, MS. American Hoechst Corporation, Somerville, NJ. Acc. No. 073933. Reference J-12.

Procedure

Fenoxaprop ethyl (90 g/l EC), at 0.2 and 0.4 lb ai/A, was applied as a postemergent herbicide to rice plots (2965 ft^2) containing silty clay soil (soil not further characterized) located near Leland, Mississippi, on May 26, 1983. There was one plot per treatment and one control plot. Soil samples (0- to 3- and 3- to 6-inch depth) were taken immediately after treatment.

Methodology

Soil samples were analyzed for fenoxaprop ethyl residues using GC as described in Study 4. The detection limit was 0.05 ppm.

Results

Fenoxaprop ethyl residues were not detected (<0.05 ppm) in any sample.

Conclusions

This study is scientifically invalid because the sampling protocol (one sampling interval) and analytical methodology (recoveries ranged from 65 to 125%) were inadequate to accurately assess the dissipation of fenoxaprop ethyl. In addition, this study would not fulfill data requirements because pretreatment and immediate posttreatment soil samples were not analyzed, the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, the soil was incompletely characterized, and field test data such as temperature, rainfall, and irrigation amounts, were not provided.

STUDY 17

Todd, L., J. Johnson, and J. O'Grodnick. 1984. Analysis of HOE 33171 in soil from Dayton, TX. American Hoechst Corporation, Somerville, NJ. Acc. No. 073933. Reference J-13.

Procedure

Fenoxaprop ethyl (0.75 lb/gal EC), at 0.2 and 0.4 lb ai/A, was applied as a postemergent herbicide to rice plots (266.7 ft^2) containing clay soil (soil not further characterized) located near Dayton, Texas, on May 26, 1983. There were two plots per treatment and one control plot. Soil samples (0- to 3-, 3- to 6-, and 6- to 12-inch depth) were taken 92 days posttreatment.

Methodology

Soil samples were analyzed for fenoxaprop ethyl residues using GC as described in Study 4. The detection limit was 0.05 ppm.

Results

Fenoxaprop ethyl residues were not detected (<0.05 ppm) in any sample.

Conclusions

This study is scientifically invalid because the sampling protocol (one sampling interval) and analytical methodology (recoveries ranged from 65 to 125%) were inadequate to accurately assess the dissipation of fenoxaprop ethyl. In addition, this study would not fulfill data requirements because pretreatment and immediate posttreatment soil samples were not analyzed, the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, the soil was incompletely characterized, and field test data such as temperature, rainfall, and irrigation amounts, were not provided.

STUDY 18

Green, R., J. Johnson, and J. O'Grodnick. 1984. Analysis of HOE 33171 in soil from Lane City, TX. American Hoechst Corporation, Somerville, NJ Acc. No. 073933. Reference J-14.

American Hoechst Corporation. 1984a. Analysis of HOE 33171 in water samples. American Hoechst Corporation, Somerville, NJ. Acc. No. 073939. Reference J-18.

Procedure

Fenoxaprop ethyl (0.75 lb/gal EC), at 0.2 and 0.4 lb ai/A, was applied as a postemergent herbicide to rice plots (1000 ft^2, soil not further characterized) located near Lane City, Texas, on June 2, 1983. There was one plot per treatment and one control plot. Soil samples (0- to 3-, 3- to 6-, and 6- to 12-inch depth) were taken 0 and 84 days posttreatment; irrigation water samples were taken from the plots 6, 20, and 69 days posttreatment.

Methodology

The soil and water samples were analyzed for fenoxaprop ethyl residues using GC as described in Study 4. The detection limit was 0.05 ppm in soil and 0.02 ppm in water.

Results

Fenoxaprop ethyl residues were not detected in either the soil (<0.05 ppm) or water (<0.02 ppm) at any sampling interval.

Conclusions

This study is scientifically invalid because the sampling protocol and analytical methodology (recoveries ranged from 65 to 125%) were inadequate to accurately assess the dissipation of fenoxaprop ethyl. In addition, this study would not fulfill data requirements because pretreatment soil samples were not analyzed, the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, the soil was incompletely characterized, and field test data such as temperature, rainfall, and irrigation amounts, were not provided.

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STUDY 19

Thomas, J., J. Johnson, and J. O'Grodnick. 1984b. Analysis of HOE 33171 HOE 33171 in soil from Leland, MS. American Hoechst Corporation, Somerville, NJ. Acc. No. 073933. Reference J-15.

American Hoechst Corporation. 1984a. Analysis of HOE 33171 in water samples. American Hoechst Corporation, Somerville, NJ. Acc. No. 073939. Reference J-18.

Procedure

Fenoxaprop ethyl (120 g/l EC), at 0.15 and 0.30 lb ai/A, was applied as a postemergent herbicide to rice plots (4560 ft^2) containing silty clay soil (2% sand, 48% silt, 50% clay, 2% organic matter, pH 6.7) located near Leland, Mississippi, on June 11, 1984. There were three plots per treatment and three control plots. Soil samples (0- to 1-, 1- to 3-, and 3- to 6-inch depth) were taken from the treated plots immediately after treatment, and 25, 75, 150, and 300 feet from the irrigation discharge levy 73 and 107 days after treatment. Irrigation water samples were taken 8, 14, 21, 38, and 72 days after treatment.

Methodology

The soil and water samples were analyzed for fenoxaprop ethyl residues using GC as described in Study 4. The detection limit was 0.05 ppm in soil and 0.02 ppm in water.

Results

Fenoxaprop ethyl residues were not detected in any soil (<0.05 ppm) or water (<0.02 ppm) samples at any sampling interval.

Conclusions

This study is scientifically invalid because the sampling protocol and analytical methodology (recoveries ranged from 65 to 125%) were inadequate to accurately assess the dissipation of fenoxaprop ethyl. In addition, this study would not fulfill data requirements because pretreatment soil samples were not analyzed, the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, the soil was incompletely characterized, and field test data such as temperature, rainfall, and irrigation amounts, were not provided.

STUDY 20

Bertges, W., J. Johnson, and J. O'Grodnick. 1985. Analysis of HOE 33171 in soil from Walnut, IA. American Hoechst Corporation, Somerville, NJ. Acc. No. 073934. Reference J-15A.

Procedure

Fenoxaprop ethyl (1 lb/gal EC), at 1.0 lb ai/A, was applied to plots (1600 ft^2) of silty clay loam soil (14.9% sand, 50% silt, 35.1% clay, 4.2% organic matter) located near Walnut, Iowa, on June 19 and July 5, 1984. Soil samples (0- to 3- and 3- to 6-inch depth) were taken prior to treatment, 0, and 16 days after the first application and 0, 15, 30, and 87 days after the second application.

Methodology

The soil samples were analyzed for fenoxaprop ethyl residues using GC as described in Study 4. The detection limit was 0.05 ppm.

Results

Fenoxaprop ethyl residues in the 0- to 3-inch soil depth were 0.170 ppm immediately after the first application of fenoxaprop ethyl and 0.058 ppm immediately after the second application; they were not detected (<0.05 ppm) in the 3- to 6-inch depth soil or at any other sampling interval.

Conclusions

This study is scientifically invalid because the sampling protocol and analytical methodology (recoveries ranged from 65 to 125%) were inadequate to accurately assess the dissipation of fenoxaprop ethyl. In addition, this study would not fulfill data requirements because the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, and field test data such as temperature, rainfall, and irrigation amounts, were not provided.

STUDY 21

Thomas, J., J. Johnson, and J. O'Grodnick. 1984c. Analysis of HOE 33171 in soil from Leland, MS. American Hoechst Corporation, Somerville, NJ. Acc. No. 073934. Reference J-16.

