3-1-99

MRID No. 443074-52

DATA EVALUATION RECORD
SEEDLING EMERGENCE TEST
§ 123-1 (TIER II)

005107 KA
005108

1. **CHEMICAL:** SAN 1269H (Diflufenzopyr+Dicamba) PC Code No.: Not reported
55% dicamba sodium salt and 21.9% diflufenzopyr sodium salt

2. **TEST MATERIAL:** 51% dicamba acid and 20% SAN 836H acid equivalents
50% equivalents

3. **CITATION:**

K. Gallagher 3/99

Author:	J.R. Hoberg
Title:	SAN 1269H: Determination of Effects on Seedling Emergence and Vegetative Vigor of Ten Plant Species
Study Completion Date:	November 13, 1996
Laboratory:	Springborn Laboratories, Inc., Wareham, MA
Sponsor:	Sandoz Agro, Inc., Des Plaines, IL
Laboratory Report ID:	96-6-6535
MRID No.:	443074-52
DP Barcode:	D239665

4. **REVIEWED BY:** Mark Mossler, M.S., Toxicologist, Golder Associates Inc.

Signature: Mark Mossler **Date:** 2/26/98

APPROVED BY: Pim Kosalwat, Ph.D., Senior Scientist Golder Associates Inc.

Signature: P. Kosalwat **Date:** 2/26/98

5. **APPROVED BY:**

Signature: Michael Dawy **Date:** 7/10/98

6. **STUDY PARAMETERS:**

Definitive Study Duration: 14 days

7. **CONCLUSIONS:** This study is scientifically sound and fulfills the guideline requirements for a Tier II seedling emergence study with terrestrial plants.

Results Synopsis:

Most sensitive monocot: Ryegrass
Most sensitive parameter: Shoot length
EC_{25}: 0.051 lb ae/A
NOEL: 0.024 lb ae/A

20 total

changed electronic copy test material description to match edits above KA 3/99

Most sensitive dicot: Turnip
Most sensitive parameter: Shoot length
EC_{25}: 0.0008 lb ae/A
NOEL: 0.0001 lb ae/A

8. **ADEQUACY OF THE STUDY:**

A. Classification: Core.

B. Rationale: N/A.

C. Repairability: N/A.

9. **GUIDELINE DEVIATIONS:** No guideline deviations of consequence were noted.

10. **SUBMISSION PURPOSE:**

11. **MATERIALS AND METHODS:**

A. Test Organisms

Guideline Criteria	Reported Information
Species 6 dicots in 4 families, including soybean and a rootcrop; 4 monocots in 2 families, including corn.	Dicots: cabbage, cucumber, lettuce, soybean, tomato, turnip Monocots: corn, oat, onion, ryegrass
Number of seeds per rep 10	10
Source of Seed	Untreated seed obtained from various commercial suppliers
Historical % Germination of Seed	≥84%

B. Test System

Guideline Criteria	Reported Information
Solvent	None
Site of test	Growth chamber

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Guideline Criteria	Reported Information
Planting method / type of pot	Planted at 1.0-cm depth/ polypropylene pots (13-cm top diameter)
Method of application	200 mL of solution applied to each pot
Method of watering	Subirrigation
Growth stage at application Seed or plant.	Seed

C. **Test Design**

Guideline Criteria	Reported Information
Dose range 2x or 3x	2x
Doses At least 5	5, 6, or 7 - rates ranging from 0.0010 to 0.25 lb of acid equivalents (ae)/A
Controls Negative and solvent	Negative (nutrient solution) control
Replicates per dose At least 3	3
Duration of test 14 days	14 days
Were observations made at least weekly?	Observations made on days 10 and 14
Maximum labeled rate	0.20 lb ae/A

12. <u>REPORTED RESULTS</u>:

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	Yes
Was an NOEL observed for each species?	Yes

Guideline Criteria	Reported Information
Phytotoxic observations	Yes
Were initial chemical concentrations measured? (Optional)	The measured concentrations ranged from 85 to 98% of nominal.
Were adequate raw data included?	Raw data for phytotoxicity observations were not included in the report.

Results for the most sensitive parameter* of each species

Species	Parameter	EC_{25} (lb ae/A)	NOEL (lb ae/A)
Cabbage	shoot length	0.0072	0.0036
Cucumber	"	0.0038	0.0018
Lettuce	"	0.0014	0.0003
Soybean	"	0.0050	0.0036
Tomato	"	0.10	0.028
Turnip	"	0.0022	0.0018
Corn	"	0.17	0.028
Oat	"	0.032	0.0068
Onion	"	0.086	0.058
Ryegrass	"	0.0052	0.0018

*Determination of the most sensitive parameter is based on EC_{25} values.

Observations: Symptoms of test material toxicity included chlorosis, necrosis, leaf curl, stem bend, stunted growth, and roots protruding from the pots.

Statistical Method: Analyses were based on measured application rates. Dunnett's test was used for mean separation and regression analysis (with or without various transformations) was used for EC value determination.

Most sensitive dicot: lettuce Parameter: shoot length
EC_{25} 95% C.L.: 0.0003 - 0.0057 lb ae/A Probit Slope: N/A

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Most sensitive monocot: ryegrass Parameter: shoot length
EC_{25} 95% C.L.: 0.0017 - 0.015 lb ae/A Probit Slope: N/A

13. **VERIFICATION OF STATISTICAL RESULTS:** Williams' test was used for mean separation. Probit analysis or linear interpolation was used for EC_{25} estimation. Where appropriate, responses for the most sensitive parameter for each species were remodeled using non-linear regression.

