2-24-99

DATA EVALUATION RECORD
STUDY 2

CHEM 005107, 005108 Diflufenzopyr acid and sodium salt §162-1
(SAN 835 H and SAN 836 H)
FORMULATION--00--ACTIVE INGREDIENT

STUDY ID 44170153
Tong, T-M. 1996. Aerobic soil metabolism of SAN-836H. Study Identification Number/Project No. 414215, Report No. 5. Unpublished study performed and submitted by Sandoz Agro, Inc., Des Plaines, IL.

DIRECT REVIEW TIME = 32

REVIEWER: Stephanie Syslo SIGNATURE: Stephanie Syslo 2/24/99
TITLE: Environmental Scientist
ORG: ERBII/EFED/OPP

PEER REVIEWER: Kathryn Gallagher, Ph.D. SIGNATURE: Kathryn Gallagher 2/24/99
TITLE: Chemist
ORG: ERBII/EFED/OPP

CONCLUSIONS:

The aerobic soil metabolism study in this review (MRID 44170153) is acceptable for parent diflufenzopyr and partially satisfies the aerobic soil metabolism(162-1) data requirement for SAN 835 H.

The registrant needs to submit an aerobic soil metabolism study for the metabolite M9 (2-keto phthalazinone), which was the major non-volatile, persistent degradate in aerobic soil metabolism studies. M9 reached a maximum concentration of 28% of the applied at 179 days posttreatment, with little decline thereafter (360 days incubation period).

The registrant also needs to conduct and submit an additional aerobic soil metabolism study with diflufenzopyr, using a soil with a neutral to alkaline pH. The pH of the soil used in the experiments was 5.5. In the hydrolysis study it was determined that diflufenzopyr hydrolyzed most rapidly in this pH region. (pH 5 hydrolysis half-life of 12.9 days; pH 7 and 9 hydrolysis half-lives were 23.9 and 25.6 days, respectively). Therefore, the soil aerobic half-life calculated in this experiment was likely to have had a significant component associated with hydrolysis. Soil aerobic metabolic half-lives of diflufenzopyr may be significantly longer in soils with higher pH's. This additional study would provide important information on the dissipation of diflufenzopyr in application areas with non-acidic soils.

1

SUMMARY:

Metabolism - Aerobic Soil

[^{14}C]Diflufenzopyr (SAN 835H as the sodium salt, SAN 836H) at an approximate concentration of 0.3 ppm, degraded with a non-linear DT_{50} of 9-10 days in loam soil. Pyridinyl-[^{14}C]SAN 835H degraded with a non-linear DT_{50} of 10.1 days (95% confidence interval (CI) of 7.6 to 15 days), and a DT_{90} of 52 days. Phenyl-[^{14}C]SAN 835H degraded with a non-linear DT_{50} of 8.6 days (95% CI of 7.2 to 10.8 days), and a DT_{90} of 46 days. Analyses conducted by EFED determined that a linear fit to natural log transformed data provided a poor fit to the data, yielding half-life estimations (approximately 60 days) which were significantly longer than observed data indicate. Material balances during the study were >90% of the applied for both labels. The only volatile degradate from both labels was carbon dioxide, which comprised >30% of the applied after 360 days. In the **[^{14}C]pyridinyl**-treated soil, the initial degradate was the cyclization product carbamoyl phthalazinone (M5; maximum concentration of 17.9% of the applied at 30 days posttreatment; declining thereafter); phthalazinone (M1; formed by the cleavage of M5; maximum concentration of 6.2% at 30 days posttreatment; declining thereafter); and 2-keto phthalazinone (M9; the oxidation product of M1; maximum concentration of 28.1% at 179 days posttreatment, declining slightly to 25% at 360 days posttreatment). M9 is the most persistent of the degradates. In the **[^{14}C]phenyl**-treated soil, the only identified non-volatile degradate was M5, which increased to a maximum concentration of 19.5% at 14 days posttreatment and declined thereafter. ^{14}C-Residues in the fulvic acid fraction were more persistent in the [^{14}C]pyridinyl-treated soil; ^{14}C-residues in the humic acid fraction were more persistent in the [^{14}C]phenyl-treated soil. Unextracted ^{14}C-residues in the [^{14}C]phenyl-treated soil were twice those in the [^{14}C]pyridinyl-treated soil (approximately 50% to 25%).

METHODOLOGY:

Elliott loam soil (28% sand, 46% silt, 26% clay, 3.4% organic matter content, pH 5.5, CEC 16.2 meq/100 g, 35.52% moisture content at field capacity [1/3 bar], 22.58% moisture content at wilting point [15 bar], bulk density 1.15 g/cm^2; from Champaign County, IL) was kept field-moist after collection and sieved through a 2-mm screen immediately before use.

Two different mixtures of radiolabelled diflufenzopyr acid (SAN 835H; 2-[1-[[[(3,5-difluorophenyl)amino]carbonyl]hydrazono]ethyl]-3-pyridinecarboxylic acid were used in this study. A mixture of [pyridine ring-4,6-^{14}C] SAN 835H (radiochemical purity 99.1%, specific activity 53 mCi/mMol [158 µCi/mg]), [carboxyl-labelled-^{13}C] SAN 835H (radiochemical purity 99.5%, specific activity unspecified), and unlabelled SAN 835H (99.5% pure) were dissolved in a few drops of DMSO and mixed with 0.05 M sodium phosphate buffer (pH 7.0-7.1) to form 100 ml of a sodium salt (SAN 836 H) solution. A second mixture of [phenyl ring-uniformly-labelled-^{14}C]SAN 835H (radiochemical purity 94.8%, specific activity 77 mCi/mMol [228 µCi/mg]), [urea-carbonyl-labelled-^{13}C]SAN 835H (radiochemical purity 98.6%, specific activity unspecified), and unlabelled San 835 H (99.5% pure) was prepared in the same way.