Procedure

Fenoxaprop ethyl (120 g/l EC), at 1.0 lb ai/A, was applied to plots (1134 ft^2) of silty clay soil (2% sand, 48% silt, 50% clay, 2% organic matter) located near Leland, Mississippi, on July 11 and August 8, 1984. Soil samples (0- to 3- and 3- to 6-inch depth) were taken prior to treatment, 0, and 27 days after the first application, and 0 days after the second application.

Methodology

The soil samples were analyzed for fenoxaprop ethyl residues using GC as described in Study 4. The detection limit was 0.05 ppm.

Results

Fenoxaprop ethyl residues were 0.09 ppm in the 0- to 3-inch depth immediately after the second treatment; they were not detected (<0.05 ppm) at the 3- to 6-inch depth or at any other sampling interval.

Conclusions

This study is scientifically invalid because the sampling protocol and analytical methodology (recoveries ranged from 65 to 125%) were inadequate to accurately assess the dissipation of fenoxaprop ethyl. In addition, this study would not fulfill data requirements because the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, the soil was incompletely characterized, and field test data such as temperature, rainfall, and irrigation amounts, were not provided.

STUDY 22

Grande, J., J. Johnson, and J. O'Grodnick. 1985. Analysis of HOE 33171 in soil from Painter, VA. American Hoechst Corporation, Somerville, NJ. Acc. No. 073934. Reference J-17.

American Hoechst Corporation. 1984a. Analysis of HOE 33171 in water samples. American Hoechst Corporation, Somerville, NJ. Acc. No. 073939. Reference J-18.

Procedure

Fenoxaprop ethyl (10% EC), at 0.02 lb ai/A, was applied as a postemergent herbicide to fields (14 acres) of soybeans containing Nimo fine sandy loam and Bojac's loamy sand soils (0-3% slopes, soils not further characterized) located near Painter, Virginia, on July 27, 1983. The treated fields were located ~200 feet from a pond; a grassy perimeter (3-8 foot width) surrounded the pond. Soil samples (0- to 3-, 3- to 6-, and 6- to 9-inch depth) were taken from the treated area, the adjacent grassy area, and the pond sediment 0, 18, 60, and 115 days after treatment. Water samples were taken from various sites in the pond 0, 18, 60, 115, and 183 days after treatment. Samples of water and soil were stored frozen for up to 20 months until analysis.

Methodology

The soil and water samples were analyzed for fenoxaprop ethyl residues using GC as described in Study 4. The detection limit was 0.05 ppm in soil and 0.02 ppm in water.

Results

During the 18 days following the application of fenoxaprop ethyl, air temperature ranged from 62 to 95 F and 0.77 inches of rain were received.

Fenoxaprop ethyl residues ranged from 0.08-0.18 ppm in soil from the 0- to 3-inch depth of the treated area immediately after treatment. They were not detected in any other soil (<0.05 ppm), sediment (<0.05 ppm), or water (<0.02 ppm) samples at any sampling interval.

Conclusions

This study is scientifically invalid because the analytical methodology (recoveries ranged from 65 to 125%) was inadequate to accurately assess the dissipation of fenoxaprop ethyl. In addition, this study would not fulfill data requirements because the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, and the soil was incompletely characterized.

STUDY 23

American Hoechst Corporation. 1984a. Analysis of HOE 33171 in water samples. American Hoechst Corporation, Somerville, NJ. Acc. Nos. 073939 and 073935. Reference J-18.

Procedure

Fenoxaprop ethyl (0.75 lb/gal EC), at 0.15 or 0.30 lb ai/A, was applied as a postemergent herbicide to irrigated rice plots located in Arkansas, California, and Mississippi (Table 17). Samples of the irrigation water were collected up to 105 days posttreatment.

Methodology

The water samples were analyzed for fenoxaprop ethyl residues using GC as described in Study 4. The detection limit was 0.02 ppm.

Results

Fenoxaprop ethyl residues were not detected (<0.02 ppm) at either the Arkansas or Mississippi sites (Table 17). At the California site, residues were <0.14 at all sampling intervals.

Conclusions

The data from the Arkansas and Mississippi sites are scientifically invalid because the application of fenoxaprop ethyl was never confirmed by demonstrating the presence of fenoxaprop ethyl in the samples. The data from California cannot be validated because the description of the test site and sampling protocol were inadequate so it could not be determined if fenoxaprop ethyl dissipated in the treated area or was flushed into an adjacent body of water. This study would not fulfill data requirements because pretreatment and immediate posttreatment samples were not analyzed (except California), the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, the test soil and water were not completely characterized, sediment samples were not taken, and field test data such as temperatures and rainfall amounts were not reported.

Table 17. Site descriptions and fenoxaprop ethyl residue concentrations (ppm) for the aquatic field dissipation studies on irrigated rice.

Location	Plot size (Acres)	Application rate (lb ai/A)	Sampling interval	Fenoxaprop ethyl residues (ppm)
Pickens, Arkansas	5	0.15	9 days	ND[a]
			87 days	ND
Rollling Fork, Mississippi	5	0.15	9 days	ND
			80 days	ND
Biggs, California	0.4	0.30	0 hours	0.07
			12 hours	0.12
			24 hours	0.14
			36 hours	0.08
			2 days	0.04
			3 days	0.04
			4 days	0.03
			5 days	ND
			10 days	ND
			14 days	ND
			21 days	ND

[a] Not detected; detection limit was 0.02 ppm.

STUDY 24

Schwalbe-Fehl, M. and H. Kocher. 1984. HOE 033171-(chlorophenyl-U-14-C), confined accumulation study on rotational crops - planting of crops 30 days after treatment of the soil. Report No. A30300. American Hoechst Corporation, Somerville, NJ. Acc. No. 073935. Reference J-21.

Procedure

Chlorophenyl ring-labeled [^{14}C]fenoxaprop ethyl (radiopurity ~98%, specific activity 26.8% mCi/g) in water was applied at 0.15 kg ai/ha to the surface of silt loam soil (11.6% sand, 72.2% silt, 16.2% clay, 1.25% organic matter, pH 7.9) contained in stainless steel tubs (0.5 m x 0.5 m x 40 cm depth). The soil was incubated in the greenhouse exposed to sunlight at 18-26 C. The soil was flooded 12 days posttreatment (simulating rice plant cultivation) and drained 23 days posttreatment. At 30 days posttreatment, soybeans, spinach, carrots, and radishes were planted in the treated soil and the tubs were moved outside.

Soil samples (0- to 5-, 5- to 10-, and 10- to 15-cm depth) were taken on the days of treatment (day 0), planting (day 29), and harvest (days 65 and 153). The radishes and spinach were sampled 21 and 34 days after planting (51 and 64 days after treatment), the soybeans 34 and 123 days after planting (64 and 153 days), and the carrots 123 days after planting (153 days).

Methodology

Total radioactivity in the soil samples was analyzed using LSC following combustion. For the samples taken at 29, 65, and 153 days posttreatment, the soil was extracted with acetonitrile:water (4:1). The extract was separated using TLC on silica gel plates developed in toluene:ethyl acetate:acetic acid:water (50:50:1:0.5:, v:v:v:v); the distribution of radioactivity on the plates was determined using an automatic TLC-linear analyzer. Radioactive compounds were identified by comparison to standards. The acetonitrile-extracted soil was further extracted with hydrochloric acid for 8 hours by refluxing. A portion of the extract was analyzed using TLC as described; the extracted soil and extract were analyzed for total radioactivity by LSC. The detection limit (background radioactivity) ranged from 0.0005 to 0.039 ppm fenoxaprop ethyl equivalents, depending on sample type and number.

Results

On the day the crops were planted (day 29), the soil contained 0.003 ppm of [^{14}C]fenoxaprop ethyl, 0.069 ppm of 2-[4-(6-chloro-2-benzoxazolyloxy)-phenoxy]propionic acid, and 0.004 ppm of both 6-chloro-2,3-dihydrobenzoxazol-2-one and 4-(6-chloro-2-benzoxazolyloxy)phenol; 99.8% of the [^{14}C]-residues originally applied to the soil were recovered (Table 18).