Species	Parameter	EC_{25} (lb ae/A)	NOEL (lb ae/A)
Cabbage	shoot length	0.0071	0.0036
Cucumber	"	0.0022	0.0018
Lettuce	"	0.0019	0.0002*
Soybean	"	0.0043	0.0018
Tomato	phytotoxicity	0.040**	0.028***
Turnip	shoot length	0.0008	0.0001*
Corn	phytotoxicity	0.0069	0.0030*
Oat	shoot length	0.030	0.004*
Onion	"	0.089	0.028
Ryegrass	"	0.0055	0.0018

*The EC_5 value from the probit analysis.
**Linear interpolation.
***Visual interpretation.

Results for most sensitive parameter of most sensitive species

	Monocot	Dicot
Species	ryegrass	turnip
Parameter	shoot length	shoot length
EC_{25} (lb ae/A)	0.0052	0.0008
95% C.I. (lb ae/A)	0.0017 - 0.015	0.0003 - 0.0024
Probit Slope	N/A	N/A
NOEL (lb ae/A)	0.0018	0.0001

14. **REVIEWER'S COMMENTS:** This study is scientifically sound and fulfills the guideline requirements. The study is classified as **Core.**

cabbage shoot length
File: cab Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Control	3	3.367	3.367	3.400
2	0.0018 lb ae/A	3	3.433	3.433	3.400
3	0.0036 lb ae/A	3	3.200	3.200	3.200
4	0.0068 lb ae/A	3	2.667	2.667	2.667
5	0.016 lb ae/A	3	2.000	2.000	2.000
6	0.028 lb ae/A	3	1.200	1.200	1.200
7	0.058 lb ae/A	3	1.033	1.033	1.033

cabbage shoot length
File: cab Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Control	3.400				
0.0018 lb ae/A	3.400	0.187		1.76	k= 1, v=14
0.0036 lb ae/A	3.200	0.935		1.85	k= 2, v=14
0.0068 lb ae/A	2.667	3.929	*	1.88	k= 3, v=14
0.016 lb ae/A	2.000	7.670	*	1.89	k= 4, v=14
0.028 lb ae/A	1.200	12.160	*	1.90	k= 5, v=14
0.058 lb ae/A	1.033	13.096	*	1.91	k= 6, v=14

s = 0.218
Note: df used for table values are approximate when v > 20.

NOEL = 0.0036 lb ae/A

cabbage shoot length

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence Limits	Upper 95% Confidence Limits
EC 1.00	0.0009	0.0004	0.0014
EC 5.00	0.0022	0.0014	0.0031
EC10.00	0.0036	0.0025	0.0048
EC15.00	0.0051	0.0037	0.0065
EC50.00	0.0214	0.0181	0.0257
EC85.00	0.0893	0.0660	0.1359
EC90.00	0.1253	0.0884	0.2043
EC95.00	0.2068	0.1359	0.3748
EC99.00	0.5293	0.3031	1.1755

EC_{25} = 0.0085 lbae/A

cabbage shoot length 1
09:18 Wednesday, February 11, 1998

OBS	CONC	LOG_CONC	Y1	Y2	Y3	Y4	Y5	Y6
1	0.0000	.	3.2	3.5	3.4	.	.	.
2	0.0036	-2.44370	2.8	3.4	3.4	.	.	.
3	0.0068	-2.16749	2.5	2.9	2.6	.	.	.
4	0.0160	-1.79588	1.7	2.2	2.1	.	.	.
5	0.0280	-1.55284	1.1	1.2	1.3	.	.	.
6	0.0580	-1.23657	1.1	0.9	1.1	.	.	.

cabbage shoot length 2
MODEL: COUNT = CO * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
WEIGHTED REGRESSION
09:18 Wednesday, February 11, 1998

Non-Linear Least Squares Iterative Phase
Dependent Variable COUNT Method: Gauss-Newton

Iter	LOG_EC50	SIGMA	CO	Weighted SS
0	-1.670000	0.599000	3.367000	0.602121
1	-1.694870	0.702018	3.509156	0.509616
2	-1.681403	0.683014	3.472019	0.508018
3	-1.684359	0.687982	3.479747	0.507974
4	-1.683632	0.686704	3.477782	0.507972
5	-1.683819	0.687030	3.478282	0.507972
6	-1.683772	0.686947	3.478154	0.507972
7	-1.683784	0.686968	3.478187	0.507972
8	-1.683781	0.686962	3.478179	0.507972

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable COUNT

Source	DF	Weighted SS	Weighted MS
Regression	3	40.400000000	13.466666667
Residual	15	0.507971927	0.033864795
Uncorrected Total	18	40.907971927	
(Corrected Total)	17	7.918631104	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval Lower	Upper
LOG_EC50	-1.683780633	0.06654876060	-1.8256254195	-1.5419358470
SIGMA	0.686962453	0.08756727838	0.5003179270	0.8736069793
CO	3.478178589	0.18903859609	3.0752538907	3.8811032866

Asymptotic Correlation Matrix

Corr	LOG_EC50	SIGMA	CO
LOG_EC50	1	-0.590587372	-0.838265612
SIGMA	-0.590587372	1	0.588964714
CO	-0.838265612	0.588964714	1

cabbage shoot length 3
MODEL: COUNT = CO * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
SUMMARY OF NONLINEAR REGRESSION
09:18 Wednesday, February 11, 1998

OBS	CONC	LOG_EC50	SIGMA	CO	RESID_SS	EC50
1	0	-1.68378	0.68696	3.47818	0.50797	0.020712

cabbage shoot length 4
MODEL: YOUNG = CO * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
WEIGHTED REGRESSION
09:18 Wednesday, February 11, 1998

Non-Linear Least Squares Iterative Phase
Dependent Variable COUNT Method: Gauss-Newton

