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OPP OFFICIAL RECORD
HEALTH EFFECTS DIVISION
SCIENTIFIC DATA REVIEWS
EPA SERIES 361

January 6, 1999

Memorandum

SUBJECT: Review of the Pilot Study Results for the Broadleaf Turf Herbicide Transferable Foliar Residue (TFR) Task Force; MRID No. 446557-01; *Comparison of the Transferable Turf residues from the Application of Various Forms of Phenoxy Herbicides and the Effects from the Application of Various Spray Volumes Per Acre*, dated 9/10/98; DP Barcode 252025; Guideline: 875.2100 Transferable Residue Dissipation: Lawn and Turf.

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The Broadleaf Turf Herbicide Transferable Foliar Residue (TFR) Task Force is responding to the turf data call-in for 2,4-D; 2,4-D DMA; 2,4-D 2EHE; MCPA; MCPA DMA; MCPA 2EHE; 2,4-DP-p DMA; 2,4-DP-p 2EHE; MCPP; MCPP DMA; MCPP-p; MCPP-p DMA; Dicamba; and Dicamba DMA. The following table lists the PC Codes for these chemicals.

Chemical	Case Number	PC Code		
		Acid	DMA	2-EHE
2,4-D	[illegible]	030001	030019	[illegible]
2,4-DPP	294	031402	031403	031465
MCPA	17	030501	030516	--
MCPP-p	377	129046	031520	031564
Dicamba	65	029801	029802	--

Dicamba				

The Task Force has conducted the **pilot study** and is requesting a review from the Agency before starting the **definitive study**. The results of the pilot study are reviewed in this memo for the purpose of determining if the Turf Task Force should proceed with the definitive study as planned. The Turf Task Force needs the Agency's opinion by early January 1999 for logistical reasons.

Pilot Study Summary

2,4-D, 2,4-DP, MCPA, MCPP, and Dicamba represent approximately 75% EPA registered products. The Turf Task Force conducted a pilot study in North Carolina during April-May 1998, to select a surrogate compound to be used in a more extensive study (i.e., the definitive study). The pilot study monitored transferable foliar residues (TFR) of DMA salt and 2EHE along with monitoring TFR resulting from single ingredient and combination compounds in side by side tests in a single location. The Task Force anticipated that the 2EHE forms will result in less transferable residues than DMA forms. If the hypothesis is confirmed, and they can prove that DMA salts are the most transferable of all the others and its combinations, they are poised to use DMA salts as a surrogate product that produces the "worst case" scenario.

Data have been submitted in the pilot study for *"...the comparison of 2,4-D, MCPA and 2,4-DP-p applied alone as the 2-ethylhexyl ester forms and dimethylamine salt forms, and in combinations as the dimethylamine salt forms. MCPP-p as the dimethylamine salt form was applied alone and in combination. Also, the dimethylamine salt of Dicamba was applied in combination with the dimethylamine forms of 2,4-D and MCPP-p. These applications were made in a nominal spray solution of 10 gallons per acre using a tractor boom sprayer*

The pilot study was conducted in two phases. The first phase compared the various compounds using a spray volume of 10 gallons per acre (GPA). The second phase investigated the effects of various dilution rates and was performed using 2, 5, and 20 GPA for comparison

Results

For this review, only the Excel spreadsheets for the first phase were obtained. The data for the second phase are available in the registrant's hard copy submission

PHASE 1:

Table 1 lists the transferrable residues as a percentage of the application rate (maximum label rate -- calculated rate not the analytical rate) converted to acid equivalents (ae) for 3 hrs, 8 hrs, 24 hrs, and 2, 3, 4, 5, 6, 7, 10 and 14 days after treatment (DAT). HED performed a linear regression for each of the 12 sets of data (triplicate samples) listed in Table 1. Table 2 summarizes the treatment number, compound, application rate (lb ae/acre), correlation of

determination (R^2), initial residue value as a percent of the application rate, the percent dissipation per day, and the half-life. One-half the LOQ (LOQ = 0.88 ng/cm2) was used for the first sampling interval that the residue values were nondetected (either less than the LOQ or LOD -- see Conclusion section for further discussion). The 12 sets of regressions are provided in Appendix A. The initial residue levels (as a percentage of the application rate) ranged from 0.186 to 2.05 percent for 0 DAT and ranged from 0.054 to 0.880 percent for 1 DAT. The dissipation over time ranged from 33 to 93 percent per day. The half-life ranged from 0.26 to 1.44 days. When all the compounds are grouped as one "sample" and the samples were assumed to be zero after the first interval of nondetects, the initial residue level (as a percentage of the application rate) is 0.391 on 0 DAT, dissipation rate is 42 percent per day, and the half-life is 1.27 days. Assuming one-half the LOQ for all intervals that were nondetect, the initial residue level (as a percentage of the application rate) is 0.223 on 0 DAT, dissipation rate is 33 percent per day, and the half-life is 1.71 days. Figure 1 illustrates the comparison of the 12 dissipation curves along with the two "overall" curves. Other pertinent items noted in this cursory review include the following:

- Each plot consisted of full grass (fescue) coverage with no bare spots (turf farm);
- The grass was mowed to a height of 2 inches the day prior to the application and was not mowed again until after the seventh day of sampling;
- No irrigation was performed and 0.05 inches of rain fell after 2 DAT, 0.01 inches just before 3 DAT, 0.04 inches before 7 DAT, 0.17 inches before 10 DAT, and 0.76 inches between 10 and 14 DAT;
- Mean laboratory recoveries ranged from 88.8 to 108 percent;
- Sampling was conducted using a modified California roller (100 percent, 200 thread count cotton cloth) as per the SOP developed by the Outdoor Residential Exposure Task Force (ORETF).
- Study site was in North Carolina, the temperature ranged from 35 to 81 ° F.

PHASE 2:

A cursory review of the second phase indicates that the gallons per acre did not affect the residue transfer (i.e., still within the range of the results in Phase 1). 2,4-D DMA, MCPP-p DMA, and Dicamba DMA, were applied at approximately 1.8, 0.7, and 0.2 lb ae/acre. At 2 GPA, the highest values within the triplicate samples, as a percentage of the application rate, are 1.35, 1.66, and 1.52 percent for 2,4-D DMA, MCPP-p DMA, and Dicamba DMA, respectively. At 5 GPA, the highest values within the triplicate samples, as a percentage of the application rate, are 1.23, 1.29, and 1.31 percent for 2,4-D DMA, MCPP-p DMA, and Dicamba DMA, respectively. At 20 GPA, the highest values within the triplicate samples, as a percentage of the

application rate, are 0.714, 0.724, and 0.770 percent for 2,4-D DMA, MCPP-p DMA, and Dicamba DMA, respectively

Conclusions

It was hypothesized in the protocol that the DMA sal (or any salt or acid form which would rapidly convert to ionic form) to be less readily absorl ed by the waxy cuticle of the plant and thus more readily available to be dislodged. The results f the ranking of the data in the pilot study indicate that MCPP-p DMA has the highest initial resi ue level (as a percentage of the application rate) as well as the highest percent dissipation pe day. However, the highest residue levels (as a percentage of the application rate) on 1 DAT are or 2,4-D 2-EHE and MCPA 2-EHE. Other considerations that are noteworthy include the ollowing:

- It would be appropriate to use one-half the LOD for esidues that were not detected instead of the LOQ, however, in the limited time of t is review, the LOD was not evident in the summary of the submission. Although the effe t of using the LOQ instead of the LOD is not believed to be significant in this analysis, it is the most conservative manner to handle the samples.

- No discussion was provided on how the Task Force p ans to relate the transferable foliar residue data from the definitive study to human expo ure (e.g., activity-specific transfer coefficients). In the absence of transfer coefficients, he Agency would use the default provided in the SOPs for Residential Exposure Asses ments (e g hand-to-mouth activities and dermal contact with turf or "Jazzercise" transfer coefficients)

- A complete review of this data submission is necessa y to ensure that the requirements of Series 875 have been met (e.g., QA/QC samples, san ple storage, etc.).

- Only one study location was performed because this tudy was designed as the pilot.

Recommendations

HED requests additional information from the registi nt on what effect environmental conditions (e.g., climatic and soil types) would have on the t ansferability and/or dissipation of 2,4-D turf residues. If a rationale can be established by the r gistrant (e.g., data from magnitude of residue trials) for the use of NC as a representative site o 2,4-D residues for geographic variations, then HED recommends the following three items

- (1) The results for treatment number 9 for MCPP-p I MA, which showed an initial concentration of residues at 0 DAT of ***2.05 percent o the application rate*** (lb ae/acre), be used to represent all 2,4-D residential turf products. he highest initial concentration rate

has been selected because of the concern for children entering treated lawns on the day of application.