[^{14}C]Fenoxaprop ethyl residues were below the detection limit in the leaves (<0.003 ppm fenoxaprop ethyl equivalents) and roots (<0.039 ppm) of immature radishes, leaves (<0.001 ppm) and roots (<0.001 ppm) of mature radishes, and leaves (<0.001 ppm) and stems (<0.001 ppm) of mature spinach. [^{14}C]-Residues were 0.001 ppm fenoxaprop ethyl equivalents in leaves of immature spinach (detection limit 0.0005 ppm) and 0.020 ppm in roots of mature

spinach (detection limit 0.014 ppm). Immature spinach stems and roots were not analyzed because of insufficient sample material. [^{14}C]Residues were <0.009 ppm (fenoxaprop ethyl equivalents on a dry weight basis) in the leaves, stems, beans, and hulls of mature soybeans [not detected (<0.003 ppm) in immature soybeans]. In carrot leaves and roots, [^{14}C]fenoxaprop ethyl residues were not detected (<0.009 ppm).

Conclusions

[^{14}C]Fenoxaprop ethyl residues were not detected (detection limit ranged from 0.0005 to 0.039 ppm fenoxaprop ethyl equivalents) in radishes (tops and roots), mature spinach (leaves and stems), immature soybeans (whole plant), and carrots (tops and roots) planted in silt loam soil 29 days after the soil was treated with [^{14}C]fenoxaprop ethyl (radiopurity ~98%) at 0.15 kg ai/ha. [^{14}C]Residues were 0.020 ppm fenoxaprop ethyl equivalents in the roots of mature spinach, and ranged from 0.002 to 0.009 ppm in the leaves, stems, beans, and hulls of mature soybeans. At the time of planting, the soil contained 0.003 ppm of fenoxaprop ethyl, 0.069 ppm of 2-[4-(6-chloro-2-benzoxazolyloxy)phenoxy]propionic acid, and 0.004 ppm each of 6-chloro-2,3-dihydro-benzoxazol-2-one and 4-(6-chloro-2-benzoxazolyloxy)phenol.

This study fulfills data requirements by providing information on the accumulation of fenoxaprop ethyl by confined rotational crops (30 day treatment to planting interval).

Table 18. [^{14}C]Fenoxaprop ethyl and its residues (ppm) in silt loam soil treated with [^{14}C]fenoxaprop ethyl (radiopurity ~98%) at 0.15 kg ai/ha.

[^{14}C]Compound	Sampling interval (days)		
	29	65	153
Fenoxaprop ethyl	0.003	ND[a]	0.003
2-[4-(6-Chloro-2-benzoxazolyloxy)phenoxy]-propionic acid	0.069	0.084	0.043
6-Chloro-2,3-dihydro-benzoxazol-2-one	0.004	0.009	0.004
4-(6-Chloro-2-benzoxazolyloxy)phenol	0.004	0.006	0.003
Polar compounds	0.009	0.015	0.007
Unextractable compounds	0.143	0.128	0.178

[a] Not detected; detection limit for the TLC method was not specified.

STUDY 25

Kuhner, M. and J. O'Grodnick. 1985. Long-term field dissipation and 3-year rotational crop study of HOE-033171 in Crown Point, IN. American Hoechst Corporation, Somerville, NJ. Acc. Nos. 073936, 073937, 073938, and 073940. Reference No. J-23.

Procedure

Fenoxaprop ethyl (EC), at 0.2 and 0.4 lb ai/A, was applied as a postemergent herbicide to soybean fields (40 x 80 feet, 1.9% slope) containing clay loam soil (27% sand, 43% silt, 30% clay, 2.8% organic matter, pH 6.3) located near Crown Point, Indiana. The herbicide was applied on July 25, 1982; a portion of the fields were retreated on August 7, 1982. A portion of the plots treated with fenoxaprop ethyl in 1982 were retreated in 1983 (July 26 and August 12); some fields treated in 1982 and 1983 were retreated in 1984 (July 30 and August 17).

Following the soybean harvest in 1982 and 1983, the treated soil was replanted with lettuce (291 days posttreatment), radishes (291 days posttreatment), wheat (79-97 days posttreatment), carrots (266-283 days posttreatment), and corn (290-303 days posttreatment).

Soil samples (0- to 3-, 3- to 6-, and 6- to 12-inch depth) were taken before and immediately after treatment, and at regular intervals up to 448 days posttreatment. The rotational crops were harvested at maturity in 1983, and at quarter, half, and full maturity in 1984. All samples were kept frozen until analysis.

Methodology

Soil and plant samples were analyzed for fenoxaprop ethyl residues using GC as described in Study 4. The detection limit was 0.05 ppm for soil and plant samples. Recovery of fenoxaprop ethyl residues from fortified samples ranged from 70 to 140% in soil and from 53.2 to 122.1% in plants.

Results

Fenoxaprop ethyl residues, immediately after the application of fenoxaprop ethyl, ranged from <0.05 (detection limit) to 0.096 ppm in the soil treated at 0.2 lb ai/A, and from 0.059 to 0.245 ppm in the soil treated at 0.4 lb ai/A. Fenoxaprop ethyl residues were <0.05 ppm at all other sampling intervals.

Fenoxaprop ethyl residues were not detected (<0.05 ppm) in lettuce (leaves), radishes (roots and tops), corn (silage, cobs, husks, and grain), wheat (foliage and grain), and carrots (leaves and roots) at all stages of development.

Conclusions

This study was conducted according to EPA Guidelines and good scientific practices, and is reported adequately. However, the data are scientifically invalid because the analytical method was inadequate to accurately

assess the concentration of fenoxaprop ethyl residues in soil and plants. Recovery of fenoxaprop ethyl residues from freshly treated samples was too variable, ranging from 70 to 140% in soil and 53.2 to 122.1% in plants. Also, the method was not specific; it did not distinguish between fenoxaprop ethyl and its degradates.

STUDY 26

O'Grodnick, J. 1985b. Long-term field dissipation and 3-year rotational crop study of HOE-033171 in York, NE. American Hoechst Corporation, Somerville, NJ. Acc. Nos. 073941, 073942, 073943, 073944, and 073945. Reference No. J-24.

Procedure

Fenoxaprop ethyl (1 lb/gal EC), at 0.2 and 0.4 lb ai/A, was applied as a postemergent herbicide to soybean fields (20 x 80 ft, 1% slope) containing silt loam soil (20% sand, 57% silt, 23% clay, 2.3% organic matter, pH 6.4) located near York, Nebraska. The herbicide was applied in July, 1982, July, 1983, and June, 1984; a portion of the fields were retreated in July, 1984.

Following the soybean harvest in 1982 and 1983 the treated soil was replanted with wheat (50-92 days posttreatment), alfalfa (50-288 days posttreatment), sugar beets (265-288 days posttreatment), sorghum (301-324 days posttreatment), carrots (292-313 days posttreatment), and corn (298-319 days posttreatment). Following the soybean harvest in 1984, the soil was replanted with wheat (62-84 days posttreatment).

Soil samples (0- to 3-, 3- to 6-, and 6- to 12-inch depth) were taken only during 1984: ~322 days after the soil was treated in 1983; immediately before the 1984 treatment; immediately after the first and second 1984 treatments; and 21, 100, and 121 days after the second 1984 treatment. The rotational crops were harvested at quarter, half, and full maturity; wheat planted following the 1984 harvest was sampled only at quarter maturity. All samples were kept frozen until analysis.

Methodology

Soil and plant samples were analyzed for fenoxaprop ethyl residues using GC as described in Study 4. The detection limit was 0.05 ppm. Recovery from fortified samples ranged from 58 to 77% in soil and from 51 to 124% in plants.