Iter	LOG_EC25	SIGMA	CO	Weighted SS
0	-2.072000	0.599000	3.367000	0.597209
1	-2.168443	0.702272	3.509231	0.509555
2	-2.142028	0.682963	3.471952	0.508020
3	-2.148412	0.687994	3.479766	0.507974
4	-2.146803	0.686701	3.477777	0.507972
5	-2.147215	0.687031	3.478283	0.507972
6	-2.147110	0.686946	3.478154	0.507972
7	-2.147137	0.686968	3.478187	0.507972
8	-2.147130	0.686962	3.478179	0.507972

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable COUNT

Source	DF	Weighted SS	Weighted MS
Regression	3	40.400000000	13.466666667
Residual	15	0.507971927	0.033864795
Uncorrected Total	18	40.907971927	
(Corrected Total)	17	7.918631124	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval Lower	Upper
LOG_EC25	-2.147129921	0.11207102399	-2.3860027461	-1.9082570960
SIGMA	0.686962439	0.08756727715	0.5003179158	0.8736069629
CO	3.478178567	0.18903859461	3.0752538727	3.8811032622

Asymptotic Correlation Matrix

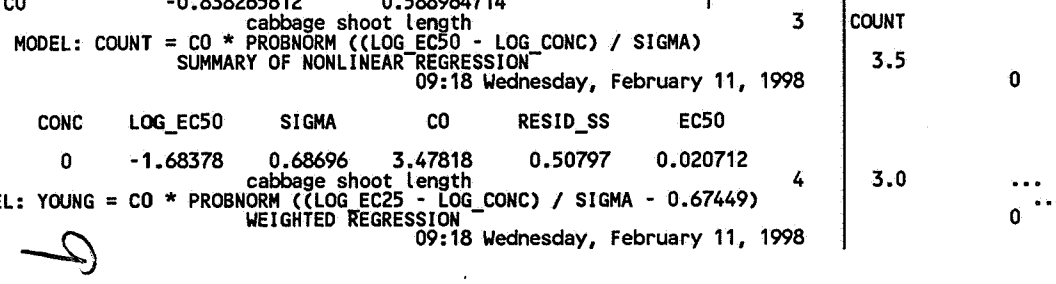
Corr	LOG_EC25	SIGMA	CO
LOG_EC25	1	-0.877712244	-0.80816348
SIGMA	-0.877712244	1	0.5889647196
CO	-0.80816348	0.5889647196	1

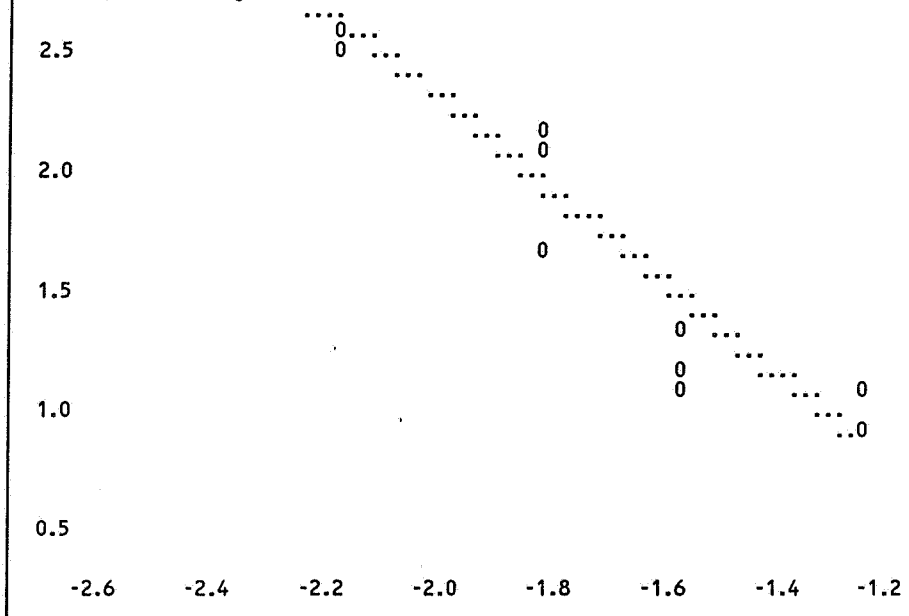
cabbage shoot length 5
MODEL: YOUNG = CO * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
SUMMARY OF NONLINEAR REGRESSION
09:18 Wednesday, February 11, 1998

OBS	CONC	LOG_EC25	SIGMA	CO	RESID_SS	EC25
1	0	-2.14713	0.68696	3.47818	0.50797	.0071264

cabbage shoot length 6
MODEL: YOUNG = CO * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
09:18 Wednesday, February 11, 1998

Plot of COUNT*LOG_CONC. Symbol used is '0'.
Plot of PRED*LOG_CONC. Symbol used is '.'.





NOTE: 1235 obs had missing values. 1158 obs hidden.

cabbage shoot length 7
COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
09:18 Wednesday, February 11, 1998

General Linear Models Procedure
Class Level Information

Class	Levels	Values
DOSE	6	0 0.016 0.028 0.058 0.0036 0.0068

Number of observations in data set = 36

NOTE: Due to missing values, only 18 observations can be used in this analysis.

cabbage shoot length 8
COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
09:18 Wednesday, February 11, 1998

General Linear Models Procedure

Dependent Variable: RESPONSE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	14.90444444	2.98088889	63.88	0.0001
Error	12	0.56000000	0.04666667		
Corrected Total	17	15.46444444			

R-Square	C.V.	Root MSE	RESPONSE Mean
0.963788	9.624862	0.216025	2.244444

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DOSE	5	14.90444444	2.98088889	63.88	0.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DOSE	5	14.90444444	2.98088889	63.88	0.0001

cabbage shoot length 9
COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
09:18 Wednesday, February 11, 1998

General Linear Models Procedure

Level of DOSE	N	RESPONSE Mean	RESPONSE SD
0	3	3.36666667	0.15275252
0.016	3	2.00000000	0.26457513
0.028	3	1.20000000	0.10000000
0.058	3	1.03333333	0.11547005
0.0036	3	3.20000000	0.34641016
0.0068	3	2.66666667	0.20816660

cabbage shoot length 10
COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
09:18 Wednesday, February 11, 1998

General Linear Models Procedure

Dunnett's One-tailed T tests for variable: RESPONSE

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 12 MSE= 0.046667
Critical Value of Dunnett's T= 2.502
Minimum Significant Difference= 0.4413

Comparisons significant at the 0.05 level are indicated by '***'.