- (2) Treatment number 2 for 2,4-D 2-EHE, which showed the highest combination of initial residue levels (1.46 pecent of the application rate based on lb ae/acre) and the longest ***half-life of 1.37 days***, be used to represent all 2,4-D sodfarm or other uses that require assessments over time. This combination was selected because it represents the highest residue levels for an intermediate-term exposure duration.

- (3) Recommendations (1) and (2) above will be used by the HED for all formulations.

At this time, HED recommends that the definitive study be put on hold until a formal HED review of the pilot study can be completed. If HED finds (a) that the requirements of Series 875 (e.g., QA/QC) are met, (b) that an acceptable rationale is established for the selection of one geographical region to be representative, and (c) that the registrant agrees to the three recommendations above, then an additional study may not be required.

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% ae combined

Table 1. Transferable Turf Residues for 2,4-D Reported as a Percentage of the Application Rate

Treatment	compound	rate lb ae/	ng sq cm	0.125 day	0.333 day	1 day	2 day	3 day	4 day	5 day	6 day	7 day	10 day	14 day
2	24D ehe	1.705	19111	1.295783	1.516324	2.273426	0.766841	0.333188	0.294735	0.1428	0.061238	0.077901	0.009195	0.002302
				1.154031	1.248826	1.688424	0.571604	0.222852	0.185554	0.136687	0.069364	0.065184	0.003123	0.002302
				1.122804	1.19854	1.377443	0.391206	0.145311	0.136707	0.067871	0.025438	0.03185	0.002302	0.002302
3	24D dma	1.725	19335	2.291182	1.5360[illegible]	4.060683	0.079548	0.039264	0.044375	0.026429	0.024515	0.010189	0.002276	
				1.57745	0.532713	2.477173	0.076028	0.02566	0.040548	0.022084	0.015516	0.002276	0.002276	
				0.915438	0.346522	2.146367	0.042307	0.013532	0.039979	0.007344	0.014999	0.002276	0.002276	
9	24D dma com	1.585	17765	0.655598	3566	0.466185	0.011089	0.008725	0.006699	0.002477				
				0.602308	1.165212	0.445258	0.00900	0.006305	0.006136	0.002477				
				0.499296	0.878131	0.415424	0.008594	0.002477	0.00546	0.002477				
4	MCPA ehe	1.544	17306	2.004342	1.294409	2.025713	0.427242	0.175266	0.076403	0.022516	0.109732	0.013771	0.001631	0.002542
				1.819814	1.271547	84.914	0.267[illegible]	0.048598	0.067734	0.019366	0.008101	0.007619	0.002542	0.002542
				1.46312	0.954668	643659	0.[illegible]8041	0.02[illegible]19	0.03387	0.0[illegible]6587	0.006767	0.006396	0.002542	0.002542
5	MCPA dma	1.547	17340	1.493656	1.38985	2.760092	0.054671	0.032353	0.042272	0.037832	0.019204	0.023183	0.005288	0.002537
				1.[illegible]7943	1.366782	2.06459	0.047751	0.019954	0.027797	0.0[illegible]5398	0.012745	0.002537	0.002537	0.002537
				0.[illegible]79547	0.911188	1.89158	0.041061	0.010265	0.007497	0.008304	0.007151	0.002537	0.002537	0.002537
10	MCPA dma com	1.496	[illegible]	1.[illegible]7485[illegible]	2.170802	[illegible]	[illegible]	0.0[illegible]	0.01[illegible]	0.006[illegible]9	0.007872	0.002624		
				0.822996	1.109256	0.546875	0.025167	0.011633	0.01[illegible]	0.002624	0.002624	0.002624		
				0.614265	0.745468	0.180105	0.01801	0.0[illegible]125	0.0[illegible]643	0.002624	0.002624	0.002624		
6	24DP ehe	0.612	6860	0.371657	0.115922	0.136365	0.010756	0.006414						
				0.175293	0.095161	0.092908	0.006414	0.006414						
				0.112235	0.064682	0.0583[illegible]	0.006414	0.006414						
7	24DP dma	0.596	6680	1.208084	1.946108	2.110778	0.037425	0.023653	0.026048	0.006587				
				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
				0.706587	0.800898	0.647305	0.006587	0.013473	0.006587	0.006587				
10	24DP dma com	0.587	[illegible]	465[illegible]6	2.948[illegible]76	[illegible]	[illegible]	0.006688	0.015808	0.006688				
				10[illegible]491	1.535[illegible]88	[illegible]	[illegible]	0.006688	0.006688	0.006688				
				0.[illegible]54	[illegible]	0.199118	[illegible]	0.006688	0.006688	0.006688				
8	MCPP dma	0.599	[illegible]	[illegible]	[illegible]	0.722371	0.031278	0.006553						
				[illegible]	[illegible]	0.618111	0.021001	0.006553						
				0.612154	1.136431	0.490021	0.016831	0.006551						
	MCPP [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.006609							
				[illegible]	[illegible]	[illegible]	0.006609							
				[illegible]	[illegible]	[illegible]	0.006609							
	MCPP dma [illegible]	[illegible]	[illegible]	[illegible]8897	[illegible]529537	0.56498	0.020751	0.006665						
				[illegible]	1.343532	0.552863	0.018175	0.006665						
				[illegible]14535	0.898213	0.172675	[illegible]	0.006665						

Shaded values are nondetects (either less than the LOQ or LOD) and are reported as one-half the LOQ of 0.88 ng/cm2 converted to a percentage of the application rate

Table 2. Turf Transferable Residues as a Percentage of the Application Rate: Summary of Phase 1 of the Pilot Study for 2,4-D.