Results

Fenoxaprop ethyl residues, immediately after the application of fenoxaprop ethyl in 1984, were <0.05 ppm (detection limit) in the soil treated at 0.2 lb ai/A, and ranged from <0.05 to 0.117 ppm in the soil treated at 0.4 lb ai/A. Fenoxaprop ethyl residues were not detected in any other soil samples.

Fenoxaprop ethyl residues were not detected (<0.05 ppm) in wheat (foliage, grain, and straw), alfalfa (hay), sugar beets (tops and roots), sorghum (grain and fodder), carrot (tops and roots) and corn (silage, fodder, seed, cob, and husk).

Conclusions

All data except the 1984 wheat data are invalid because the application of fenoxaprop ethyl to the soil at the stated rate was not confirmed by

samples taken at the time of treatment. All data, including the 1984 wheat data, cannot be validated because the analytical method is inadequate to accurately assess the concentration of fenoxaprop ethyl in soil and plants. This study would not fulfill data requirements because the method was nonspecific and insufficient sampling of the treated soils was performed.

STUDY 27

O'Grodnick, J. 1985a. Long-term field dissipation and 3-year rotational crop study of HOE-033171 in Leland, MS. American Hoechst Corporation, Somerville, NJ. Acc. Nos. 073946, 073947, and 073948. Reference J-25.

Procedure

Fenoxaprop ethyl (EC), at 0.2 and 0.4 lb ai/A, was applied as a postemergent herbicide to soybean fields (380 ft^2, 1% slope) containing silty clay soil (2% sand, 48% silt, 50% clay, 2% organic matter, pH 6.4) located near Leland, Mississippi. The soil was treated in July and August, 1981; a portion of the fields were retreated in July and August, 1982.

Following the soybean harvest in 1981 and 1982, the treated soil was replanted with wheat (74-473 days posttreatment), turnips (73-472 days posttreatment), radishes (266-634 days posttreatment), and sorghum (290-689 days posttreatment). Soil samples (0- to 3-, 3- to 6-, and 6- to 12-inch depth) were taken 0, 97, and 220 days after the 1981 treatments; no samples were taken following the 1982 treatment. Plant samples were taken when the rotational crops were mature.

Methodology

Soil and plant samples were analyzed for fenoxaprop ethyl residues using GC as described in Study 4. The detection limit was 0.05 ppm. Recovery from fortified samples ranged from 52 to 104% in soil and from 52 to 134% in plants.

Results

Fenoxaprop ethyl residues were <0.05 ppm (detection limit) in all soil and plant samples.

Conclusions

This study is scientifically invalid because the analytical method was inadequate (recovery was too variable) to adequately assess the concentration of fenoxaprop ethyl in soil and plants, and because the application of fenoxaprop ethyl to the soil was not confirmed. No soil samples were provided following the 1982 application, and no residues were detected following the 1981 treatment even in samples taken immediately after treatment. This study would not fulfill data requirements because the sampling intervals were inappropriate.

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STUDY 28

Schwalbe-Fehl, M. 1984. HOE 033171, Assessment of the residue situation in irrigated crops. Report No. A30351. American Hoechst Corporation, Somerville, NJ. Acc. No. 073948. Reference J-28.

Procedure

Three studies, two in the greenhouse and one in containers outdoors, were conducted to determine the concentration of [^{14}C]fenoxaprop ethyl residues in water used to irrigate fields treated with [^{14}C]fenoxaprop ethyl at 0.07-0.15 kg ai/ha (Table 19). The rice or soil surfaces were sprayed with [^{14}C]fenoxaprop ethyl and then the soil was flooded 2-12 days after application. Water samples were taken between 0.5 hours and 149 days following the flooding (Table 20). In two studies, the water level was held constant, while in the third study, the level decreased from a 5.2 to 2.8 cm depth during the 224 hour period.

Methodology

Water samples from all three studies were measured directly by LSC. In addition, water samples from Study III taken 168 hours after flooding were analyzed using LSC on silica gel plates developed in toluene:ethyl acetate: water:acetic acid (50:50:0.5:1, v:v:v:v). The plates were analyzed using an automatic TLC-Linear Analyzer, and radioactive compounds were identified by comparison to standards.

Results

In the studies in which fenoxaprop ethyl was applied to rice, the maximum concentration of radioactive residues (1.7-6.5% of the applied) occurred ~6 hours after the soil was flooded (Table 20). In the study in which fenoxaprop ethyl was applied to the soil surface, the maximum concentration (18.1% of the applied) occurred 4 days after flooding. Residues in the water were much higher when the pesticide was applied to bare soil rather than rice. In 168 hour Study III water sample, 91.2% of the radioactive residues were 2-[4-(6-chloro-2-benzoxazolyloxy)phenoxy]propionic acid, 3.5% were 6-chloro-2,3-dihydrobenzoxazol-2-one, and 5.3% were polar compounds.

Conclusions

Maximum [^{14}C]fenoxaprop ethyl residue concentrations in irrigation water were 1.7-6.5% of the applied (maximum 0.055 mg equivalents/l) and occurred ~6 hours after flooding (2-6 days posttreatment) in samples where [^{14}C]fenoxaprop ethyl (1 lb/gal EC) was applied as a postemergent herbicide to rice at 0.07-0.17 lb ai/A. When [^{14}C]fenoxaprop ethyl was applied to a bare soil surface at 0.15 lb ai/A, maximum residues were 18.1% (0.063 mg/l) of the applied and occurred 4 days after flooding; 91.2% of the residues were 2-[4-(6-chloro-2-benzoxazolyloxy)phenoxy]propionic acid.

This is an ancillary study submitted to provide information on the concentration of fenoxaprop ethyl residues in irrigation water. The study is scientifically valid; however, several deficiencies exist. [^{14}C]Residues were not characterized in all experiments or at multiple sampling intervals. Also, the concentration of residues in the soil and the nature of those residues was not specified.

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Table 19. Design of the irrigation studies.

Study number	Test substance[a]	Application rate (lb ai/A)	Flooding (Days after treatment)	Soil type	Container Size	Comments
I	Chlorophenyl-ring-labeled, 98% radiopure specific activity 25.4 mCi/g	0.083	2	Loamy sand[b]	36 x 36 x 24 cm	Applied to rice; Greenhouse
		0.17	2			
II	Chlorophenyl-ring-labeled, 98% radiopure specific activity 26.8 mCi/g	0.11	6	Clay loam[c]	0.7 x 1.0 m, 40 cm depth	Applied to rice; Outdoors
	Dioxyphenyl-ring-labeled, 96% radiopure specific activity 11.35 mCi/g	0.07	6			
III	Chlorophenyl-ring-labeled, 98% radiopure specific activity 26.8 mCi/g	0.15	12	Silt loam[d]	0.5 x 0.5 m 40 cm depth	Applied to soil; Greenhouse

[a] All radiolabeled material was formulated as 1 lb/gal EC before application.

[b] 87.5% Sand, 7.8% silt, 4.7% clay, 7.4% organic carbon, pH 4.3.

[c] 27% Sand, 46% silt, 27% clay, 1.2% organic carbon, pH 8.4.

[d] 11.6% Sand, 72.2% silt, 16.2% clay, 1.25% organic matter, pH 7.9.

Table 20. [^{14}C]Fenoxaprop ethyl residues (% of applied) in water used to irrigate soil treated with [^{14}C]fenoxaprop ethyl (1 lb/gal EC) at 0.07-0.17 lb ai/A.