Separate portions (3400 g dry weight) of field-moist soil were treated with the appropriate sodium salt solutions added dropwise to the soil. The flasks were then rinsed with 92 ml of sodium phosphate buffer, and the rinsates were added to the soil to bring the soil to 75% of field capacity (1/3 bar moisture tension). The registrant stated that this resulted in the maximum application rate of 0.2 lb ae/A (approximately 0.3 ppm based on soil weight). (The actual proposed maximum application rate, based on the registrant's submitted proposed label is 0.125 lb ae/A.) Portions (two replicates of 200 g dry weight) of each treated soil were placed in four 1-L bottles. The individual bottles were then attached to flow-though systems and humidified CO_2-free air was passed over the soil (Figure 2a). Exit air was passed sequentially through 1.5 N potassium hydroxide, 1 N sulfuric acid, a polyurethane foam plug, and ethylene glycol to trap ^{14}C-volatiles. Contents of the volatiles sampling bottles were changed at each sampling interval and/or every other week. With the remainder of each treated soil, 30 replicates consisting of 100 g soil in 8-oz glass jars were prepared; the jars were loosely fitted with aluminum foil covers, so no volatiles were trapped from these samples. All soil samples were incubated at 23 ± 1 °C in the dark; deionized water was added as needed to maintain soil moisture (sterility of water not specified).

Radioactivity in each trapping solution was assayed immediately after sampling by LSC; foam plugs were extracted with ethyl acetate and the extract was analyzed immediately for total radioactivity by LSC. Remaining solutions were then stored for up to 6 weeks at 4 °C before analysis; foam plugs were stored frozen at -20 °C until analysis (duration of storage not specified). All LSC counts were corrected for background; the limit of detection was 0.0001 μg/g moist soil.

Duplicate statically-incubated soil samples were collected at 0, 1, 3, 5, 7, 14, 30, 60, 92, 179, 269 (pyridinyl only), 270 (phenyl only), and 360 days posttreatment; the flow-through samples were analyzed only at 360 days posttreatment. A portion (10 g) of soil from each sample was extracted sequentially by agitating twice with ethyl acetate, acetone/water (90:10. v:v), 0.1 N KOH, and 0.1 N HCl (Figure 1); after each extraction, the sample was centrifuged and the supernatant decanted. Supernatants from the ethyl acetate and acetone/water extractions were concentrated before further analysis. The KOH extract (base hydrolysate) was further treated by acidification with HCl; the solution was centrifuged and the supernatant containing fulvic acid was decanted and further partitioned with ethyl acetate. The pellet (humic acid) was redissolved in 0.1 N KOH. Radioactivity in all supernatants was assayed by LSC; unextractable radioactivity in the soil was determined by LSC following combustion with counts being corrected for method recovery from [^{14}C]-spiked control soil. The solvent extractable radioactivity was characterized by TLC; reference standards were chromatographed on the same plates. Standards were visualized under UV light, and radioactivity was located and quantified by radioanalytical imaging. Recoveries of the radioactivity applied to the TLC plates were >99%. Identity of SAN 835H and its metabolites was confirmed by HPLC, NMR, or GC/MS; recoveries of the radioactivity applied to the HPLC columns were >100%.

In addition, total soil radioactivity was determined by analyzing triplicate samples of the statically-incubated soils by LSC following combustion; the flow-through soil was analyzed for

total soil radioactivity only at 360 days posttreatment. Combustion recoveries of ^{14}C-SAN-835H spiked soils were 92-100% and 95-104% of the applied for the pyridinyl and phenyl label, respectively; the LOD was 0.0011-0.0012 μg/g moist soil.

DATA SUMMARY:

[^{14}C]Diflufenzopyr (SAN 835H as the sodium salt, SAN 836H) at an approximate concentration of 0.3 ppm, degraded with a non-linear DT_{50} of 9-10 days in loam soil at 75% of field capacity incubated in the dark at 23 °C. The DT_{90} for diflufenzopyr was 46-52 days. The study author calculated the half-life using a SAS non-linear regression program, fitting the data to non-linear kinetics. EFED verified the data fit using least squares curve fitting via a statistical/graphing software package (GraphPad Prism™, version 1.03). The data were analyzed for both the pyridinyl and phenyl labels. A nonlinear least squares fit, based on one phase exponential decay, provided a good fit to the observed data (r^2=0.97 for the pyridinyl label, r^2=0.99 phenyl label). Initial analyses conducted by EFED determined that a linear fit to natural log transformed data provided a poor fit to the data; a runs test indicated significantly nonlinearity (p=0.0242 for the pyridinyl label; p= 0.0152, phenyl label). Linear regressions of natural log transformed data yielded first order half-life estimations of 60 and 60.3, for the pyridinyl and phenyl-labelled diflufenzopyr, respectively. These half-lives were observed to be closer to the time to 90% loss of parent, than to 50% loss, based on direct evaluation of the data In this case, the Agency used the non-linear DT_{50} value in data models because it provided a better fit to the observed data. A summary of EFED data analyses is provided in the appendix to this report. DT_{50}s were calculated based on the nonlinear fit and graphical examination. DT_{90}s were determined via graphical evaluation. Because the degradation of diflufenzopyr did not follow first order kinetics, estimation of degradation rates are concentration dependent.