DOSE Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
0.0036 - 0	-0.6080	-0.1667	0.2747	
0.0068 - 0	-1.1413	-0.7000	-0.2587	***
0.016 - 0	-1.8080	-1.3667	-0.9253	***
0.028 - 0	-2.6080	-2.1667	-1.7253	***
0.058 - 0	-2.7747	-2.3333	-1.8920	***

cucumber shoot length
File: cuc Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Control	3	10.967	10.967	10.967
2	0.0018 lb ae/A	3	10.600	10.600	10.600
3	0.0036 lb ae/A	3	7.500	7.500	7.500
4	0.0068 lb ae/A	3	5.867	5.867	5.983
5	0.016 lb ae/A	3	6.100	6.100	5.983
6	0.028 lb ae/A	3	5.533	5.533	5.533
7	0.058 lb ae/A	3	3.667	3.667	3.667

cucumber shoot length
File: cuc Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Control	10.967				
0.0018 lb ae/A	10.600	0.503		1.76	k= 1, v=14
0.0036 lb ae/A	7.500	4.754	*	1.85	k= 2, v=14
0.0068 lb ae/A	5.983	6.834	*	1.88	k= 3, v=14
0.016 lb ae/A	5.983	6.834	*	1.89	k= 4, v=14
0.028 lb ae/A	5.533	7.451	*	1.90	k= 5, v=14
0.058 lb ae/A	3.667	10.011	*	1.91	k= 6, v=14

s = 0.893
Note: df used for table values are approximate when v > 20.

NOEL = 0.0018 lb ae/A

cucumber shoot length

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence	Upper Limits
EC 1.00	0.0000	0.0000	0.0001
EC 5.00	0.0001	0.0000	0.0004
EC10.00	0.0003	0.0000	0.0010
EC15.00	0.0006	0.0001	0.0017
EC50.00	0.0192	0.0125	0.0311
EC85.00	0.5794	0.1968	6.7432
EC90.00	1.2979	0.3534	25.7103
EC95.00	4.2877	0.8372	187.7842
EC99.00	40.3275	4.1853	7886.5024

EC_{25} = 0.002116 ae/A

cucumber shoot length 11
09:18 Wednesday, February 11, 1998

OBS	CONC	LOG_CONC	Y1	Y2	Y3	Y4	Y5	Y6
1	0.0000	.	10.30	10.00	12.60	.	.	.
2	0.0036	-2.44370	7.20	7.10	8.20	.	.	.
3	0.0114	-1.94310	6.15	5.15	6.65	.	.	.
4	0.0280	-1.55284	4.60	5.00	7.00	.	.	.
5	0.0580	-1.23657	3.80	3.40	3.80	.	.	.

cucumber shoot length 12
MODEL: COUNT = C0 * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
WEIGHTED REGRESSION
09:18 Wednesday, February 11, 1998

Non-Linear Least Squares Iterative Phase
Dependent Variable COUNT Method: Gauss-Newton

Iter	LOG_EC50	SIGMA	C0	Weighted SS
0	-1.717000	1.429000	10.970000	1.654251
1	-1.720899	1.398716	10.935091	1.660628
2	-1.720516	1.397962	10.933667	1.660593
3	-1.720506	1.397921	10.933620	1.660595
4	-1.720506	1.397919	10.933618	1.660595
5	-1.720506	1.397919	10.933618	1.660595

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable COUNT

Source	DF	Weighted SS	Weighted MS
Regression	3	100.95000000	33.65000000
Residual	12	1.66059486	0.13838290
Uncorrected Total	15	102.61059486	
(Corrected Total)	14	13.23146757	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval Lower	Upper
LOG_EC50	-1.72050563	0.14611146884	-2.0388556397	-1.402155616
SIGMA	1.39791877	0.30051344869	0.7431552467	2.052682291
C0	10.93361770	0.70869277019	9.3895065269	12.477728876

Asymptotic Correlation Matrix

Corr	LOG_EC50	SIGMA	C0
LOG_EC50	1	-0.345953605	-0.818114849
SIGMA	-0.345953605	1	0.3453372076
C0	-0.818114849	0.3453372076	1

cucumber shoot length 13
MODEL: COUNT = C0 * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
SUMMARY OF NONLINEAR REGRESSION
09:18 Wednesday, February 11, 1998

OBS	CONC	LOG_EC50	SIGMA	C0	RESID_SS	EC50
1	0	-1.72051	1.39792	10.9336	1.66059	0.019032

cucumber shoot length 14
MODEL: YOUNG = C0 * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
WEIGHTED REGRESSION
09:18 Wednesday, February 11, 1998

Non-Linear Least Squares Iterative Phase
Dependent Variable COUNT Method: Gauss-Newton

Iter	LOG_EC25	SIGMA	C0	Weighted SS
0	-2.671000	1.429000	10.970000	1.652752
1	-2.664333	1.398560	10.934909	1.660757
2	-2.663423	1.397957	10.933661	1.660593
3	-2.663390	1.397921	10.933620	1.660595
4	-2.663388	1.397919	10.933618	1.660595
5	-2.663388	1.397919	10.933618	1.660595