Sampling interval[a]	STUDY I[b]		STUDY II[a]		STUDY III[d]
	0.083 lb ai/A	0.17 lb ai/A	0.11 lb ai/A	0.07 lb ai/A	0.15 lb ai/A
0.5 hours	1.9	3.9	--	--	--
2 hours	2.9	4.6	--	--	9.4
3 hours	--	--	1.1	1.4	--
4 hours	3.6	6.1	--	--	--
6 hours	4.1	6.5	1.8	1.7	9.4
8 hours	--	--	--	--	9.6
24 hours	2.9	6.2	0.5	1.1	11.8
32 hours	--	--	--	--	12.3
48 hours	--	--	0.2	0.6	--
56 hours	--	--	--	--	16.0
3 days	2.9	6.0	--	--	--
4 days	--	--	0.5	0.9	18.1
5 days	2.2	4.2	--	--	--
7 days	2.2	4.0	--	--	16.8
8 days	--	--	0.5	0.9	--
9 days	--	--	--	--	12.6
13 days	1.2	1.9	--	--	--
30 days	--	--	0.1	0.1	--
59 days	--	--	0.2	0.06	--
149 days	0.1	0.2	--	--	--

[a] Interval after flooding.

[b] Flooded 2 days after treatment.

[c] Flooded 6 days after treatment.

[d] Flooded 12 days after treatment; unlike studies I and II, the water depth was not kept constant but decreased by approximately 50% (5.2 to 2.8 cm) during the study period.

EXECUTIVE SUMMARY

The data summarized here are scientifically valid data reviewed to date, but do not fulfill data requirements unless noted.

Fenoxaprop ethyl, at 0.45 ppm, degraded with a half-life of 1.75 days at 20 C in a sterile buffered pH 9 solution (Asshauer, 1981, Acc. No. 071800). In a pH 7 solution, fenoxaprop ethyl degraded with a half-life of 8 days at 40 C and 4 days at 50 C. In a pH 5 solution incubated at 50 C, 94% of the fenoxaprop ethyl remained undegraded after 5 days of incubation. 2-[4-(6-Chloro-2-benzoxazolyloxy)phenoxy]propionic acid was the only degradate.

[^{14}C]Fenoxaprop ethyl degraded with a calculated half-life of 183.4 hours in distilled water (pH 7) when irradiated with a mercury vapor lamp (Gildemeister et al., 1985, Acc. No. 258976). 2-[4-(6-Chloro-2-benzoxazolyloxy)-phenoxy]propionic acid, 6-chloro-2,3-dihydro-benzoxazol-2-one, 4-(6-chloro-2-benzoxazolyloxy)phenol, and 6 other degradates were isolated; only 2-[4-(6-chloro-2-benzoxazolyloxy)phenoxy]propionic acid was >10% of the applied. In the dark control, 62.4% of the applied radioactivity was identified as parent 192 hours after treatment.

[^{14}C]Fenoxaprop ethyl degraded with a half-life of <4 hours in irradiated loamy sand soil samples, an interval equivalent to <32 hours of natural sunlight (Gildemeister and Jordan, 1984, Acc. No. 258976). Degradation in the dark control occurred at approximately the same rate, with <4% of the applied remaining in both irradiated and control samples at hour 45. The major degradate formed was 2-[4-(6-chloro-2-benzoxazolyloxy)phenoxy] propionic acid.

Fenoxaprop ethyl degraded with a half-life of <1 day in a loamy sand and two sandy loam soils incubated aerobically in the dark at 22 C and 40% of field capacity (Gildemeister, Schmidt, and Jordan, 1982, Acc. No. 071800). The major degradates were 2-[4-(6-chloro-2-benzoxazolyloxy)phenoxy]propionic acid (up to 58.2% of applied), 6-chloro-2,3-dihydro-benzoxazol-2-one (up to 11.6% of applied), and 4-(6-chloro-2-benzoxazolyloxy)phenol (up to 2.3% of applied); up to 64.6% of the applied was bound by day 32 posttreatment.

Fenoxaprop ethyl degraded with a half-life of <1 day in flooded loamy sand and sandy loam soil incubated at 22 C in the dark (Gildemeister, 1982, Acc. No. 071800). The major degradates were 2-[4-(6-chloro-2-benzoxazolyloxy)phenoxy]propionic acid (77.0% of applied) and 6-chloro-2,3-dihydro-benoxazol-2-one (15.0% of applied); bound residues comprised 42.3% of the applied at 32 days posttreatment.

[^{14}C]Fenoxaprop ethyl (radiopurity 96.3%), at ~4 mg ai/kg, degraded with a half-life of <1 day in flooded sandy loam and loamy sand soils incubated in the dark at 22 ± 2 C (Gildemeister and Schmidt, 1984, Acc. No. 073932). The major degradates were 2-[4-(6-chloro-2-benzoxazolyloxy)phenoxy]propionic acid (76.4% of applied), 6-chloro-2,3-dihydro-benzoxazol-2-one (10.7%), and 4-(6-chloro-2-benzoxazolyloxy)phenol (1.9%).

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[^{14}C]Fenoxaprop ethyl (radiopurity 96%), at ~2.8 mg ai/l, degraded with a half-life of <6 days in an aerobic water:silt loam soil (180:20) system (Dorn et al., 1983, Acc. No. 073932). Fenoxaprop ethyl was recovered only from the soil fraction. The major degradate in both the soil and water fractions was 2-[4-(6-chloro-2-benzoxazolyloxy)phenoxy]propionic acid (60.4% and 40.8% of applied at maximum, respectively); the only other degradate was 6-chloro-2,3-dihydro-benzoxazol-2-one (≤9.3% of applied). By day 29 post-treatment, 25% of the applied was evolved as $^{14}CO_2$.

K_{ads} values for fenoxaprop ethyl (98.8% pure) in a water:soil slurry (100:10) were ~26 in a Versuchsfeld sand (0.8% organic carbon), ~36 in a Hatzenbuhl sandy loam soil (1% organic carbon), and 188 in a Neuhofen sand (2.58% organic carbon) (Asshauer and Klockner, 1982, Acc. No. 258976).

Fenoxaprop ethyl was immobile (R_f <0.09 by soil TLC) in one silty clay and two silt loam soils (Gildemeister, Stephenson, and Smith, 1982, Acc. No. 071800).

Aged (16 days) fenoxaprop ethyl residues were of low to intermediate mobility in one silty clay and two silt loam soils using soil TLC (Gildemeister and Jordan, 1982, Acc. No. 071800). Average R_f values were 0.17 for 2-[4-(6-chloro-2-benzoxazolyloxy)phenoxy]propionic acid, 0.4 for 6-chloro-2,3-dihydro-benzoxazol-2-one, and 0.53 for 4-(6-chloro-2-benzoxazolyloxy)phenol.

[^{14}C]Fenoxaprop ethyl residues were not detected (detection limit ranged from 0.0005 to 0.039 ppm fenoxaprop ethyl equivalents) in radishes (tops and roots), mature spinach (leaves and stems), immature soybeans (whole plant), and carrots (tops and roots) planted in silt loam soil 29 days after the soil was treated with [^{14}C]fenoxaprop ethyl (radiopurity ~98%) at 0.15 kg ai/ha. [^{14}C]Residues were 0.020 ppm fenoxaprop ethyl equivalents in the roots of mature spinach, and ranged from 0.002 to 0.009 ppm in the leaves, stems, beans, and hulls of mature soybeans. At the time of planting, the soil contained 0.003 ppm of fenoxaprop ethyl, 0.069 ppm of 2-[4-(6-chloro-2-benzoxazolyloxy)phenoxy]propionic acid, and 0.004 ppm each of 6-chloro-2,3-dihydro-benzoxazol-2-one and 4-(6-chloro-2-benzoxazolyloxy)phenol.