Pyridinyl-[^{14}C]SAN 835H declined in a nonlinear manner from 77.2% of the applied radioactivity immediately posttreatment (approximately 0.256 ppm) to 1.1% of the applied (approximately 0.004 ppm) after 360 days incubation (Table XXVII), with a DT_{50} of 10.1 days (95% confidence interval (CI) of 7.6 to 15 days). The pyridinyl-labelled SAN 835H DT_{90} was determined graphically to be 52 days. Phenyl-[^{14}C]SAN 835H declined with non-linear kinetics from 84.2% of the applied radioactivity immediately posttreatment (approximately 0.265 ppm) to 1.1% of the applied (approximately 0.003 ppm) after 360 days incubation (Table XXVIII), with a DT_{50} of 8.6 days (95% CI of 7.2 to 10.8 days). The phenyl-labelled SAN 835H DT_{90} was determined graphically to be 46 days. The balance of the remaining applied radioactivity at time 0 was not extracted from the soil by organic solvents. Material balances during the study were 93.3 ± 2.7 and 98.0 ± 2.8% of the applied for the pyridinyl- and phenyl-labelled [^{14}C]SAN 835H, respectively (Tables V and VII). The only volatile degradate from both labels was carbon dioxide, which comprised 35.1% and 33.5% of the applied after 360 days in the [^{14}C]pyridinyl- and [^{14}C]phenyl-treated soils, respectively (Tables VI and VIII); the total production of $^{14}CO_2$ was comparable for the statically incubated and flowthrough incubated soils. ^{14}C-Residues in the fulvic acid fraction were more persistent in the [^{14}C]pyridinyl-treated soil; ^{14}C-residues in the humic acid fraction were more persistent in the [^{14}C]phenyl-treated soil. Unextracted ^{14}C-

residues in the [^{14}C]phenyl-treated soil were twice those in the [^{14}C]pyridinyl-treated soil (approximately 50% to 25%; Tables VI and VIII).

In the **[^{14}C]pyridinyl**-treated soil, the initial degradate was the cyclization product

carbamoyl phthalazinone (M5),

which increased from 8.9% of the applied at time 0 to a maximum concentration of 17.9% (approximately 0.059 ppm) at 30 days posttreatment; it declined to 1.4% of the applied (approximately 0.005 ppm) by 360 days posttreatment (Table XXVII; Figure 4a).

Phthalazinone (M1),

formed by the cleavage of M5, increased from 1.4% of the applied at time 0 to a maximum concentration of 6.2% (approximately 0.021 ppm) at 30 days posttreatment; it declined to 1.2% of the applied (approximately 0.004 ppm) by 360 days posttreatment (Table XXVII; Figure 4a).

2-Keto phthalazinone (M9),

the oxidation product of M1, increased from 1.8% of the applied at time 0 to a maximum concentration of 28.1% (approximately 0.093 ppm) at 179 days posttreatment; it declined to 25.0% of the applied (approximately 0.083 ppm) by 360 days posttreatment (Table XXVII). M9 is the most persistent of the degradates (Figure 4a).

Fulvic acid increased to 11.7% of the applied by 1 day posttreatment and varied between 12.9 and 18.7% for the duration of the study; humic acid increased to a maximum of 5.6% of the applied by 5 days posttreatment and declined slowly to 0.6% by 360 days posttreatment (Table VI). Unextractable radioactivity was a maximum of 25.7% of the applied (approximately 0.085 ppm) at 92 days posttreatment and decreased to 23.6% of the applied by 360 days posttreatment (Table VI). Total soil radiocarbon decreased from 100% of the applied at time 0 to 56.5% at 360 days posttreatment for the statically-incubated ^{14}C-pyridinyl-treated soils; total soil radiocarbon was 57.6% in the flow-through sample at 360 days (Table III).

In the **[^{14}C]phenyl**-treated soil, the initial degradate was the cyclization product

carbamoyl phthalazinone (M5),

which increased from 5.5% of the applied at time 0 to a maximum concentration of 19.5% (approximately 0.061 ppm) at 14 days posttreatment; it declined to 2.2% of the applied (approximately 0.007 ppm) by 360 days posttreatment (Table XXVIII; Figure 4b). No other degradates were identified.

Fulvic acid increased to 13.5% of the applied by 14 days posttreatment and declined to 7.6% by 360 days posttreatment; humic acid increased to 3.0% of the applied by 3 days posttreatment and

varied between 3.1 and 6.4% for the duration of the study (Table VIII). Unextractable radioactivity was a maximum of 48.3% of the applied (approximately 0.152 ppm) at 270 days posttreatment and decreased to 40.0% of the applied by 360 days posttreatment (Table VIII). Total soil radiocarbon decreased from 100% of the applied at time 0 to 61.6% at 360 days posttreatment for the statically-incubated 14C-phenyl treated soils; total soil radiocarbon was 61.2% in the flow-through sample at 360 days (Table IV),

The proposed metabolic pathway for SAN 835H in soil, provided by the registrant, is presented on page 18. This figure also includes data on percents of metabolites recovered. The initial step appears to be cyclization to M5, followed by cleavage of the bridge between the rings. The pyridinyl moiety is found in M1, which further oxidizes to M9, which is persistent; the phenyl moiety is rapidly incorporated into the unextractable fraction. Mineralization to CO_2 is approximately the same for both moieties.

COMMENTS:

1. The registrant needs to conduct and submit an aerobic soil metabolism study with a neutral pH soil for the metabolite M9 (2-keto phthalazinone), which was the major non-volatile, persistent degradate in this aerobic soil metabolism study. M9 reached a maximum concentration of 28% of the applied at 179 days posttreatment, with little decline thereafter (360 days incubation period). The Agency requires information on the half-life of this degradate in order to determine its fate and persistence in the environment.