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable COUNT

Source	DF	Weighted SS	Weighted MS
Regression	3	100.95000000	33.65000000
Residual	12	1.66059486	0.13838290
Uncorrected Total	15	102.61059486	
(Corrected Total)	14	13.23146757	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval Lower	Upper
LOG_EC25	-2.66338786	0.28796621272	-3.2908132606	-2.035962455
SIGMA	1.39791877	0.30051344852	0.7431552465	2.052682290
C0	10.93361770	0.70869277017	9.3895065263	12.477728875

Asymptotic Correlation Matrix

Corr	LOG_EC25	SIGMA	C0
LOG_EC25	1	-0.879412563	-0.658179667
SIGMA	-0.879412563	1	0.3453372078
C0	-0.658179667	0.3453372078	1

cucumber shoot length 15
MODEL: YOUNG = C0 * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
SUMMARY OF NONLINEAR REGRESSION
09:18 Wednesday, February 11, 1998

OBS	CONC	LOG_EC25	SIGMA	C0	RESID_SS	EC25
1	0	-2.66339	1.39792	10.9336	1.66059	.0021708

cucumber shoot length 16
MODEL: YOUNG = C0 * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
09:18 Wednesday, February 11, 1998

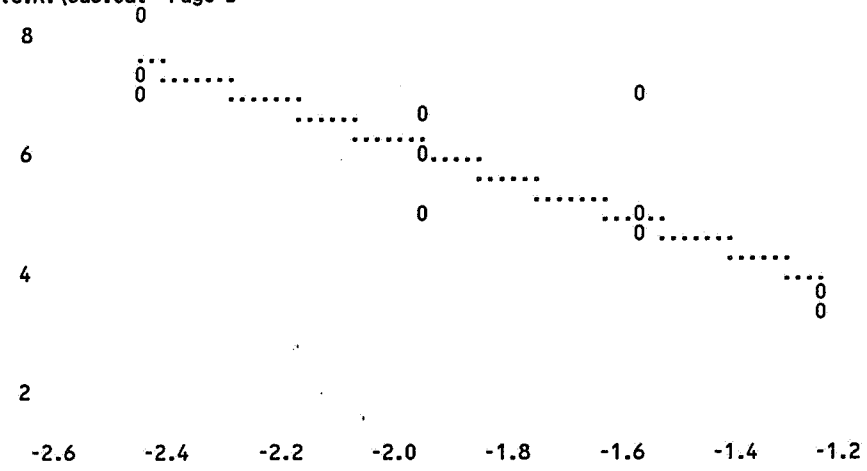
Plot of COUNT*LOG_CONC. Symbol used is '0'.
Plot of PRED*LOG_CONC. Symbol used is '.'.

COUNT

14

12

10



NOTE: 1232 obs had missing values. 1163 obs hidden.

General Linear Models Procedure
Class Level Information

Class	Levels	Values
DOSE	5	0 0.028 0.058 0.0036 0.0114

Number of observations in data set = 30

NOTE: Due to missing values, only 15 observations can be used in this analysis.

General Linear Models Procedure

Dependent Variable: RESPONSE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	89.74733333	22.43683333	23.95	0.0001
Error	10	9.36666667	0.93666667		
Corrected Total	14	99.11400000			

R-Square	C.V.	Root MSE	RESPONSE Mean
0.905496	14.38062	0.967815	6.730000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DOSE	4	89.74733333	22.43683333	23.95	0.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DOSE	4	89.74733333	22.43683333	23.95	0.0001

General Linear Models Procedure

Level of DOSE	N	RESPONSE Mean	RESPONSE SD
0	3	10.9666667	1.42243922
0.028	3	5.5333333	1.28582010
0.058	3	3.6666667	0.23094011
0.0036	3	7.5000000	0.60827625
0.0114	3	5.9833333	0.76376262

General Linear Models Procedure

Dunnett's One-tailed T tests for variable: RESPONSE

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 10 MSE= 0.936667
Critical Value of Dunnett's T= 2.466
Minimum Significant Difference= 1.9483

Comparisons significant at the 0.05 level are indicated by '***'.

DOSE Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
0.0036 - 0	-5.4150	-3.4667	-1.5183	***
0.0114 - 0	-6.9317	-4.9833	-3.0350	***
0.028 - 0	-7.3817	-5.4333	-3.4850	***
0.058 - 0	-9.2483	-7.3000	-5.3517	***

lettuce shoot length
File: let Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Control	3	5.733	5.733	5.733
2	0.0009 lb ae/A	3	4.467	4.467	4.467
3	0.0018 lb ae/A	3	4.167	4.167	4.167
4	0.0036 lb ae/A	3	3.300	3.300	3.333
5	0.0068 lb ae/A	3	3.367	3.367	3.333
6	0.016 lb ae/A	3	2.367	2.367	2.367
7	0.028 lb ae/A	3	1.467	1.467	1.467

lettuce shoot length
File: let Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Control	5.733				
0.0009 lb ae/A	4.467	2.881	*	1.76	k= 1, v=14
0.0018 lb ae/A	4.167	3.563	*	1.85	k= 2, v=14
0.0036 lb ae/A	3.333	5.458	*	1.88	k= 3, v=14
0.0068 lb ae/A	3.333	5.458	*	1.89	k= 4, v=14
0.016 lb ae/A	2.367	7.657	*	1.90	k= 5, v=14
0.028 lb ae/A	1.467	9.704	*	1.91	k= 6, v=14

s = 0.539
Note: df used for table values are approximate when v > 20.