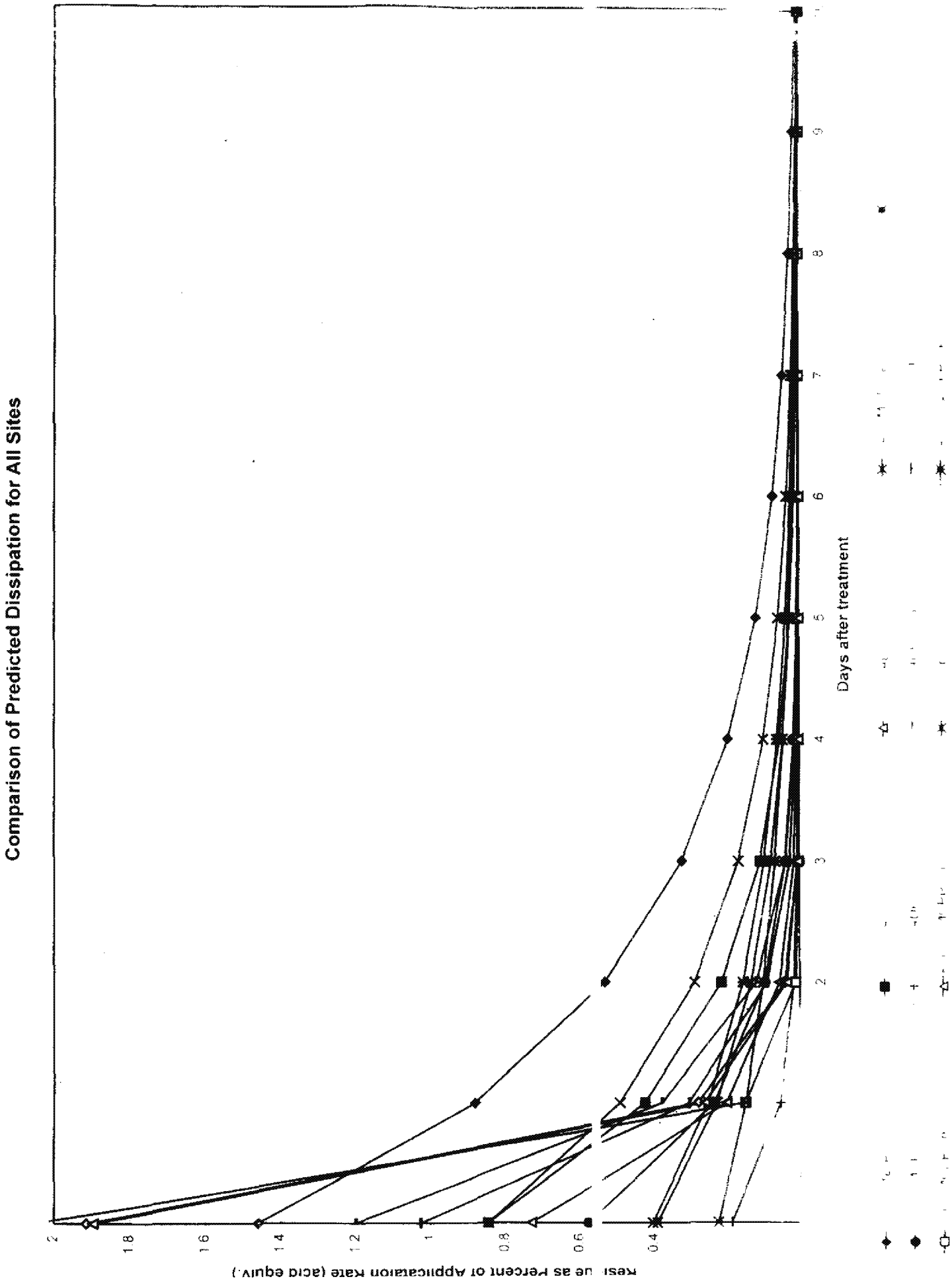
Treatment No.[a]	Compound	Application Rate (lb ae/acre)[b]	R^2	Initial % of application Rate[c]		Percent Dissipation Per Day	Half Life (Days)
				0 DAT	1 DAT		
2	2,4-D 2-EHE	1.705	0.94	1.46	0.880	40	1.37
3	2,4-D DMA	1.725	0.81	0.845	0.423	50	1.00
4	MCPA 2-EHE	1.544	0.84	0.845	0.491	42	1.28
5	MCPA DMA	1.547	0.68	0.403	0.249	38	1.44
6	2,4-DP-p 2-EHE	0.612	0.85	0.186	0.054	71	0.56
7	2,4-DP-p DMA	0.596	0.79	1.20	0.376	69	0.60
8	MCPP-p DMA	0.599	0.93	1.91	0.277	86	0.36
9	2,4-D DMA	1.585	0.84	0.730	0.200	73	0.53
9	MCPP-p DMA	0.594	0.87	2.05	0.149	93	0.26
10	MCPA DMA	1.496	0.84	0.577	0.233	60	0.76
10	2,4-DP-p DMA	0.587	0.83	1.03	0.302	71	0.57
10	MCPP-p DMA	0.589	0.93	1.90	0.259	86	0.35
Overall	Stop at one ND	1.1 ± 0.53	0.57	0.391	0.227	42	1.27
Overall	Extend ND to 14 DAT	1.1 ± 0.53	0.54	0.223	0.149	33	1.71

a Treatment number represents each plot as identified in the study report. Treatment 1 was the control. Treatment 9 was a combination of 2,4-D+MCPP-p+Dicamba DMA. Treatment 10 was a combination of MCPA+MCPP-p+2,4-DP-p DMA.

b All compounds converted to acid equivalents (ae).

c All residues converted as a percentage of the application rate (ae). The values are predicted values. Sampling intervals were 3 hr, 8 hr, and 1, 2, 3, 4, 5, 6, 7, 10, and 14 days after treatment (DAT). See Appendix A for individual regressions.

d "Overall" represents all treatment plots as one sample. "Stop at one ND" represents using one sampling interval at ½ LOQ. "Extend ND to 14 DAT" represents using ½ LOQ for all sampling intervals regardless of when sample was ND.


Comparison of Predicted Dissipation for All Sites
Days after treatment
Residue as Percent of Application Rate (acid equiv.)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
2
3
4
5
6
7
8
9

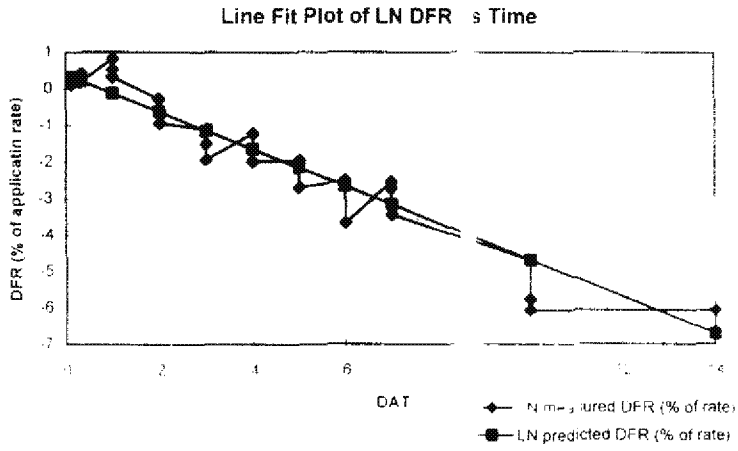
Appendix A

2,4-D Regression Analysis

Natural Log of Raw Data

DAT	LN measured DFR (% of rate)	LN predicted DFR (% of rate)
0.125	0.2591153	0.314407
0.125	0.1432606	0.314407
0.125	0.1158288	0.314407
0.333	0.4162888	0.209179
0.333	0.2222041	0.209179
0.333	0.1811045	0.209179
1	0.821288	-0.128258
1	0.5237953	-0.128258
1	0.3202291	-0.128258
2	-0.2733315	-0.63416
2	-0.5592042	-0.63416
2	-0.9385222	-0.63416
3	-1.0990479	-1.140062
3	-1.5012457	-1.140062
3	-1.9288801	-1.140062
4	-1.2216794	-1.645964
4	-1.6844075	-1.645964
4	-1.989913	-1.645964
5	-1.9463109	-2.151866
5	-1.9900648	-2.151866
5	-2.6901393	-2.151866
6	-2.510371	-2.657769
6	-2.6683873	-2.657769
6	-3.6714973	-2.657769
7	-2.552314	-3.163671
7	-2.7305372	-3.163671
7	-3.4467336	-3.163671
10	-4.6891401	-4.681377
10	-5.7690603	-4.681377
10	-6.073977	-4.681377
14	-6.073977	-6.704986
14	-6.073977	-6.704986
14	-6.073977	-6.704986

Application rate (lb acid equiv A	1.705	
slope	-0.5059	
intercept	0.37764	
R^2	0.9389	
Adjusted R^2	0.93692	
dissipation	40%	
Half-life	1.37	days

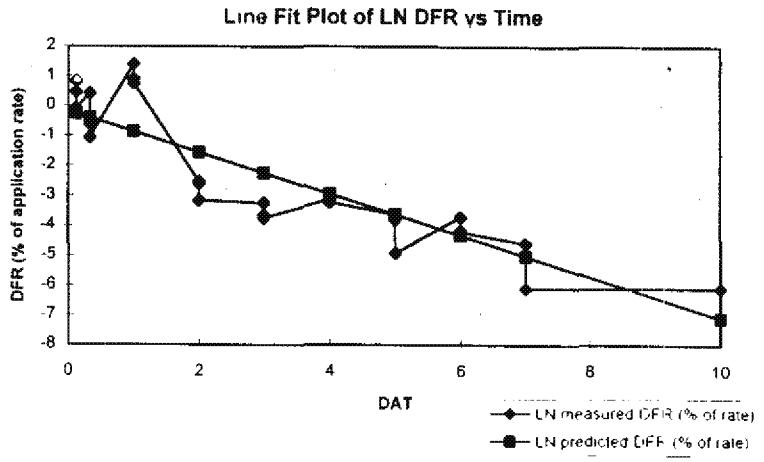


(3) - 24D dma

Natural Log of Raw Data

DAT	LN measured DFR (% of rate)	LN predicted DFR (% of rate)
0.125	0.8290678	-0.254594
0.125	0.4558098	-0.254594
0.125	-0.0883523	-0.254594
0.333	0.4292301	-0.398541
0.333	-0.629773	-0.398541
0.333	-1.0598094	-0.398541
1	1.4062643	-0.860139
1	0.9071986	-0.860139
1	0.7637765	-0.860139
2	-2.5301345	-1.552191
2	-2.5766545	-1.552191
2	-3.1628099	-1.552191
3	-3.2389888	-2.244243
3	-3.6550641	-2.244243
3	-3.7493748	-2.244243
4	-3.1150681	-2.936294
4	-3.2052632	-2.936294
4	-3.2193932	-2.936294
5	-3.6333026	-3.628346
5	-3.8128882	-3.628346
5	-4.9138451	-3.628346
6	-3.7084649	-4.320398
6	-4.1658897	-4.320398
6	-4.1997913	-4.320398
7	-4.5864685	-5.01245
7	-6.0854826	-5.01245
7	-6.0854826	-5.01245
10	-6.0854826	-7.088605
10	-6.0854826	-7.088605
10	-6.0854826	-7.088605