2. The registrant needs to conduct and submit an additional aerobic soil metabolism study with diflufenzopyr, using a soil with a neutral to alkaline pH (see Comment #3). This study would provide important information on the dissipation of diflufenzopyr in application areas with non-acidic soils.

3. The pH of the soil used in the experiments was 5.5. In the hydrolysis study it was determined that diflufenzopyr hydrolyzed most rapidly in this pH region. (pH 5 hydrolysis half-life of 12.9 days; pH 7 and 9 hydrolysis half-lives were 23.9 and 25.6 days, respectively). Therefore, the soil aerobic half-life calculated in this experiment was likely to have had a significant component associated with hydrolysis. Soil aerobic metabolic half-lives of diflufenzopyr may be significantly longer in soils with higher pH's.

4. The study author calculated the half-life using a SAS non-linear regression program, fitting the data to nonlinear kinetics. EFED verified the data fit using least squares curve fitting via a statistical/graphing software package (GraphPad Prism™, version 1.03). The data were analyzed for both the pyridinyl and phenyl labels. Initial analyses conducted by EFED determined that a linear fit to natural log transformed data provided a poor fit to the data. Runs test indicated significantly nonlinearity ($p=0.0242$ for the pyridinyl label; $p= 0.0152$, phenyl label). A nonlinear least squares fit based on exponential decay of the parent provided an improved fit to the observed data trends ($r^2=0.97$ for the pyridinyl label; $r^2=0.99$, phenyl label). A summary of EFED data analyses is provided in the appendix to this report. DT_{50}s

were calculated based on the nonlinear fit and graphical examination of the data. DT_{90}s were determined via graphical evaluation.

5. At day zero only 77% and 84% of the applied was recovered for the pyridinyl and phenyl labels, respectively. In an earlier study conducted by the registrant (Study No R95-034), recovery of the parent was found to decrease with increasing applied concentrations; recovery of the parent was 100% at 0.012 ppm, 81% at 0.12ppm. The current experiment was conducted at 0.33ppm. Additional solvent extractions may have recovered more of the applied at day zero, and may have resulted in improved recovery and identification of labelled metabolites.

6. Aerobic soil metabolism studies were only performed using one soil. A soil with relatively high organic matter content soil (3.4%) was used, potentially resulting in increased initial sorption of some metabolites. The high clay content (26%) of the soil used may have contributed to irreversible binding of polar constituents, and hence the high level of unextractable residues Additional experiments with low organic carbon content and coarser texture would improve our understanding of the behavior of diflufenzopyr and its metabolites in a wider variety of soils.

7. The study author stated that because it was found that M5 could degrade to M1 and M3 in pure solvent, all samples and extracts were stored at -70°C for long-term storage or stored frozen at -20°C for short-term storage until analysis. The timetable of events was presented in Tables P and Q; the maximum duration of storage for a group of samples was apparently no more than 6 months (360 day samples of the ^{14}C-pyridinyl treatment).

   To assess storage stability, day 0 soil samples for both labels were stored in a freezer at -70°C and extracted with ethyl acetate after 5 and 16 months. Residue levels of SAN 835H, M5, and M1 in the extracts were compared to those in the original analysis; residues are apparently stable during frozen storage for up to 16 months (Table XXXII, with annotations from Tables XIV and XVI).

8. The study author did not explain why ^{13}C-urea-labelled SAN 835H was added to each treatment mixture. However, as part of the documentation for metabolite identification (pp.271-305), a study identifying metabolites from corn treated with a combination of ^{13}C-urea-labelled SAN 835H and 14C-phenyl-labelled SAN 835H was presented. In that study, the structure of M9 was unequivocally determined.

9. Unidentified components in the ethyl acetate extracts did not exceed 7.4% of the applied (p. 329).

10. All specific activity calculations were based on the application rate of SAN 835H as acid equivalents.

11. Microbial counts determined at the initiation of the study indicated that a viable microbial population was present in the soil (Table II).

12. The loam soil used in this study was also used in the batch equilibrium study conducted with SAN 835H (MRID 44170154). The site from which the test soil was collected had been fallow for two years with no pesticide application.

13. The maximum application rate of SAN 835H was stated as 0.2 lb ae/A, which is approximately equal to 0.4 μg SAN 835H per gram of dry soil, or 0.3 μg SAN 835H per gram of wet soil. The proposed label lists the maximum application rate as 0.125 lb ae/A.

14. Additional soil was treated at 1.0 lb ae/A for the purpose of metabolite identification "if needed." A diffuse band was seen during TLC of the ^{14}C-phenyl samples throughout the experiment (peak amount approximately 4% of the applied, days 14 to 30). The registrant reported that "a large quantity of soil was extracted and the band was isolated." However, after further characterization into at least four bands, each of the bands were present at <1% of the applied. None of the bands matched the M2 metabolite. A tentative identification of methyl carbamate (M8) was listed for one of the bands.

15. Extraction conditions for the foam plugs were not specified. In addition, the study author noted that foam plugs were kept at -70°C for long-term storage; however, he did not specify the duration of storage or why the plugs were retained.

16. The [^{14}C]SAN 835H compounds were obtained from Amersham Corporation, Arlington Heights, Illinois; the [^{13}C]SAN 835H compounds were obtained from Wizard Lab, Sacramento, CA; and the unlabelled reagent-grade SAN 835H was obtained from Sandoz Agro, Inc.