NOEL = prob.t EC_5 = 0.0002 lb ae/A

lettuce shoot length

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence Limits	Upper 95% Confidence Limits
EC 1.00	0.0000	0.0000	0.0001
EC 5.00	0.0002	0.0000	0.0005
EC10.00	0.0005	0.0001	0.0009
EC15.00	0.0008	0.0003	0.0014
EC50.00	0.0082	0.0061	0.0111
EC85.00	0.0833	0.0475	0.2144
EC90.00	0.1440	0.0737	0.4522
EC95.00	0.3240	0.1405	1.3732
EC99.00	1.4832	0.4679	11.1262

$EC_{25} = 0.0018$ 16 ae/A

lettuce shoot length 21
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OBS	CONC	LOG_CONC	Y1	Y2	Y3	Y4	Y5	Y6
1	0.0000	.	6.2	5.8	5.2	.	.	.
2	0.0018	-2.74473	4.8	4.1	3.6	.	.	.
3	0.0052	-2.28400	3.8	3.5	2.7	.	.	.
4	0.0160	-1.79588	2.1	2.4	2.6	.	.	.
5	0.0280	-1.55284	1.3	1.8	1.3	.	.	.

lettuce shoot length 22
MODEL: COUNT = C0 * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
WEIGHTED REGRESSION
09:18 Wednesday, February 11, 1998

Non-Linear Least Squares Iterative Phase
Dependent Variable COUNT Method: Gauss-Newton

Iter	LOG_EC50	SIGMA	C0	Weighted SS
0	-2.086000	0.971000	5.730000	0.738539
1	-2.091642	0.945677	5.693674	0.739410
2	-2.090814	0.944626	5.691601	0.739295
3	-2.090769	0.944537	5.691473	0.739293
4	-2.090765	0.944530	5.691463	0.739292
5	-2.090765	0.944529	5.691462	0.739292
6	-2.090765	0.944529	5.691462	0.739292

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable COUNT

Source	DF	Weighted SS	Weighted MS
Regression	3	51.200000000	17.066666667
Residual	12	0.739292378	0.061607698
Uncorrected Total	15	51.939292378	
(Corrected Total)	14	10.266165617	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval Lower	Upper
LOG_EC50	-2.090764852	0.09721445004	-2.3025772548	-1.8789524489
SIGMA	0.944529139	0.14032518430	0.6387863763	1.2502719008
C0	5.691461926	0.33919750910	4.9524129525	6.4305108990

Asymptotic Correlation Matrix

Corr	LOG_EC50	SIGMA	C0
LOG_EC50	1	-0.569404821	-0.813098585
SIGMA	-0.569404821	1	0.4548115916
C0	-0.813098585	0.4548115916	1

lettuce shoot length 23
MODEL: COUNT = C0 * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
SUMMARY OF NONLINEAR REGRESSION
09:18 Wednesday, February 11, 1998

OBS	CONC	LOG_EC50	SIGMA	C0	RESID_SS	EC50
1	0	-2.09076	0.94453	5.69146	0.73929	.0081140

lettuce shoot length 24
MODEL: YOUNG = C0 * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
WEIGHTED REGRESSION
09:18 Wednesday, February 11, 1998

Non-Linear Least Squares Iterative Phase
Dependent Variable COUNT Method: Gauss-Newton

Iter	LOG_EC25	SIGMA	C0	Weighted SS
0	-2.738000	0.971000	5.730000	0.739347
1	-2.729463	0.945621	5.693583	0.739430
2	-2.727951	0.944623	5.691596	0.739295
3	-2.727849	0.944536	5.691472	0.739293
4	-2.727841	0.944530	5.691463	0.739292
5	-2.727840	0.944529	5.691462	0.739292
6	-2.727840	0.944529	5.691462	0.739292

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable COUNT

Source	DF	Weighted SS	Weighted MS
Regression	3	51.200000000	17.066666667
Residual	12	0.739292378	0.061607698
Uncorrected Total	15	51.939292378	
(Corrected Total)	14	10.266165617	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval Lower	Upper
LOG_EC25	-2.727840310	0.16996245269	-3.0981572283	-2.3575233924
SIGMA	0.944529138	0.14032518428	0.6387863762	1.2502719006
C0	5.691461926	0.33919750910	4.9524129523	6.4305108988

Asymptotic Correlation Matrix

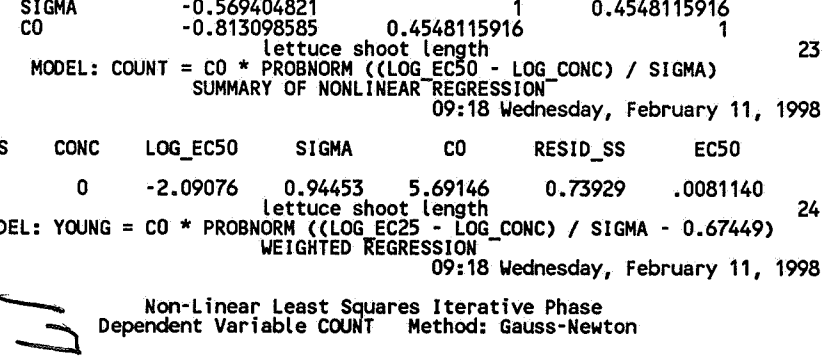
Corr	LOG_EC25	SIGMA	C0
LOG_EC25	1	-0.882561458	-0.718346359
SIGMA	-0.882561458	1	0.4548115917
C0	-0.718346359	0.4548115917	1