Application rate (lb acid equiv./ A)	1.725	
slope	-0.69205	
intercept	-0.16809	
R^2	0.80837	
Adjusted R^2	0.80153	
dissipation	50%	
Half-life	1.00	days

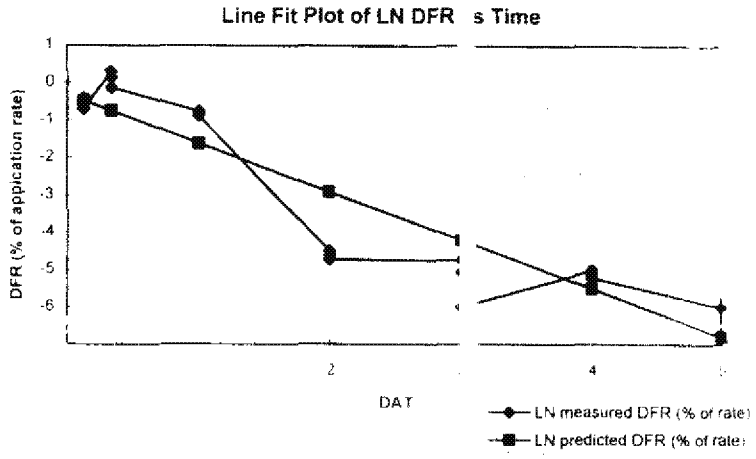


DAT	incremental predicted DFR (% of rate)
0	0.84527986
1	0.42310316
2	0.21178345
3	0.10600779
4	0.05306199
5	0.02656007
6	0.01329459
7	0.00665458
8	0.00333094
9	0.00166729
10	0.00083456
11	0.00041774
12	0.0002091
13	0.00010466
14	5.2389E-05
15	2.6223E-05
16	1.3126E-05
17	6.5702E-06
18	3.2887E-06
19	1.6462E-06
20	8.2398E-07
21	4.1244E-07
22	2.0645E-07
23	1.0334E-07
24	5.1725E-08
25	2.5891E-08
26	1.296E-08
27	6.4869E-09
28	3.247E-09
29	1.6253E-09
30	8.1353E-10
31	4.0721E-10
32	2.0383E-10
33	1.0203E-10
34	5.1069E-11
35	2.5562E-11
36	1.2795E-11
37	6.4046E-12
38	3.2058E-12
39	1.6047E-12
40	8.0321E-13
41	4.0205E-13
42	2.0124E-13
43	1.0073E-13
44	5.0421E-14
45	2.5238E-14
46	1.2633E-14
47	6.3234E-15
48	3.1652E-15
49	1.5843E-15
50	7.9303E-16
51	3.9695E-16
52	1.9869E-16
53	9.9455E-17
54	4.9782E-17
55	2.4918E-17

Natural Log of Raw Data

DAT	LN measured DFR (% of rate)	LN predicted DFR (% of rate)
0.125	-0.4176414	-0.476677
0.125	-0.5069865	-0.476677
0.125	-0.6945554	-0.476677
0.333	0.3049816	-0.746211
0.333	0.1529035	-0.746211
0.333	-0.1299593	-0.746211
1	-0.7633873	-1.610536
1	-0.8091024	-1.610536
1	-0.8784566	-1.610536
2	-4.5017818	-2.906375
2	-4.6145015	-2.906375
2	-4.7223905	-2.906375
3	-4.7415604	-4.202215
3	-5.0664866	-4.202215
3	-6.0007959	-4.202215
4	-5.005862	-5.498054
4	-5.0936376	-5.498054
4	-5.2102745	-5.498054
5	-6.0007959	-6.793893
5	-6.0007959	-6.793893
5	-6.0007959	-6.793893

Application rate (lb acid equiv./ A)	1.585
slope	-1.29584
intercept	-0.3147
R^2	0.84329
Adjusted R^2	0.83504
dissipation	[illegible]
Half-life	[illegible] days

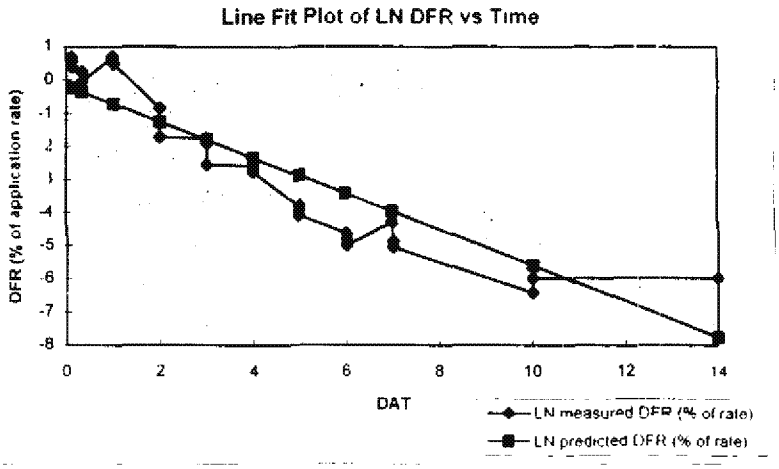


(4) - MCPA ehe

Natural Log of Raw Data

DAT	LN measured DFR (% of rate)	LN predicted DFR (% of rate)
0.125	0.6953156	-0.236676
0.125	0.5987343	-0.236676
0.125	0.3941482	-0.236676
0.333	0.2580546	-0.349495
0.333	0.2402343	-0.349495
0.333	-0.0463912	-0.349495
1	0.7059216	-0.711275
1	0.6140572	-0.711275
1	0.4969249	-0.711275
2	-0.8504058	-1.253674
2	-1.3190509	-1.253674
2	-1.712482	-1.253674
3	-1.7414517	-1.796073
3	-1.9065081	-1.796073
3	-2.5492617	-1.796073
4	-2.5717314	-2.338472
4	-2.6921628	-2.338472
4	-2.7585013	-2.338472
5	-3.7935136	-2.880871
5	-3.9442116	-2.880871
5	-4.099125	-2.880871
6	-4.6323785	-3.42327
6	-4.8157599	-3.42327
6	-4.9956972	-3.42327
7	-4.2852028	-3.965669
7	-4.8770683	-3.965669
7	-5.0520155	-3.965669
10	-6.4188559	-5.592866
10	-5.9748041	-5.592866
10	-5.9748041	-5.592866
14	-5.9748041	-7.762461
14	-5.9748041	-7.762461
14	-5.9748041	-7.762461

Application rate (lb acid equiv./ A)	1.544
slope	-0.5424
intercept	-0.16888
R^2	0.8398
Adjusted R^2	0.83463
dissipation	42%
Half-life	1.28 days



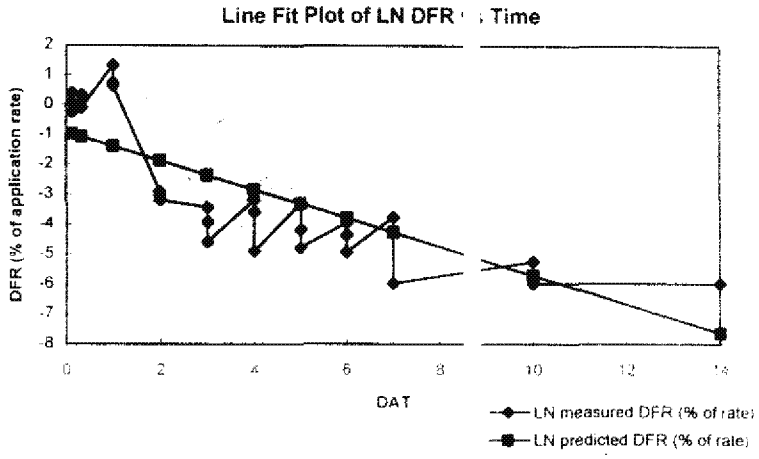
DAT	incremental predicted DFR (% of rate)
0	0.84461347
1	0.49101769
2	0.28545409
3	0.16594929
4	0.09647494
5	0.0560859
6	0.03260565
7	0.01895536
8	0.01101973
9	0.00640634
10	0.00372434
11	0.00216515
12	0.00125872
13	0.00073176
14	0.00042541
15	0.00024731
16	0.00014378
17	8.3584E-05
18	4.8592E-05
19	2.8249E-05
20	1.6423E-05
21	9.5473E-06
22	5.5503E-06
23	3.2267E-06
24	1.8758E-06
25	1.0905E-06
26	6.3398E-07
27	3.6857E-07
28	2.1427E-07
29	1.2456E-07
30	7.2416E-08
31	4.2099E-08
32	2.4474E-08
33	1.4228E-08
34	8.2716E-09
35	4.8087E-09
36	2.7955E-09
37	1.6252E-09
38	9.4481E-10
39	5.4927E-10
40	3.1932E-10
41	1.8564E-10
42	1.0792E-10
43	6.2739E-11
44	3.6474E-11
45	2.1204E-11
46	1.2327E-11
47	7.1663E-12
48	4.1662E-12
49	2.422E-12
50	1.408E-12
51	8.1857E-13
52	4.7588E-13
53	2.7665E-13
54	1.6083E-13
55	9.35E-14