17. The study authors did not confirm that the radioactivity in the KOH trap was exclusively $^{14}CO_2$.

APPENDIX for MRID No. 44170153
Diflufenzopyr
Soil Aerobic Metabolism Study: EFED's Data Analysis[1]

PYRIDINYL LABEL

LINEAR REGRESSION

Parameter	Value	Half-Life Calculation (days)
Slope	-0.0116 +/- 0.0019	0.693/-k= 60
95% Confidence Interval	-0.0158 to -0.0073	44 to 95
Goodness of Fit		
r^2	0.78	
Is Slope Significantly Nonzero?		
F	36.52	
P value	0.0001	
Deviation from Zero	Significant	
Runs Test		
P value	0.0242	
Significantly Nonlinear?	Significant	

[1] Analyzed using GraphPad Prism™ version 1.03

APPENDIX for MRID No. 44170153
Diflufenzopyr
Soil Aerobic Metabolism Study: EFED's Data Analysis

NONLINEAR REGRESSION BASED ON FIRST ORDER EXPONENTIAL DECAY
Days 0-360: PYRIDINYL LABEL

Parameter	Value	DT_{50} Calculation (days)
K	-0.0685	0.693/-K= 10.1
95% Confidence Interval of K	-0.0908 to -0.0462	7.6 to 15
Std error of K	0.0100	
Goodness of Fit		
r^2	0.97	
Runs Test		
P value	0.0242	
Deviation from Model	Significant	
DT_{90} extrapolation		[ln (10/100)]/-0.0685=33.6*
DT_{90} 95% CI		25.4 to 49.8*

Exponential fit of entire data range yields poor fit of data in this region

BASED ON GRAPHICAL POINT TO POINT EVALUATION (VISUAL EXAMINATION)
PYRIDINYL LABEL

DT_{50} (days)	DT_{90} (days)
9	52

APPENDIX for MRID No. 44170153
Diflufenzopyr
Soil Aerobic Metabolism Study: EFED's Data Analysis

PHENYL LABEL

LINEAR REGRESSION

Parameter	Value	Half-Life Calculation (days)
Slope	-0.0115 +/- 0.0020	0.693/-k= 60.3
95% Confidence Interval	-0.0160 to -0.0071	43.3 to 97.6
Goodness of Fit		
r^2	0.77	
Std Error	0.80	
Is Slope Significantly Nonzero?		
F	33.30	
P value	0.0002	
Deviation from Zero	Significant	
Runs Test		
P value	0.0152	
Significantly Nonlinear?	Significant	

NONLINEAR REGRESSION BASED ON FIRST ORDER EXPONENTIAL DECAY
Days 0-360: PHENYL LABEL

Parameter	Value	DT_{50} Calculation (days)
K	-0.0806	0.693/K= 8.6
95% Confidence Interval of K	-0.0969 to -0.0643	7.2 to 10.8
Std error of K	0.0073	
Goodness of Fit		
r^2	0.99	
Runs Test		
P value	0.2788	
Deviation from Model	Not significant	
DT_{90} extrapolation		[ln (10/100)]/-0.0806=28.6*
DT_{90} 95% CI		23.8 to 35.8*

Exponential fit of entire data range yields poor fit of data in this region

11

APPENDIX for MRID No. 44170153
Diflufenzopyr
Soil Aerobic Metabolism Study: EFED's Data Analysis