Maximum [^{14}C]fenoxaprop ethyl residue concentrations in irrigation water were 1.7-6.5% of the applied and occurred ~6 hours after flooding (2-6 days posttreatment) in samples where [^{14}C]fenoxaprop ethyl (1 lb/gal EC) was applied as a postemergent herbicide to rice at 0.07-0.17 lb ai/A (Schwalbe-Fehl, 1984, Acc. No. 073948). When [^{14}C]fenoxaprop ethyl was applied to a bare soil surface at 0.15 lb ai/A, maximum residues were 18.1% of the applied and occurred 4 days after flooding; 91.2% of the residues were 2-[4-(6-chloro-2-benzoxazolyloxy)phenoxy]propionic acid.

Chlorophenyl-ring-labeled [^{14}C]fenoxaprop ethyl, at 0.01 ppm, accumulated in bluegill sunfish exposed in a flow-through system (McAllister and Franklin, 1984, Acc. No. 258980; Shaffer et al., 1985, Acc. No. 258981). During a 28-day exposure period, bioconcentration factors ranged from 20 to 40x in edible tissue, from 254 to 866x in viscera, and from 112 to 527x in whole fish. Accumulated residues were depurated rapidly, with >47% elimination by day 1 and >83% by day 14. The major component of the residues accumulated in tissue was the free acid of the parent. Smaller amounts

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of 6-chlorobenzoxazol-2-one were also present. Comparable results were obtained using dioxphenyl-ring-labeled [^{14}C]fenoxaprop ethyl.

In plots sprayed with fenoxaprop ethyl (50 g/l EC) at 0.25 and 0.50 lb ai/A, dislodgeable fenoxaprop ethyl residues dissipated with a half-life of <3 hours, while total extractable residues dissipated with a half-life of 1-3 days (O'Grodnick and Grande, 1984, Acc. No. 258979).

Recommendations

Available data are insufficient to fully assess the environmental fate of, and the exposure of humans and nontarget organisms to fenoxaprop ethyl. The submission of data relative to full registration requirements (Subdivision N) on field and vegetable crop, aquatic food crop, terrestrial nonfood crop, and domestic outdoor use sites is summarized below:

Hydrolysis studies: Based on previously submitted data (Asshauer, 1981, Acc. No. 071800), all data requirements have been fulfilled.

Photodegradation studies in water: One study (Gildemeister et al., 1985, Acc. No. 258976) was reviewed and is scientifically valid, but does not fulfill data requirements because the distilled water was not buffered, it was not stated that sterile conditions were maintained, the incubation temperature for the dark control was not reported, and the artificial light was not compared to natural sunlight. All data are required.

Photodegradation studies in soil: One study (Gildemeister and Jordan, 1984, Acc. No. 258976) was reviewed and is scientifically valid but does not fulfill data requirements because the incubation temperature of both the dark control and treated samples was not reported, no material balance was provided for the dark control soils, and the material balance for irradiated samples declined to <75% of the applied after 32 hours of irradiation. All data are required.

Photodegradation studies in air: No data were submitted; however, no data are required because of the low vapor pressure of fenoxaprop ethyl.

Aerobic soil metabolism studies: One study (Smith, 1985, Acc. No. 258976) was reviewed for this report and is scientifically invalid because the sampling protocol was inadequate to accurately assess the decline of fenoxaprop ethyl in soil. In addition, this study would not fulfill data requirements because there was no immediate posttreatment sample to confirm the application rate, there was no material balance, and the soils were not completely characterized. Based on previously submitted data (Gildemeister et al., 1982, Acc. No. 071800), all data requirements have been fulfilled.

Anaerobic soil metabolism studies: One study (Gildemeister et al., 1982, Acc. No. 071800) was previously reviewed and is scientifically valid. This study does not fulfill data requirements because the soils were not completely characterized and the treated soil was not aged aerobically for 30 days or one half-life prior to establishing anaerobic conditions. No data are required because a satisfactory anaerobic aquatic metabolism study has been provided.

Anaerobic aquatic metabolism studies: One study (Gildemeister and Schmidt, 1984, Acc. No. 073932) was reviewed for this report and fulfills data requirements by providing information on the anaerobic aquatic metabolism of fenoxaprop ethyl in two West German soils.

Aerobic aquatic metabolism studies: One study (Dorn et al., 1983, Acc. No. 073932) was reviewed for this report and fulfills data requirements by providing information on the aerobic metabolism of fenoxaprop ethyl in a typical Mississippi rice field soil.

Leaching and adsorption/desorption studies: One study (Asshauer and Klockner, 1982, Acc. No. 258976) was reviewed for this report and this study partially fulfills data requirements by providing information on the adsorption of fenoxaprop ethyl to two sand soils and one sandy loam soil (batch equilibrium). Two studies (Gildemeister and Jordan, 1982, Acc. No. 071800; Gildemeister, Stephenson, and Smith, 1982, Acc. No. 071800) were reviewed previously and partially fulfill data requirements by providing information on the mobility of fenoxaprop ethyl in a silty clay and two silt loam soils (TLC and column leaching). In order to satisfy the data requirements for aquatic food crop use, a batch equilibrium study is needed to determine the desorption properties of fenoxaprop ethyl in the three soils for which adsorption properties have been established, as well as the adsorption/desorption properties of a fourth soil and an aquatic sediment.

Laboratory volatility studies: No data were submitted; however, no data are required because of the low vapor pressure of fenoxaprop ethyl.

Field volatility studies: No data were submitted; however, no data are required because of the low vapor pressure of fenoxaprop ethyl.

Terrestrial field dissipation studies: Nine studies were reviewed; all are scientifically invalid. One study (Smith, 1985, Acc. No. 258976) is scientifically invalid because the sampling protocol (one sampling interval) was inadequate to accurately assess the dissipation of fenoxaprop ethyl from soil. In addition, this study would not fulfill data requirements because the test substance was not a typical end-use product, the soil was incompletely characterized, field test data such as air and soil temperatures and rainfall amounts were not reported, there was no immediate posttreatment sample to confirm application rates, and the plots were too small to simulate actual field conditions. The second study (American Hoechst Corporation, 1984, Acc. No. 258977) is scientifically invalid because the analytical methodology was inadequate (recoveries ranged from 65 to 125%) to accurately assess the dissipation of fenoxaprop ethyl from soil. In addition, this study would not fulfill data requirements because the test substance was not characterized, pretreatment soil samples were not analyzed, the analytical method was nonspecific, and the patterns of decline of fenoxaprop ethyl and the formation and decline of its degradates were not addressed. Also, the concentration of fenoxaprop ethyl residues on the day 0 sampling interval was considerably lower than would be expected for the reported application rates. The third study (Johnson and O'Grodnick, 1985, Acc. No. 258978) is scientifically invalid because the analytical method was inadequate (recoveries ranged from 65 to 125%) to accurately assess the dissipation of fenoxaprop ethyl from soil. In addition, this study would not fulfill data requirements because the method was nonspecific, the patterns of decline of fenoxaprop ethyl and

formation and decline of its degradates were not addressed, the soil pH and CEC were not reported, field test data including air and soil temperatures and precipitation amounts were incomplete, pesticides other than fenoxaprop ethyl were not characterized, and more than one pesticide was applied to the soil which may have affected the dissipation rate of fenoxaprop ethyl.