MCPA dma

Natural Log of Raw Data

DAT	LN measured DFR (% of rate)	LN predicted DFR (% of rate)
0.125	0.401227	-0.969056
0.125	0.0755076	-0.969056
0.125	-0.2503263	-0.969056
0.333	0.3291959	-1.068954
0.333	0.3124591	-1.068954
0.333	-0.093006	-1.068954
1	1.3244435	-1.389297
1	0.7249319	-1.389297
1	0.6374125	-1.389297
2	-2.9064167	-1.869572
2	-3.0417581	-1.869572
2	-3.1926933	-1.869572
3	-3.4310503	-2.349847
3	-3.9143325	-2.349847
3	-4.5789877	-2.349847
4	-3.1636255	-2.830122
4	-3.5828271	-2.830122
4	-4.8932368	-2.830122
5	-3.2746105	-3.310398
5	-4.1735226	-3.310398
5	-4.790958	-3.310398
6	-3.9526288	-3.790673
6	-4.3626085	-3.790673
6	-4.9404897	-3.790673
7	-3.7643192	-4.270948
7	-5.9765816	-4.270948
7	-5.9765816	-4.270948
10	-5.2422489	-5.711773
10	-5.9765816	-5.711773
10	-5.9765816	-5.711773
14	-5.9765816	-7.632874
14	-5.9765816	-7.632874
14	-5.9765816	-7.632874

Application rate (lb acid equiv / A)	1.547
slope	-0.48028
intercept	-0.90902
R^2	0.67755
Adjusted R^2	0.66714
dissipation	38%
Half-life	1.44 days

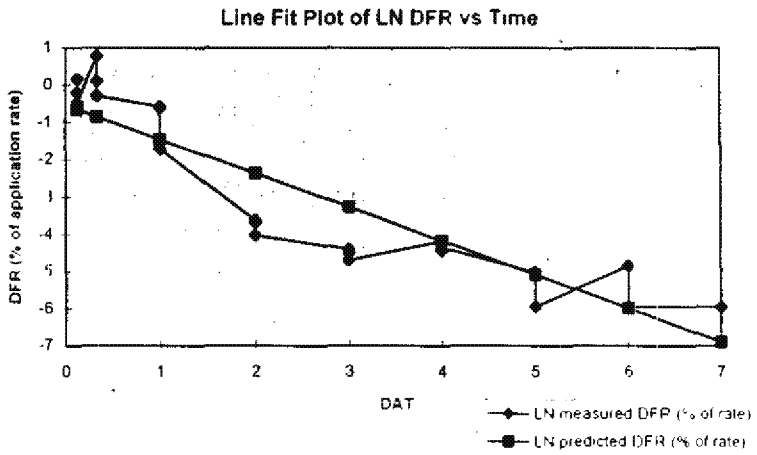


(10) - MCPA dma com

Natural Log of Raw Data

DAT	LN measured DFR (% of rate)	LN predicted DFR (% of rate)
0.125	0.1611463	-0.663031
0.125	-0.1948037	-0.663031
0.125	-0.4873284	-0.663031
0.333	0.7750965	-0.851503
0.333	0.1036893	-0.851503
0.333	-0.2937437	-0.851503
1	-0.5713434	-1.455881
1	-0.603535	-1.455881
1	-1.7142155	-1.455881
2	-3.631403	-2.361996
2	-3.6822223	-2.361996
2	-4.0168006	-2.361996
3	-4.3993514	-3.268111
3	-4.5068718	-3.268111
3	-4.6967897	-3.268111
4	-4.1898933	-4.174226
4	-4.4289102	-4.174226
4	-4.3706413	-4.174226
5	-5.0087287	-5.080341
5	-5.943038	-5.080341
5	-5.943038	-5.080341
6	-4.8444257	-5.986455
6	-5.943038	-5.986455
6	-5.943038	-5.986455
7	-5.943038	-6.89257
7	-5.943038	-6.89257
7	-5.943038	-6.89257

Application rate (lb acid equiv./ A)	1.496	
slope	-0.90611	
intercept	-0.54977	
R^2	0.8434	
Adjusted R^2	0.83714	
dissipation	60%	
Half-life	0.76	days

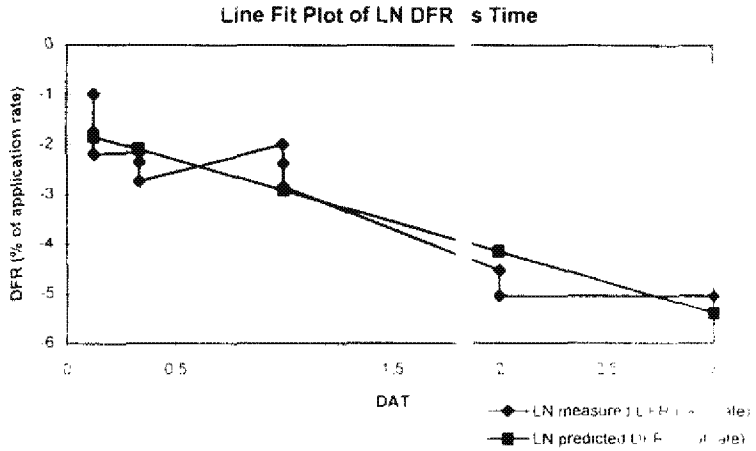


DAT	incremental predicted DFR (% of rate)
0	0.57708459
1	0.23319477
2	0.09423194
3	0.03807829
4	0.0153871
5	0.00621779
6	0.00251255
7	0.0010153
8	0.00041027
9	0.00016579
10	6.6994E-05
11	2.7071E-05
12	1.0939E-05
13	4.4205E-06
14	1.7863E-06
15	7.2182E-07
16	2.9168E-07
17	1.1787E-07
18	4.7629E-08
19	1.9246E-08
20	7.7772E-09
21	3.1427E-09
22	1.2699E-09
23	5.1317E-10
24	2.0737E-10
25	8.3796E-11
26	3.3861E-11
27	1.3683E-11
28	5.5292E-12
29	2.2343E-12
30	9.0286E-13
31	3.6484E-13
32	1.4743E-13
33	5.9574E-14
34	2.4073E-14
35	9.7278E-15
36	3.9309E-15
37	1.5885E-15
38	6.4188E-16
39	2.5938E-16
40	1.0481E-16
41	4.2354E-17
42	1.7115E-17
43	6.9159E-18
44	2.7947E-18
45	1.1293E-18
46	4.5634E-19
47	1.844E-19
48	7.4516E-20
49	3.0111E-20
50	1.2168E-20
51	4.9168E-21
52	1.9868E-21
53	8.0287E-22
54	3.2443E-22
55	1.311E-22

Natural Log of Raw Data

DAT	LN measured DFR (% of rate)	LN predicted DFR (% of rate)
0.125	-0.9897847	-1.83456
0.125	-1.7412976	-1.83456
0.125	-2.1871587	-1.83456
0.333	-2.1548396	-2.091713
0.333	-2.3521867	-2.091713
0.333	-2.738272	-2.091713
1	-1.9924225	-2.916332
1	-2.3761465	-2.916332
1	-2.8418276	-2.916332
2	-4.5322926	-4.152642
2	-5.0492731	-4.152642
2	-5.0492731	-4.152642
3	-5.0492731	-5.388952
3	-5.0492731	-5.388952
3	-5.0492731	-5.388952