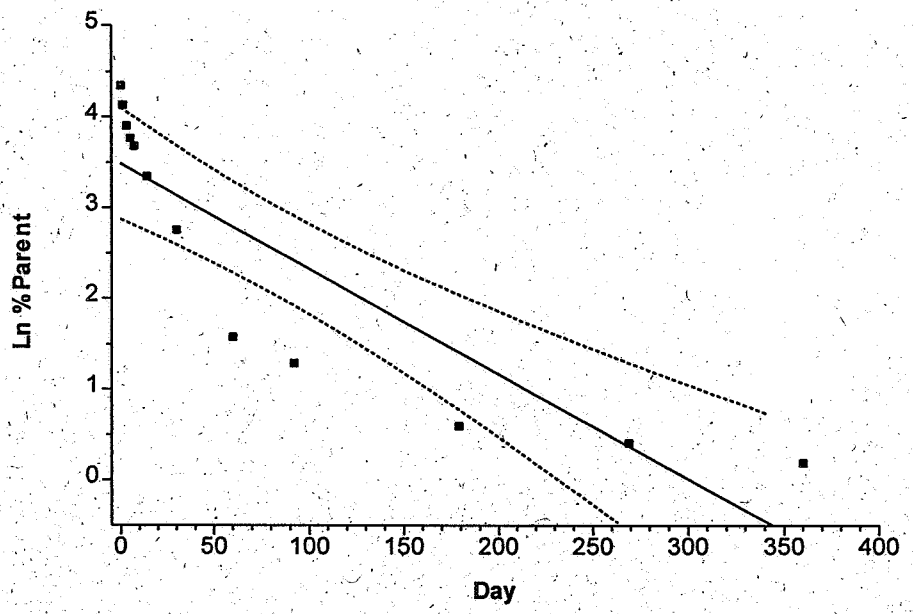
BASED ON GRAPHICAL POINT TO POINT EVALUATION (VISUAL EXAMINATION)
PHENYL LABEL

DT_{50} (days)	DT_{90} (days)
8	46

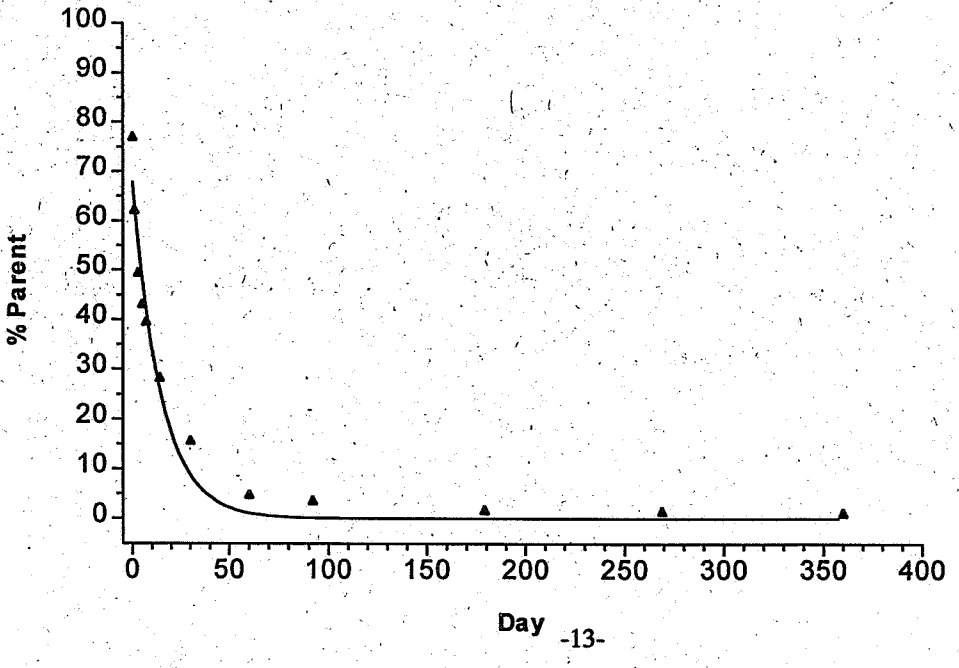
EFED's Data analysis

Diflufenzopyr Soil Aerobic Metabolism

Linear Regression
(Pyridinyl Label)

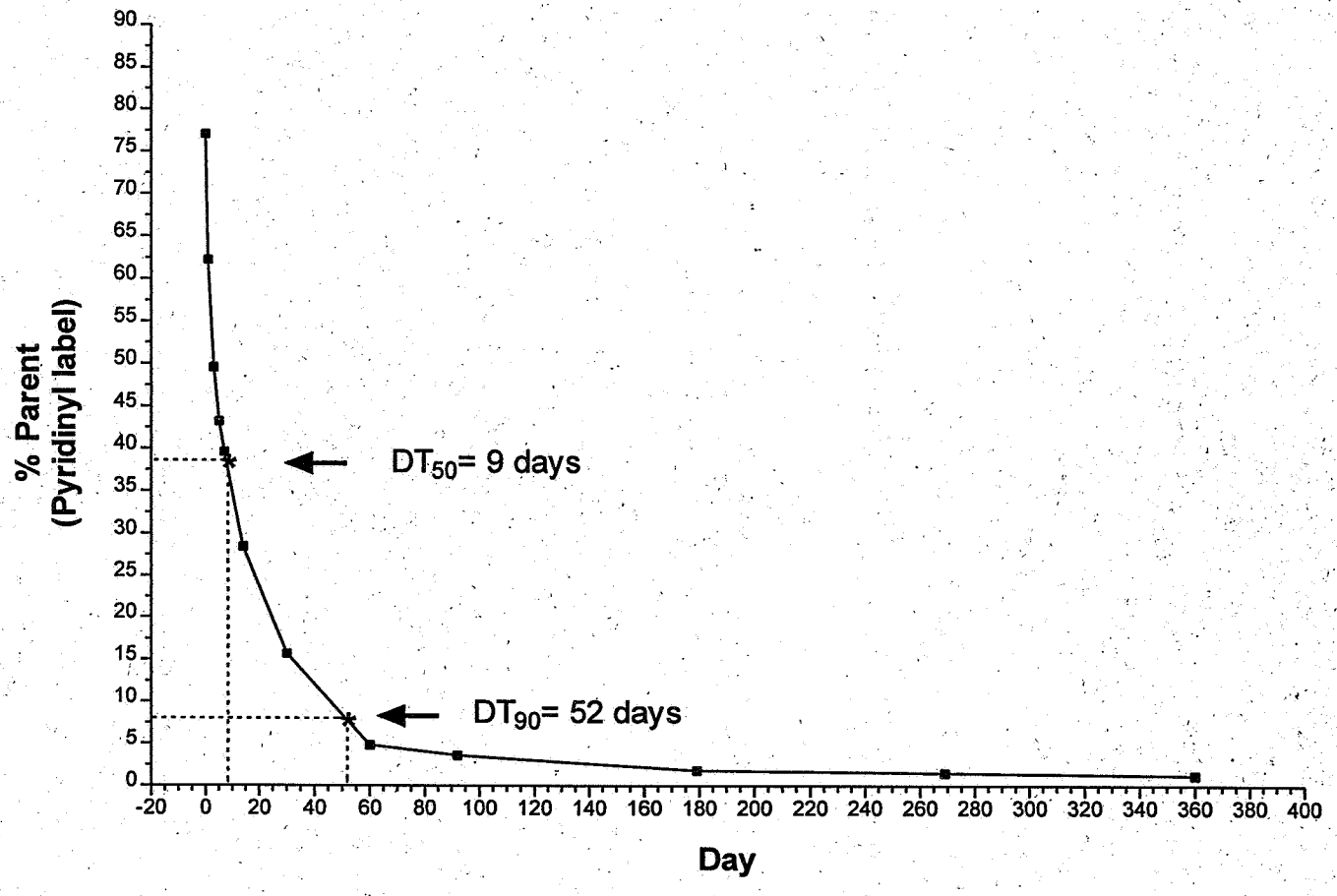


Nonlinear Regression
(Pyridinyl label)