The fourth study (Johnson and Horton, 1985, Acc. No. 258979) is scientifically invalid because the analytical methodology was inadequate (recoveries from fortified samples ranged from 65 to 125%) to accurately assess the dissipation of fenoxaprop ethyl from the soil. In addition, this study would not fulfill data requirements because the method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, the soil pH and CEC were not reported, the glyphosate was not characterized, field test data were incomplete, and more than one pesticide was applied to the soil which may have affected the dissipation rate of fenoxaprop ethyl. Meteorological data, including soil and air temperatures and rainfall amounts were provided but were illegible. The fifth study (Bertges et al., 1985. Acc. No. 073934) is scientifically invalid because the sampling protocol and analytical methodology (recoveries ranged from 65 to 125%) were inadequate accurately assess the dissipation of fenoxaprop ethyl. In addition, this study would not fulfill data requirements because the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, and field test data such as temperature, rainfall, and irrigation amounts, were not provided. The sixth study (Thomas et al., 1984c, Acc. No. 073934) is scientifically invalid because the sampling protocol and analytical methodology (recoveries ranged from 65 to 125%) were inadequate to accurately assess the dissipation of fenoxaprop ethyl. In addition, this study would not fulfill data requirements because the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, the soil was incompletely characterized, and field test data such as temperature, rainfall, and irrigation amounts, were not provided. The seventh study (Kuhner and O'Grodnick, 1985, Acc. Nos. 073936, 073937, 073938, and 073940) was conducted according to EPA Guidelines and good scientific practices, and is reported adequately. However, the data are scientifically invalid because the analytical method was inadequate to accurately assess the concentration of fenoxaprop ethyl residues in soil and plants. Recovery of fenoxaprop ethyl residues from freshly treated samples was too variable, ranging from 70 to 140% in soil and 53.2 to 122.1% in plants. Also, the method was not specific; it did not distinguish between fenoxaprop ethyl and its degradates. The eighth study (O'Grodnick, 1985a, Acc. Nos. 073946, 073947, and 073948) is scientifically invalid because the analytical method was inadequate (recovery was too variable) to adequately assess the concentration of fenoxaprop ethyl in soil and plants, and because the application of fenoxaprop ethyl to the soil was not confirmed. No soil samples were provided following the 1982 application, and no residues were detected following the 1981 treatment even in samples taken immediately after treatment. This study would not fulfill data requirements because the sampling intervals were inappropriate. In the ninth study (O'Grodnick, 1985b, Acc. Nos. 073941, 073942, 073943, 073944, and 073945), all data except the 1984 wheat data are invalid because the application of fenoxaprop ethyl to the soil at the stated rate was not confirmed by samples taken at the time of treatment. All data, including

the 1984 wheat data, cannot be validated because the analytical method is inadequate to accurately assess the concentration of fenoxaprop ethyl in soil and plants. This study would not fulfill data requirements because the method was nonspecific and insufficient sampling of the treated soils was performed. All data are required.

Aquatic field dissipation studies: Nine studies on rice plots were reviewed, all are scientifically invalid. In the first study (American Hoechst Corporation, 1984a, Acc. Nos. 073939 and 073935), the data from the Arkansas and Mississippi sites are scientifically invalid because the application of fenoxaprop ethyl was never confirmed by demonstrating the presence of fenoxaprop ethyl in the samples. The data from California cannot be validated because the description of the test site and sampling protocol were inadequate so it could not be determined if fenoxaprop ethyl dissipated in the treated area or was flushed into an adjacent body of water. This study would not fulfill data requirements because pretreatment and immediate posttreatment samples were not analyzed (except California), the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, the test soil and water were not completely characterized, sediment samples were not taken, and field test data such as temperatures and rainfall amounts were not reported. The second study (Thomas et al., 1984b, Acc. No. 073933; American Hoechst Corporation, 1984a, Acc. No. 073939) is scientifically invalid because the sampling protocol and and analytical methodology (recoveries ranged from 65 to 125%) were inadequate to accurately assess the dissipation of fenoxaprop ethyl. In addition, this study would not fulfill data requirements because pretreatment soil samples were not analyzed, the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, the soil was incompletely characterized, and field test data such as temperature, rainfall, and irrigation amounts, were not provided. The third study (Strachan et al., 1984a, Acc. No. 073933) is scientifically invalid because the sampling protocol (one sampling interval) and analytical methodology (recoveries ranged from 65 to 125%) were inadequate to accurately assess the dissipation of fenoxaprop ethyl. In addition, this study would not fulfill data requirements because pretreatment and immediate posttreatment soil samples were not analyzed, the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, the soil was incompletely characterized, and field test data such as temperature, rainfall, and irrigation amounts, were not provided. The fourth study (Thomas et al., 1984a, Acc. No. 073933) is scientifically invalid because the sampling protocol (one sampling interval) and analytical methodology (recoveries ranged from 65 to 125%) were inadequate to accurately assess the dissipation of fenoxaprop ethyl. In addition, this study would not fulfill data requirements because pretreatment and immediate posttreatment soil samples were not analyzed, the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, the soil was incompletely characterized, and field test data such as temperature, rainfall, and irrigation amounts, were not provided. The fifth study (Todd et al., 1984, Acc. No. 073933) is scientifically invalid because the sampling protocol (one sampling interval) and analytical methodology (recoveries ranged from 65 to 125%) were inadequate to accurately assess the dissipation of fenoxaprop ethyl. In addition, this study would not fulfill data requirements because pretreatment and immediate posttreatment soil

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samples were not analyzed, the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, the soil was incompletely characterized, and field test data such as temperature, rainfall, and irrigation amounts, were not provided. The sixth study (Strachen et al., 1984b, Acc. No. 073933; American Hoechst Corporation, 1984a, Acc. No. 073939) is scientifically invalid because the sampling protocol and analytical methodology (recoveries ranged from 65 to 125%) were inadequate to accurately assess the dissipation of fenoxaprop ethyl. In addition, this study would not fulfill data requirements because pretreatment soil samples were not analyzed, the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, the soil was incompletely characterized, and field test data such as temperature, rainfall, and irrigation amounts, were not provided. The seventh study (Kinney et al., 1984, Acc. No. 073933; American Hoechst Corporation, 1984a, Acc. No. 073939) is scientifically invalid because the sampling protocol and analytical methodology (recoveries ranged from 65 to 125%) were inadequate to accurately assess the dissipation of fenoxaprop ethyl. In addition, this study would not fulfill data requirements because pretreatment soil samples were not analyzed, the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, the soil was incompletely characterized, and field test data such as temperature, rainfall, and irrigation amounts, were not provided. The eighth study (Green et al., 1984, Acc. No. 073933; American Hoechst Corporation, 1984, Acc. No. 073939) is scientifically invalid because the sampling protocol and and analytical methodology (recoveries ranged from 65 to 125%) were inadequate to accurately assess the dissipation of fenoxaprop ethyl. In addition, this study would not fulfill data requirements because pretreatment soil samples were not analyzed, the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, the soil was incompletely characterized, and field test data such as temperature, rainfall, and irrigation amounts, were not provided. The ninth study (Grande et al., 1985, Acc. No. 073934; American Hoechst Corporation, 1984a, Acc. No. 079939) is scientifically invalid because the analytical methodology (recoveries range from 65 to 125%) was inadequate to accurately assess the dissipation of fenoxaprop ethyl. In addition, this study would not fulfill data requirements because the analytical method was nonspecific, the patterns of decline of fenoxaprop ethyl and formation and decline of its degradates were not addressed, and the soil was incompletely characterized. All data are required.

Forestry dissipation studies: No data were submitted; however, no data are required because fenoxaprop ethyl has no forestry use.

Dissipation studies for combination products and tank mix uses: No data were submitted; however, no data are required because data requirements for combination products and tank mix uses are currently not being imposed for this Standard.