Application rate (lb acid equiv./ A)	0.612	
slope	-1.23631	
intercept	-1.58002	
R	0.75262	
Adjusted R	.84128	
dissipation	71%	
Half-life	0.56	days

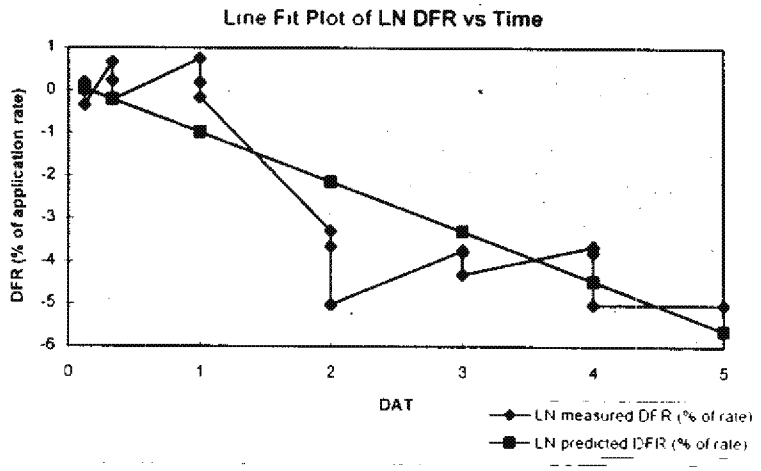


(7) - 24DP dma.

Natural Log of Raw Data

DAT	LN measured DFR (% of rate)	LN predicted DFR (% of rate)
0.125	0.1890355	0.036772
0.125	-0.0014981	0.036772
0.125	-0.3473092	0.036772
0.333	0.6658314	-0.20481
0.333	0.2231436	-0.20481
0.333	-0.2220214	-0.20481
1	0.7470568	-0.979497
1	0.1964429	-0.979497
1	-0.1656941	-0.979497
2	-3.2854123	-2.140946
2	-3.647818	-2.140946
2	-5.0226836	-2.140946
3	-3.7442782	-3.302396
3	-3.7829927	-3.302396
3	-4.3070636	-3.302396
4	-3.647818	-4.463845
4	-3.796238	-4.463845
4	-5.0226836	-4.463845
5	-5.0226836	-5.625295
5	-5.0226836	-5.625295
5	-5.0226836	-5.625295

Application rate (lb acid equiv./ A)	0.596
slope	-1.16145
intercept	0.18195
R^2	0.79449
Adjusted R^2	0.78367
dissipation	69%
Half life	0.60 days

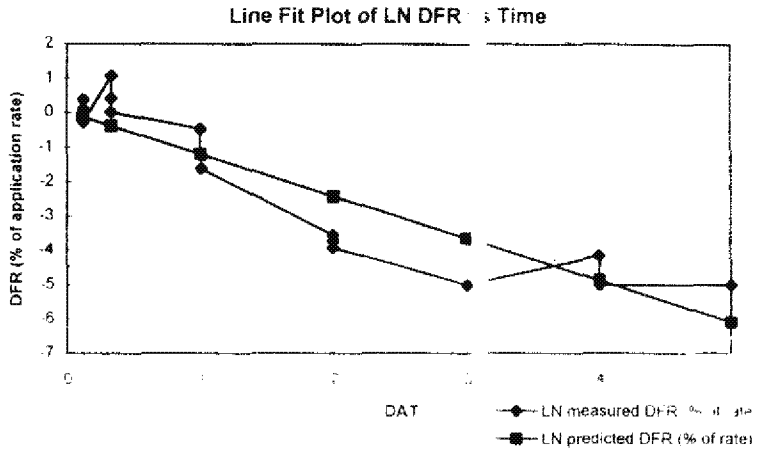


DAT	incremental predicted DFR (% of rate)
0	1.19955769
1	0.37550005
2	0.11754356
3	0.03679491
4	0.01151799
5	0.0036055
6	0.00112864
7	0.0003533
8	0.00011059
9	3.462E-05
10	1.0837E-05
11	3.3923E-06
12	1.0619E-06
13	3.3241E-07
14	1.0406E-07
15	3.2573E-08
16	1.0196E-08
17	3.1918E-09
18	9.9913E-10
19	3.1276E-10
20	9.7904E-11
21	3.0647E-11
22	9.5935E-12
23	3.0031E-12
24	9.4006E-13
25	2.9427E-13
26	9.2115E-14
27	2.8835E-14
28	9.0263E-15
29	2.8255E-15
30	8.8448E-16
31	2.7687E-16
32	8.6669E-17
33	2.713E-17
34	8.4926E-18
35	2.6585E-18
36	8.3219E-19
37	2.605E-19
38	8.1545E-20
39	2.5526E-20
40	7.9905E-21
41	2.5013E-21
42	7.8298E-22
43	2.451E-22
44	7.6724E-23
45	2.4017E-23
46	7.5181E-24
47	2.3534E-24
48	7.3669E-25
49	2.3061E-25
50	7.2188E-26
51	2.2597E-26
52	7.0736E-27
53	2.2143E-27
54	6.9314E-28
55	2.1697E-28

Natural Log of Raw Data

DAT	LN measured DFR (% of rate)	LN predicted DFR (% of rate)
0.125	0.3820384	-0.127417
0.125	0.0971187	-0.127417
0.125	-0.2585715	-0.127417
0.333	1.0813903	-0.382027
0.333	0.4286527	-0.382027
0.333	0.0092292	-0.382027
1	-0.4680296	-1.198492
1	-0.4826998	-1.198492
1	-1.6138556	-1.198492
2	-3.549891	-2.422578
2	-3.7227338	-2.422578
2	-3.9241036	-2.422578
3	-5.0074484	-3.646664
3	-5.0074484	-3.646664
3	-5.0074484	-3.646664
4	-4.1472471	-4.87075
4	-5.0074484	-4.87075
4	-5.0074484	-4.87075
5	-5.0074484	-6.094836
5	-5.0074484	-6.094836
5	-5.0074484	-6.094836

Application rate (lb acid equiv / A)	0.587
slope	-1.22409
intercept	0.02559
R^2	0.82963
Adjusted R^2	[illegible]
dissipation	[illegible]
Half-life	[illegible] days

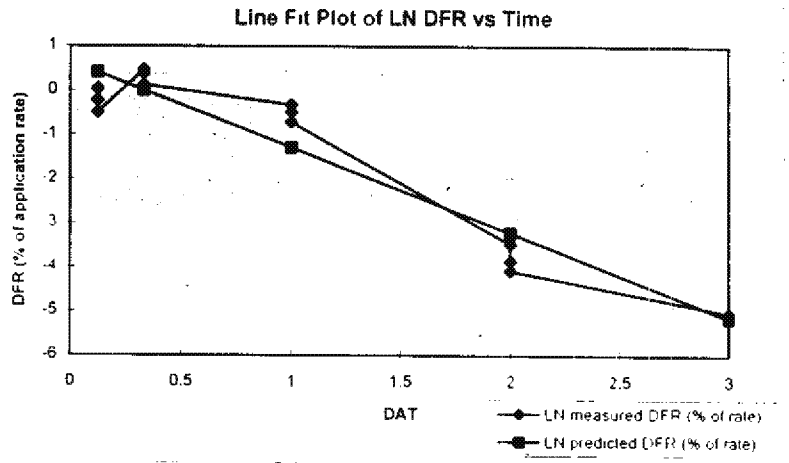


(8) - MCPP dma

Natural Log of Raw Data

DAT	LN measured DFR (% of rate)	LN predicted DFR (% of rate)
0.125	0.0374203	0.408027
0.125	-0.2252309	0.408027
0.125	-0.4907719	0.408027
0.333	0.4660488	0.00586
0.333	0.3863176	0.00586
0.333	0.1278929	0.00586
1	-0.3252162	-1.28378
1	-0.4810866	-1.28378
1	-0.7133073	-1.28378
2	-3.4648426	-3.217275
2	-3.8631903	-3.217275
2	-4.0845624	-3.217275
3	-5.0277605	-5.150769
3	-5.0277605	-5.150769
3	-5.0277605	-5.150769

Application rate (lb acid equiv./ A)	0.599	
slope	-1.93349	
intercept	0.64971	
R^2	0.93002	
Adjusted R^2	0.92464	
dissipation	86%	
Half-life	0.36	days