EFED's Data analysis

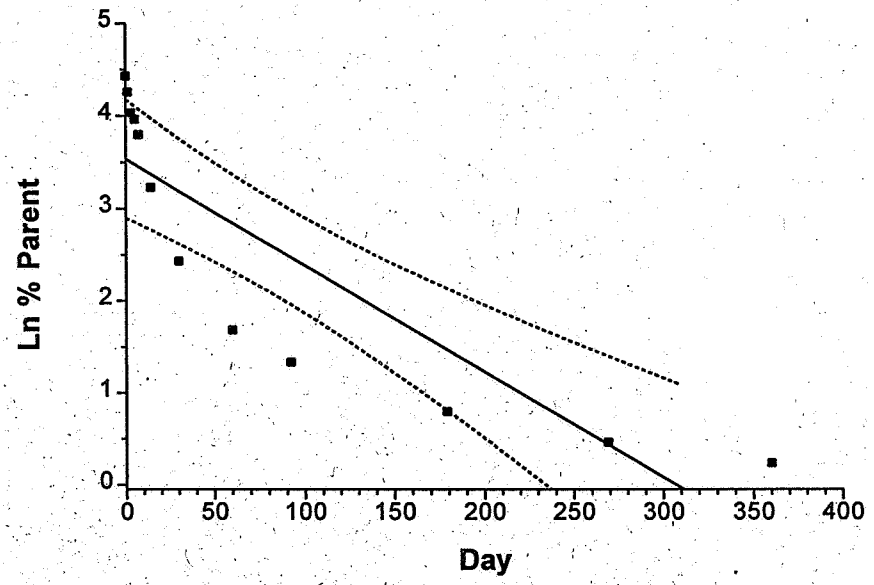
Diflufenzopyr Soil Aerobic Metabolism
% Parent Pyridinyl Label
Point to Point Graph



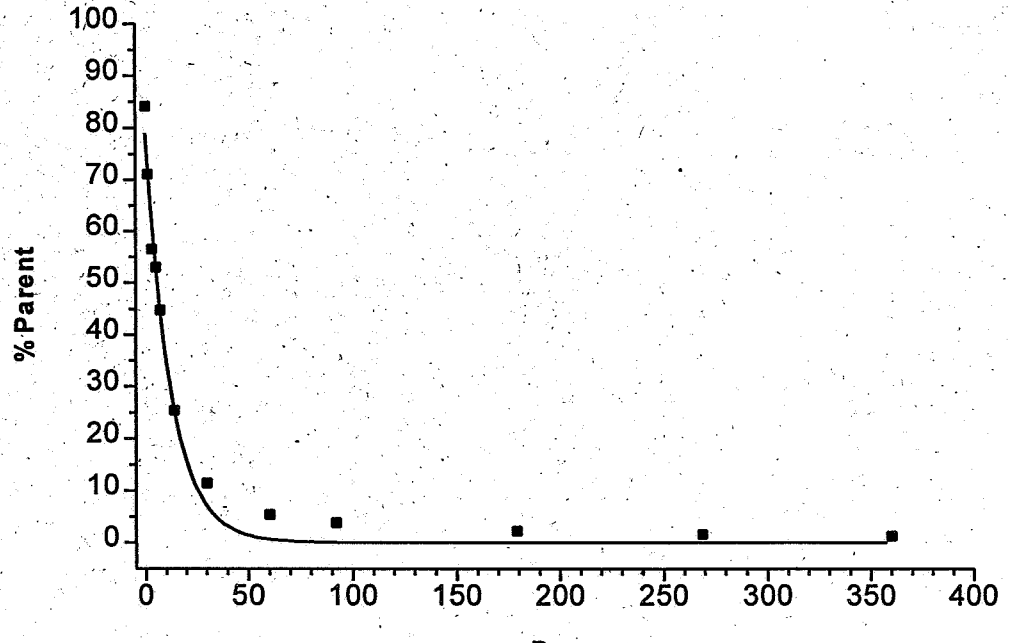
EFED's Data analysis

Diflufenzopyr Soil Aerobic Metabolism

Linear Regression
(Phenyl label)