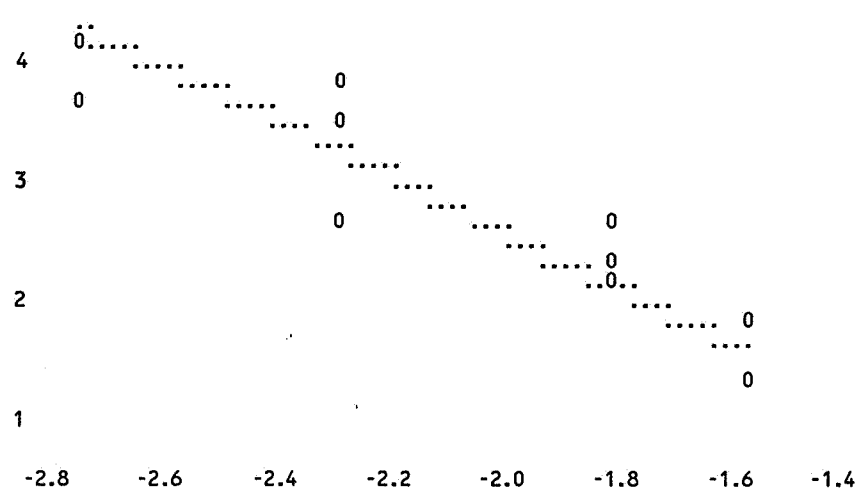
lettuce shoot length 25
MODEL: YOUNG = C0 * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
SUMMARY OF NONLINEAR REGRESSION
09:18 Wednesday, February 11, 1998

OBS	CONC	LOG_EC25	SIGMA	C0	RESID_SS	EC25
1	0	-2.72784	0.94453	5.69146	0.73929	.0018714

lettuce shoot length 26
MODEL: YOUNG = C0 * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
09:18 Wednesday, February 11, 1998

Plot of COUNT*LOG_CONC. Symbol used is '0'.
Plot of PRED*LOG_CONC. Symbol used is '.'.





NOTE: 1217 obs had missing values. 1145 obs hidden.

General Linear Models Procedure
Class Level Information

Class	Levels	Values
DOSE	5	0 0.016 0.028 0.0018 0.0052

Number of observations in data set = 30

NOTE: Due to missing values, only 15 observations can be used in this analysis.

General Linear Models Procedure

Dependent Variable: RESPONSE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	32.52400000	8.13100000	37.41	0.0001
Error	10	2.17333333	0.21733333		
Corrected Total	14	34.69733333			

R-Square	C.V.	Root MSE	RESPONSE Mean
0.937363	13.65792	0.466190	3.413333

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DOSE	4	32.52400000	8.13100000	37.41	0.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DOSE	4	32.52400000	8.13100000	37.41	0.0001

General Linear Models Procedure

Level of DOSE	N	RESPONSE Mean	RESPONSE SD
0	3	5.73333333	0.50332230
0.016	3	2.36666667	0.25166115
0.028	3	1.46666667	0.28867513
0.0018	3	4.16666667	0.60277138
0.0052	3	3.33333333	0.56862407

General Linear Models Procedure

Dunnett's One-tailed T tests for variable: RESPONSE

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 10 MSE= 0.217333
Critical Value of Dunnett's T= 2.466
Minimum Significant Difference= 0.9385

Comparisons significant at the 0.05 level are indicated by '***'.

DOSE Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
0.0018 - 0	-2.5052	-1.5667	-0.6282	***
0.0052 - 0	-3.3385	-2.4000	-1.4615	***
0.016 - 0	-4.3052	-3.3667	-2.4282	***
0.028 - 0	-5.2052	-4.2667	-3.3282	***

soybean shoot length
File: soy Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Control	3	30.933	30.933	30.933
2	0.0009 lb ae/A	3	29.933	29.933	29.933
3	0.0018 lb ae/A	3	28.867	28.867	28.867
4	0.0036 lb ae/A	3	27.533	27.533	27.533
5	0.0068 lb ae/A	3	16.267	16.267	16.267
6	0.016 lb ae/A	3	6.733	6.733	6.733

soybean shoot length
File: soy Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Control	30.933				
0.0009 lb ae/A	29.933	0.644		1.78	k= 1, v=12
0.0018 lb ae/A	28.867	1.331		1.87	k= 2, v=12
0.0036 lb ae/A	27.533	2.190	*	1.90	k= 3, v=12
0.0068 lb ae/A	16.267	9.445	*	1.92	k= 4, v=12
0.016 lb ae/A	6.733	15.585	*	1.93	k= 5, v=12

s = 1.902
Note: df used for table values are approximate when v > 20.

NOEL = 0.0018 lb ae/A

soybean shoot length

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence Limits	Upper 95% Confidence Limits
EC 1.00	0.0013	0.0008	0.0019
EC 5.00	0.0023	0.0016	0.0029
EC10.00	0.0030	0.0023	0.0037
EC15.00	0.0036	0.0029	0.0043
EC50.00	0.0081	0.0072	0.0093
EC85.00	0.0182	0.0150	0.0240
EC90.00	0.0220	0.0176	0.0304
EC95.00	0.0292	0.0224	0.0432
EC99.00	0.0495	0.0348	0.0841

EC_{25} = 0.0649 lb ae/A

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soybean shoot length 61
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OBS	CONC	LOG_CONC	Y1	Y2	Y3	Y4	Y5	Y6
1	0.0000	.	32.5	31.1	29.2	.	.	.
2	0.0036	-2.44370	29.5	24.1	29.0	.	.	.
3	0.0068	-2.16749	14.2	18.6	16.0	.	.	.
4	0.0160	-1.79588	8.3	5.6	6.3	.	.	.

soybean shoot length 62
MODEL: COUNT = C0 * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
WEIGHTED REGRESSION
09:18 Wednesday, February 11, 1998

Non-Linear Least Squares Iterative Phase
Dependent Variable COUNT Method: Gauss-Newton