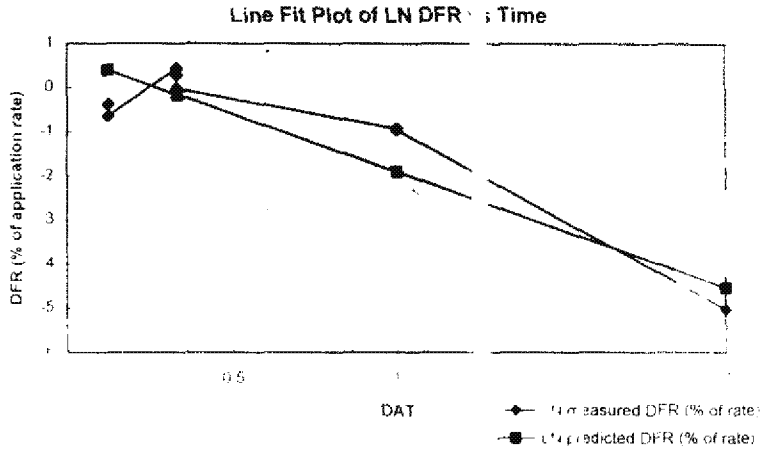


DAT	incremental predicted DFR (% of rate)
0	1.91499233
1	0.27698817
2	0.0400641
3	0.00579495
4	0.00083819
5	0.00012124
6	1.7536E-05
7	2.5365E-06
8	3.6688E-07
9	5.3066E-08
10	7.6755E-09
11	1.1102E-09
12	1.6058E-10
13	2.3227E-11
14	3.3596E-12
15	4.8594E-13
16	7.0287E-14
17	1.0166E-14
18	1.4705E-15
19	2.1269E-16
20	3.0765E-17
21	4.4498E-18
22	6.4363E-19
23	9.3097E-20
24	1.3466E-20
25	1.9477E-21
26	2.8172E-22
27	4.0748E-23
28	5.8939E-24
29	8.5251E-25
30	1.2331E-25
31	1.7836E-26
32	2.5798E-27
33	3.7314E-28
34	5.3972E-29
35	7.8066E-30
36	1.1292E-30
37	1.6332E-31
38	2.3624E-32
39	3.417E-33
40	4.9424E-34
41	7.1487E-35
42	1.034E-35
43	1.4956E-36
44	2.1633E-37
45	3.129E-38
46	4.5258E-39
47	6.5463E-40
48	9.4687E-41
49	1.3696E-41
50	1.981E-42
51	2.8653E-43
52	4.1444E-44
53	5.9946E-45
54	8.6707E-46
55	1.2541E-46

Natural Log of Raw Data

DAT	LN measured DFR (% of rate)	LN predicted DFR (% of rate)
0.125	-0.3741201	0.391598
0.125	-0.3741201	0.391598
0.125	-0.6430562	0.391598
0.333	0.4265686	-0.15396
0.333	0.2902321	-0.15396
0.333	-0.0301898	-0.15396
1	-0.9250402	-1.903416
1	-0.9441613	-1.903416
1	-0.9441613	-1.903416
2	-5.0193848	-4.526289
2	-5.0193848	-4.526289
2	-5.0193848	-4.526289

Application rate (lb acid equiv / A)	0.594	
slope	-2.62287	
intercept	0.71946	
R^2	0.87467	
Adjusted R^2	0.86214	
dissipation	93%	
Half life	0.26	days

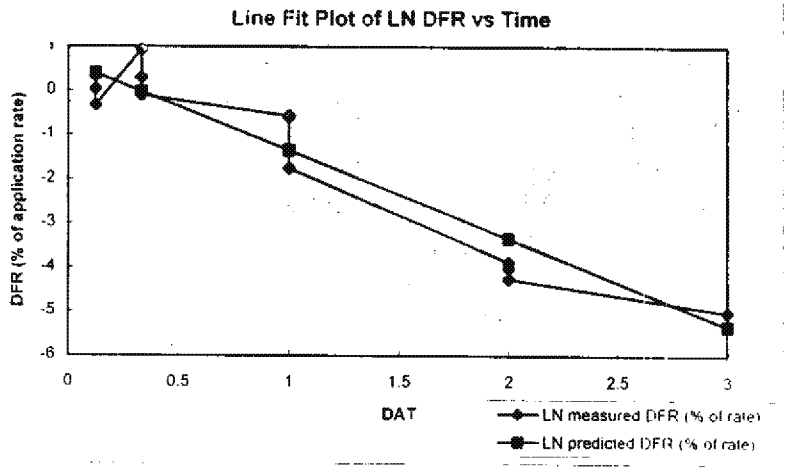


(10) - MCPP dma com

Natural Log of Raw Data

DAT	LN measured DFR (% of rate)	LN predicted DFR (% of rate)
0.125	0.3285647	0.391343
0.125	0.0354151	0.391343
0.125	-0.3355638	0.391343
0.333	0.9280361	-0.022498
0.333	0.2953022	-0.022498
0.333	-0.1073484	-0.022498
1	-0.5709644	-1.349573
1	-0.5926455	-1.349573
1	-1.7563444	-1.349573
2	-3.875147	-3.33919
2	-4.0076362	-3.33919
2	-4.2550297	-3.33919
3	-5.0109383	-5.328808
3	-5.0109383	-5.328808
3	-5.0109383	-5.328808

Application rate (lb acid equiv./ A)	0.589	
slope	-1.98962	
intercept	0.64004	
R^2	0.93354	
Adjusted R^2	0.92843	
dissipation	86%	
Half-life	0.35	days



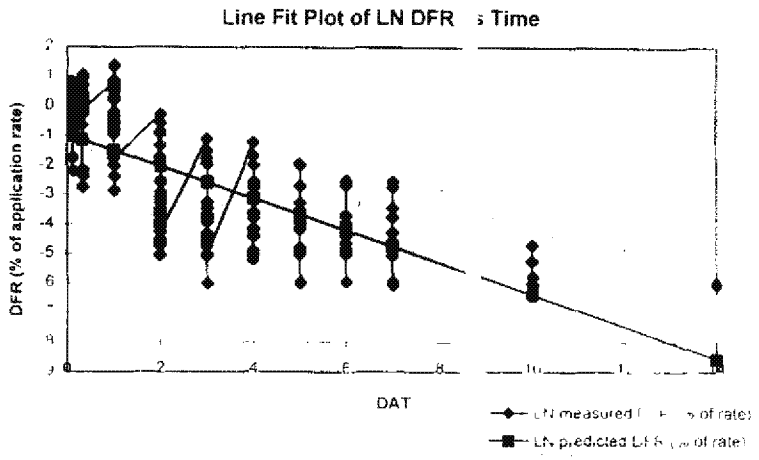
DAT	incremental predicted DFR (% of rate)
0	1.89656587
1	0.25935107
2	0.03546567
3	0.00484985
4	0.00066321
5	9.0692E-05
6	1.2402E-05
7	1.6959E-06
8	2.3192E-07
9	3.1714E-08
10	4.3368E-09
11	5.9305E-10
12	8.1098E-11
13	1.109E-11
14	1.5165E-12
15	2.0738E-13
16	2.8359E-14
17	3.878E-15
18	5.3031E-16
19	7.2519E-17
20	9.9168E-18
21	1.3561E-18
22	1.8544E-19
23	2.5359E-20
24	3.4678E-21
25	4.7421E-22
26	6.4847E-23
27	8.8677E-24
28	1.2126E-24
29	1.6583E-25
30	2.2676E-26
31	3.1009E-27
32	4.2404E-28
33	5.7987E-29
34	7.9296E-30
35	1.0844E-30
36	1.4828E-31
37	2.0277E-32
38	2.7729E-33
39	3.7919E-34
40	5.1853E-35
41	7.0908E-36
42	9.6965E-37
43	1.326E-37
44	1.8132E-38
45	2.4796E-39
46	3.3907E-40
47	4.6368E-41
48	6.3407E-42
49	8.6707E-43
50	1.1857E-43
51	1.6214E-44
52	2.2172E-45
53	3.032E-46
54	4.1462E-47
55	5.6699E-48

at LOQ)