Long-term field dissipation studies: Three studies were reviewed for this report; all are scientifically invalid. The first study (Kuhner and O'Grodnick, 1985, Acc. Nos. 073936, 073937, 073938, and 073940) was conducted according to EPA Guidelines and good scientific practices, and is reported adequately. However, the data are scientifically invalid because the analytical method was inadequate to accurately assess the concentration of

fenoxaprop ethyl residues in soil and plants. Recovery of fenoxaprop ethyl residues from freshly treated samples was too variable, ranging from 70 to 140% in soil and 53.2 to 122.1% in plants. Also, the method was not specific; it did not distinguish between fenoxaprop ethyl and its degradates. In the second study (O'Grodnick, 1985b, Acc. Nos. 073941, 073942, 073943, 073944, and 073945), all data except the 1984 wheat data are invalid because the application of fenoxaprop ethyl to the soil at the stated rate was not confirmed by samples taken at the time of treatment. All data, including the 1984 wheat data, cannot be validated because the analytical method is inadequate to accurately assess the concentration of fenoxaprop ethyl in soil and plants. This study would not fulfill data requirements because the method was nonspecific and insufficient sampling of the treated soils was performed. The third study (O'Grodnick, 1985a, Acc. Nos. 073946, 073947, and 073948) is scientifically invalid because the analytical method was inadequate (recovery was too variable) to adequately assess the concentration of fenoxaprop ethyl in soil and plants, and because the application of fenoxaprop ethyl to the soil was not confirmed. No soil samples were provided following the 1982 application, and no residues were detected following the 1981 treatment even in samples taken immediately after treatment. This study would not fulfill data requirements because the sampling intervals were inappropriate. No data are required because >50% of the applied fenoxaprop ethyl would be expected to dissipate before subsequent application.

Confined accumulation studies on rotational crops: One study (Schwalbe-Fehl and Kocher, 1984, Acc. No. 073935) was reviewed for this report and fulfills data requirements by providing information on the accumulation of fenoxaprop ethyl by confined rotational crops (30 day treatment-to-planting interval). Based on this study and a previously reviewed study (Borriston Laboratories, Inc., 1982, Acc. No. 071799), a 30-day rotational crop interval can be established for all crops except small grains (120-day interval).

Field accumulation studies on rotational crops: Three studies were reviewed; all are invalid. One study (Kuhner and O'Grodnick, 1985, Acc. Nos, 073936, 073937, 073938, and 073940) was conducted according to EPA Guidelines and good scientific practices, and is reported adequately. However, the data are scientifically invalid because the analytical method was inadequate to accurately assess the concentration of fenoxaprop ethyl residues in soil and plants. Recovery of fenoxaprop ethyl residues from freshly treated samples was too variable, ranging from 70 to 140% in soil and 53.2 to 122.1% in plants. Also, the method was not specific; it did not distinguish between fenoxaprop ethyl and its degradates. In the second study (O'Grodnick, 1985b, Acc. Nos. 073941, 073942, 073943, 073944, and 073945), all data except the 1984 wheat data are invalid because the application of fenoxaprop ethyl to the soil at the stated rate was not confirmed by samples taken at the time of treatment. All data, including the 1984 wheat data, cannot be validated because the analytical method is inadequate to accurately assess the concentration of fenoxaprop ethyl in soil and plants. This study would not fulfill data requirements because the method was nonspecific and insufficient sampling of the treated soils was performed. The third study (O'Grodnick, 1985a, Acc. Nos. 073946, 073947, and 073948) is scientifically invalid because the analytical method was inadequate (recovery was too variable) to adequately assess the concentration of fenoxaprop ethyl in soil and plants, and because the

application of fenoxaprop ethyl to the soil was not confirmed. No soil samples were provided following the 1982 application, and no residues were detected following the 1981 treatment even in samples taken immediately after treatment. This study would not fulfill data requirements because the sampling intervals were inappropriate. Based on the results of the confined accumulation studies in rotational crops, no data are required.

Accumulation studies on irrigated crops: One ancillary study (Schwalbe-Fehl, 1984, Acc. No. 073948) was submitted to provide information on the concentration of fenoxaprop ethyl residues in irrigation water. The study is scientifically valid; however, several deficiencies exist. [^{14}C]-Residues were not characterized in all experiments or at multiple sampling intervals. Also, the concentration of residues in the soil and the nature of those residues was not specified. All data are required.

Laboratory studies of pesticide accumulation in fish: Two hardcopies were combined into one review. One study (McAllister and Franklin, 1984, Acc. No. 258980; Shaffer et al., 1985, Acc. No. 258981) was reviewed and fulfills data requirements by providing information on the accumulation and depuration of chlorophenyl- and dioxyphenyl-ring-labeled [^{14}C]fenoxaprop ethyl in bluegill sunfish. Additional data may be required if catfish or crayfish are commercially cultivated in treated areas.

Field accumulation studies on aquatic nontarget organisms: No data were submitted for this report. Data may be required if catfish or crayfish are commercially cultivated in treated areas.

Reentry studies: One study (O'Grodnick and Grande, 1984, Acc. No. 258979) was submitted and is scientifically valid. The major deficiency with this study is that the analytical method was nonspecific; the pattern of decline of fenoxaprop ethyl and pattern of formation and decline of fenoxaprop ethyl degradates were not addressed individually. In addition, air temperatures throughout the study were not provided. No data are required.

In addition, one ancillary study (Richards and Wilkes, 1985, Acc. No. 073932) on the soil storage stability of fenoxaprop ethyl was reviewed and is scientifically invalid because the analytical methodology was inadequate (it was nonspecific and recovery from fortified samples was too variable) to accurately access the concentration of fenoxaprop ethyl in soil. Major deficiencies with the study were that the test substance was not characterized, the soil was not characterized, and storage conditions were not defined.

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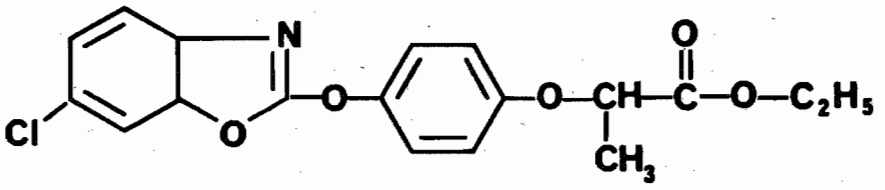
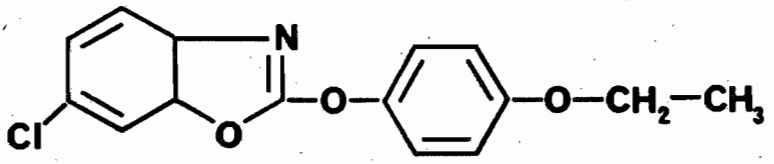
APPENDIX

STRUCTURES OF REFERENCE COMPOUNDS

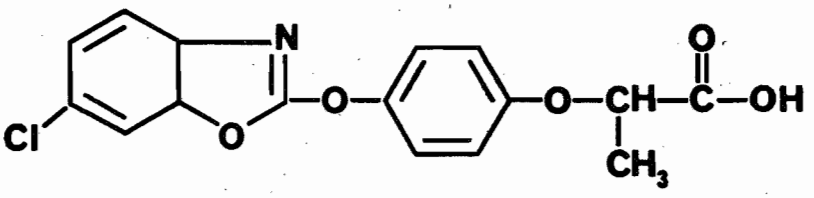


Ethyl-2-(4-(6-chloro-2-benzoxazolyloxy)phenoxy) propanoate

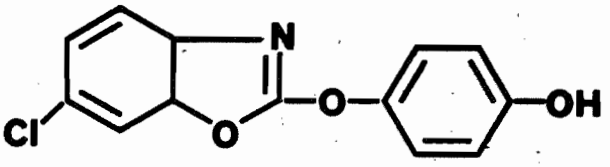
(Fenoxaprop-ethyl)



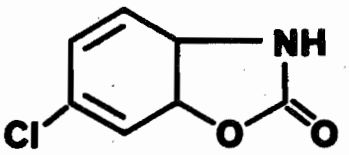
4-(6-Chloro-2-benzoxazolyloxy)phenetole



2-(4-(6-Chloro-2-benzoxazolyloxy)phenoxy)propionic acid



4-(6-Chloro-2-benzoxazolyloxy)phenol



6-Chloro-2,3-dihydro-benzoxazol-2-one