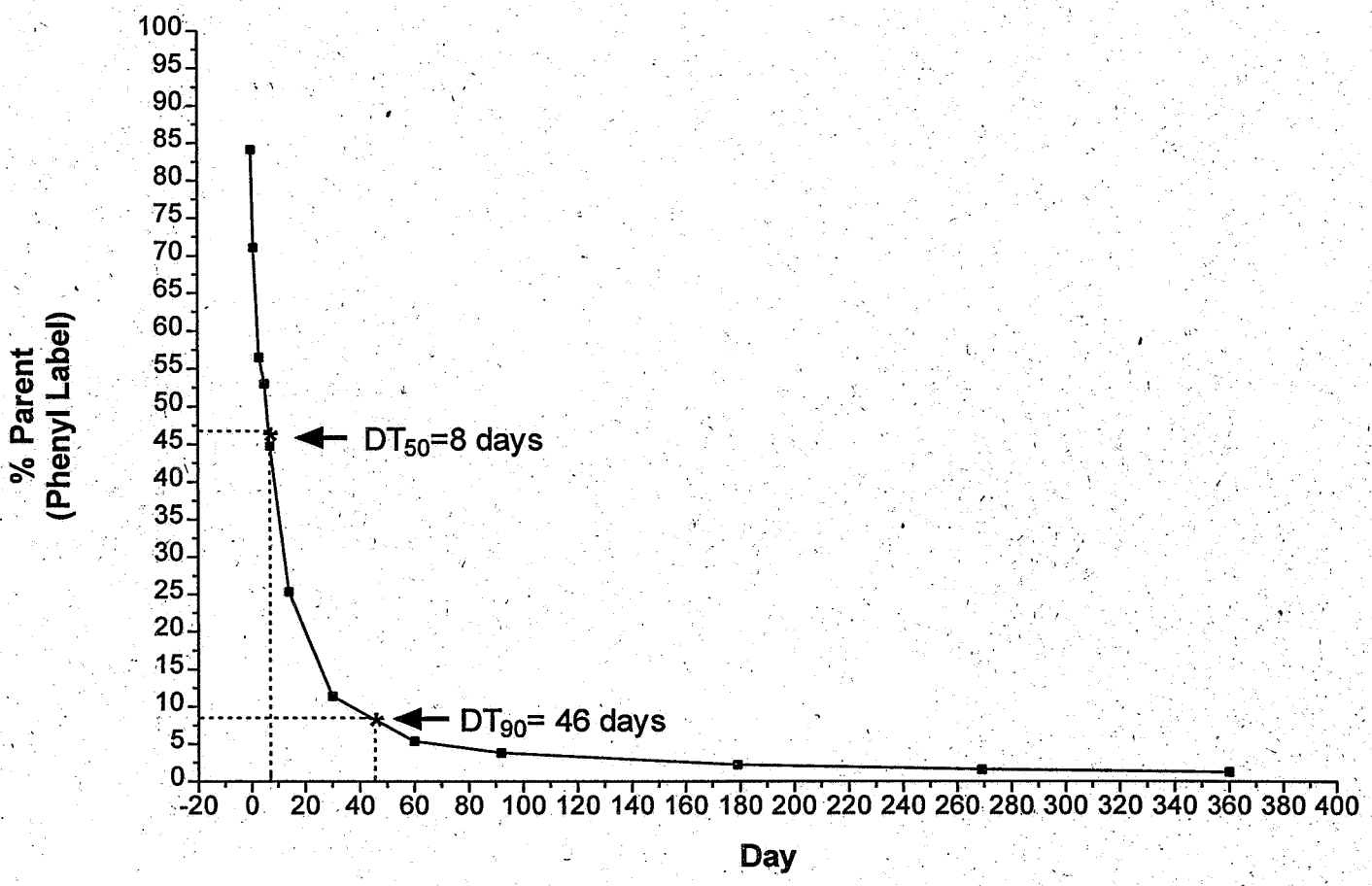


Nonlinear Regression
(Phenyl label)

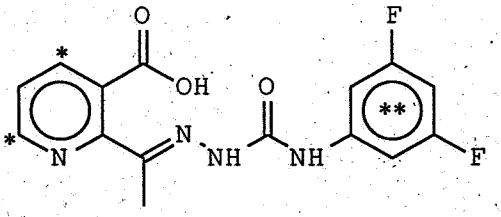


EFED's Data analysis

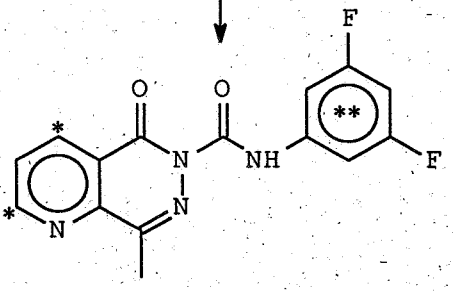
Diflufenzopyr Soil Aerobic Metabolism
% Parent Phenyl Graph
Point to Point Graph



Proposed Metabolic Pathway of SAN 835H in Aerobic Soil Metabolism Studies



SAN 835H

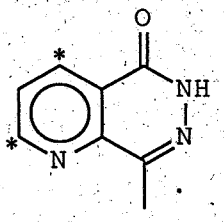


M5 (Carbamoyl Phthalazinone)

Pyridinyl label results:
8.9% at Day 0
17.9% at Day 30
1.4% at Day 360

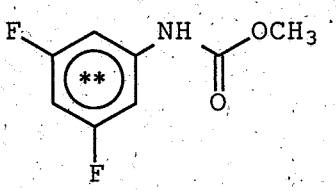
Phenyl label results:
19.5% at Day 14

1.4% at Day 0
6.2% at Day 30
1.2% at Day 360



M1 (Phthalazinone)

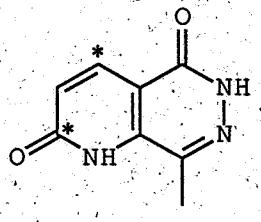
Unknown II: Peak: 3.9% at Day 14
(Multicomponent, including possible M8)



M8 (Methyl Carbamate)

Unknown I: Phenyl lab
Peak: 1.8% at days 30 and 6

1.8% at Day 0
28.1% at Day 179
25% at Day 360



M9 (2-keto-Phthalazinone)

CO_2 accumulated to 35.1% (pyridinyl) and 33.5% of applied (phenyl)

Maximum amounts of unextractable radiocarbon: 26% at day 92 (pyridinyl) and 48% at day 270 (phenyl)

Any step can lead to $*CO_2$ or $**CO_2$
Amounts expressed as percents of applied
* Position of pyridinyl ^{14}C label
** Position of phenyl ^{14}C label

Page _____ is not included in this copy.

Pages 18 through 55 are not included in this copy.

The material not included contains the following type of information:

_____ Identity of product inert ingredients.

_____ Identity of product impurities.

_____ Description of the product manufacturing process.

_____ Description of quality control procedures.

_____ Identity of the source of product ingredients.

_____ Sales or other commercial/financial information.

_____ A draft product label.

_____ The product confidential statement of formula.

_____ Information about a pending registration action.

✓ FIFRA registration data.

_____ The document is a duplicate of page(s) _____.

_____ The document is not responsive to the request.

The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.