Natural Log of Raw Data

DAT	LN measured DFR (% of rate)	LN predicted DFR (% of rate)
0.125	0.2591153	-1.008065
0.125	0.1432606	-1.008065
0.125	0.1158288	-1.008065
0.125	0.8290678	-1.008065
0.125	0.4558098	-1.008065
0.125	-0.0883523	-1.008065
0.125	-0.4176414	-1.008065
0.125	-0.5069865	-1.008065
0.125	-0.6945554	-1.008065
0.125	0.6953156	-1.008065
0.125	0.5987343	-1.008065
0.125	0.3941482	-1.008065
0.125	0.401227	-1.008065
0.125	0.0755076	-1.008065
0.125	-0.2503263	-1.008065
0.125	0.1611463	-1.008065
0.125	-0.1948037	-1.008065
0.125	-0.4873284	-1.008065
0.125	-0.9897847	-1.008065
0.125	-1.7412976	-1.008065
0.125	-2.1871587	-1.008065
0.125	0.1890355	-1.008065
0.125	-0.0014981	-1.008065
0.125	-0.3473092	-1.008065
0.125	0.3820384	-1.008065
0.125	0.0971187	-1.008065
0.125	-0.2585715	-1.008065
0.125	0.0374203	-1.008065
0.125	-0.2252309	-1.008065
0.125	-0.4907719	-1.008065
0.125	-0.3741201	-1.008065
0.125	-0.3741201	-1.008065
0.125	-0.6430562	-1.008065
0.125	0.3285647	-1.008065
0.125	0.0354151	-1.008065
0.125	-0.3355638	-1.008065
0.333	0.416289	-1.121137
0.333	0.2222041	-1.121137
0.333	0.1811045	-1.121137
0.333	0.4292301	-1.121137
0.333	-0.629773	-1.121137
0.333	-1.0598094	-1.121137
0.333	0.3049816	-1.121137
0.333	0.1529035	-1.121137
0.333	-0.1299593	-1.121137
0.333	0.2580546	-1.121137
0.333	0.2402343	-1.121137
0.333	-0.0463912	-1.121137
0.333	0.3291959	-1.121137
0.333	0.3124591	-1.121137
0.333	-0.093006	-1.121137
0.333	0.7750965	-1.121137
0.333	0.1036893	-1.121137
0.333	-0.2937437	-1.121137
0.333	-2.1548396	-1.121137
0.333	-2.3521867	-1.121137

Application rate (lb acid equiv A)	N/A
slope	-0.54361
intercept	-0.94011
R^2	0.56918
Adjusted R^2	0.5680
dissipation	[illegible]
Half-life	[illegible] days

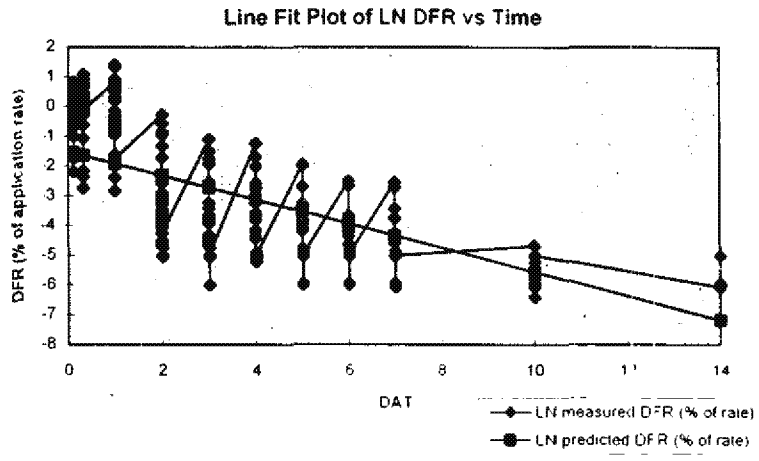


all (LOQ extended to 14th day)

Natural Log of Raw Data

DAT	LN measured DFR (% of rate)	LN predicted DFR (% of rate)
0.125	0.2591153	-1.551457
0.125	0.1432606	-1.551457
0.125	0.1158288	-1.551457
0.125	0.8290678	-1.551457
0.125	0.4558098	-1.551457
0.125	-0.0883523	-1.551457
0.125	-0.4176414	-1.551457
0.125	-0.5069865	-1.551457
0.125	-0.6945554	-1.551457
0.125	0.6953156	-1.551457
0.125	0.5987343	-1.551457
0.125	0.3941482	-1.551457
0.125	0.401227	-1.551457
0.125	0.0755076	-1.551457
0.125	-0.2503263	-1.551457
0.125	0.1611463	-1.551457
0.125	-0.1948037	-1.551457
0.125	-0.4873284	-1.551457
0.125	-0.9897847	-1.551457
0.125	-1.7412976	-1.551457
0.125	-2.1871587	-1.551457
0.125	0.1890355	-1.551457
0.125	-0.0014981	-1.551457
0.125	-0.3473092	-1.551457
0.125	0.3820384	-1.551457
0.125	0.0971187	-1.551457
0.125	-0.2585715	-1.551457
0.125	0.0374203	-1.551457
0.125	-0.2252309	-1.551457
0.125	-0.4907719	-1.551457
0.125	-0.3741201	-1.551457
0.125	-0.3741201	-1.551457
0.125	-0.6430562	-1.551457
0.125	0.3285647	-1.551457
0.125	0.0354151	-1.551457
0.125	-0.3355638	-1.551457
0.333	0.416289	-1.635948
0.333	0.2222041	-1.635948
0.333	0.1811045	-1.635948
0.333	0.4292301	-1.635948
0.333	-0.629773	-1.635948
0.333	-1.0598094	-1.635948
0.333	0.3049816	-1.635948
0.333	0.1529035	-1.635948
0.333	-0.1299593	-1.635948
0.333	0.2580546	-1.635948
0.333	0.2402343	-1.635948
0.333	-0.0463912	-1.635948
0.333	0.3291959	-1.635948
0.333	0.3124591	-1.635948
0.333	-0.093006	-1.635948
0.333	0.7750965	-1.635948
0.333	0.1036893	-1.635948
0.333	-0.2937437	-1.635948
0.333	-2.1548396	-1.635948
0.333	-2.3521867	-1.635948

Application rate (lb acid equiv./ A)	N/A
slope	-0.40621
intercept	-1.50068
R^2	0.53863
Adjusted R^2	0.53746
dissipation	33%
Half-life	1.71 days



DAT	incremental predicted DFR (% of rate)
0	0.22297836
1	0.14854159
2	0.09895402
3	0.06592024
4	0.04391412
5	0.02925429
6	0.01948834
7	0.01298256
8	0.0086486
9	0.00576144
10	0.0038381
11	0.00255683
12	0.00170328
13	0.00113468
14	0.00075589
15	0.00050355
16	0.00033545
17	0.00022347
18	0.00014887
19	9.9171E-05
20	6.6065E-05
21	4.401E-05
22	2.9318E-05
23	1.9531E-05
24	1.3011E-05
25	8.6676E-06
26	5.7741E-06
27	3.8465E-06
28	2.5624E-06
29	1.707E-06
30	1.1372E-06
31	7.5755E-07
32	5.0465E-07
33	3.3619E-07
34	2.2396E-07
35	1.4919E-07
36	9.9388E-08
37	6.621E-08
38	4.4107E-08
39	2.9383E-08
40	1.9574E-08
41	1.304E-08
42	8.6866E-09
43	5.7867E-09
44	3.855E-09
45	2.5681E-09
46	1.7108E-09
47	1.1397E-09
48	7.5921E-10
49	5.0576E-10
50	3.3692E-10
51	2.2445E-10
52	1.4952E-10
53	9.9606E-11
54	6.6355E-11
55	4.4204E-11

13544

R108672

Chemical:	2-4,D; Propanoic acid, 2-(2,4-dichlorophenoxy)-; MCPA (and salts and esters); Mecoprop-P; Dicamba; 2,4-D, dimethylamine salt; Propanoic acid, 2-(2,4-dichlorophenoxy)-; MCPA, dimethylamine salt; Propanoic acid, 2-(4-chloro-2-methylphen; Benzoic acid, 3,6-dichloro-2-methoxy-, c; 2,4-D, 2-ethylhexyl ester; 2-Ethylhexyl (R)-2-(2,4-dichlorophenoxy); 2-Ethylhexyl (R)-2-(2-methyl-4-chlorophe
PC Code:	030001; 031402; 030501; 129046; 029801; 030019; 031403; 030516; 031520; 029802; 030063; 031465; 031564
HED File Code	12000 Exposure Reviews
Memo Date:	01/06/99
File ID:	DPD252025
Accession Number:	412-05-0095

HED Records Reference Center
06/03/2005