Iter	LOG_EC50	SIGMA	C0	Weighted SS
0	-2.092000	0.337000	30.930000	3.222233
1	-2.112047	0.380109	31.734776	2.894683
2	-2.107814	0.375286	31.567735	2.889146
3	-2.108431	0.376129	31.588327	2.889569
4	-2.108329	0.375987	31.584861	2.889488
5	-2.108346	0.376011	31.585441	2.889501
6	-2.108343	0.376007	31.585343	2.889499
7	-2.108344	0.376008	31.585360	2.889499
8	-2.108344	0.376007	31.585357	2.889499
9	-2.108344	0.376008	31.585357	2.889499

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable COUNT

Source	DF	Weighted SS	Weighted MS
Regression	3	244.40000000	81.46666667
Residual	9	2.88949917	0.32105546
Uncorrected Total	12	247.28949917	
(Corrected Total)	11	76.18261655	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval Lower	Upper
LOG_EC50	-2.10834382	0.0428764869	-2.205337992	-2.011349638
SIGMA	0.37600750	0.0467052291	0.270352037	0.481662972
C0	31.58535732	1.7948406117	27.525111225	35.645603410

Asymptotic Correlation Matrix

Corr	LOG_EC50	SIGMA	C0
LOG_EC50	1	-0.605580779	-0.768884635
SIGMA	-0.605580779	1	0.5012085888
C0	-0.768884635	0.5012085888	1

soybean shoot length 63
MODEL: COUNT = C0 * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
SUMMARY OF NONLINEAR REGRESSION
09:18 Wednesday, February 11, 1998

OBS	CONC	LOG_EC50	SIGMA	C0	RESID_SS	EC50
1	0	-2.10834	0.37601	31.5854	2.88950	.0077921

soybean shoot length 64
MODEL: YOUNG = C0 * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
WEIGHTED REGRESSION
09:18 Wednesday, February 11, 1998

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Non-Linear Least Squares Iterative Phase
Dependent Variable COUNT Method: Gauss-Newton

Iter	LOG_EC25	SIGMA	C0	Weighted SS
0	-2.314000	0.337000	30.930000	3.174343
1	-2.368646	0.380561	31.737847	2.894052
2	-2.360858	0.375226	31.566401	2.889123
3	-2.362140	0.376139	31.588573	2.889575
4	-2.361926	0.375986	31.584820	2.889487
5	-2.361962	0.376011	31.585447	2.889501
6	-2.361956	0.376007	31.585342	2.889499
7	-2.361957	0.376008	31.585360	2.889499
8	-2.361957	0.376007	31.585357	2.889499
9	-2.361957	0.376008	31.585357	2.889499

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable COUNT

Source	DF	Weighted SS	Weighted MS
Regression	3	244.40000000	81.46666667
Residual	9	2.88949917	0.32105546
Uncorrected Total	12	247.28949917	
(Corrected Total)	11	76.18261654	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval Lower	Upper
LOG_EC25	-2.36195712	0.0668333992	-2.513146056	-2.210768178
SIGMA	0.37600750	0.0467052291	0.270352037	0.481662973
C0	31.58535732	1.7948406121	27.525111230	35.645603416

Asymptotic Correlation Matrix

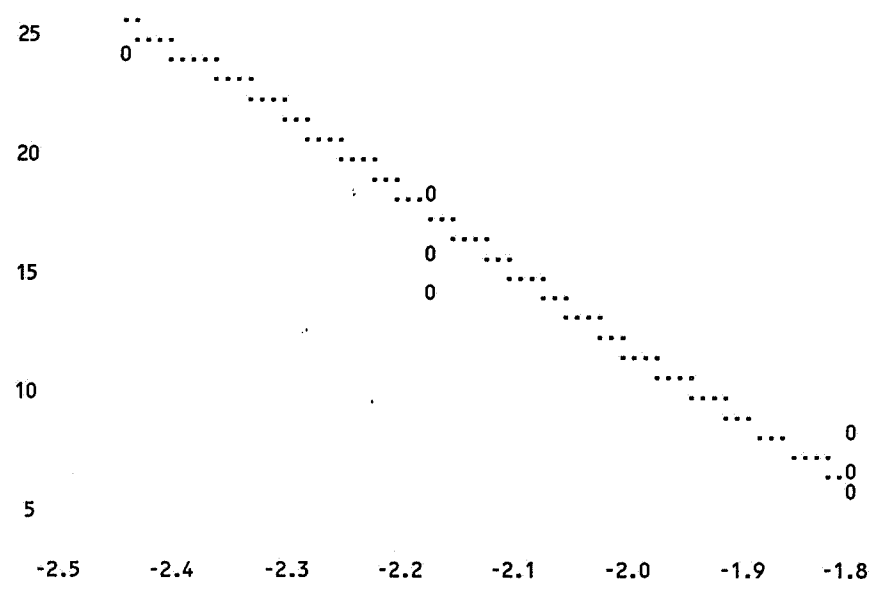
Corr	LOG_EC25	SIGMA	C0
LOG_EC25	1	-0.859860296	-0.729519235
SIGMA	-0.859860296	1	0.5012085885
C0	-0.729519235	0.5012085885	1

soybean shoot length 65
MODEL: YOUNG = C0 * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
SUMMARY OF NONLINEAR REGRESSION
09:18 Wednesday, February 11, 1998

OBS	CONC	LOG_EC25	SIGMA	C0	RESID_SS	EC25
1	0	-2.36196	0.37601	31.5854	2.88950	.0043455

soybean shoot length 66
MODEL: YOUNG = C0 * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
09:18 Wednesday, February 11, 1998

Plot of COUNT*LOG_CONC. Symbol used is '0'.
Plot of PRED*LOG_CONC. Symbol used is '.'.



NOTE: 670 obs had missing values. 584 obs hidden.

soybean shoot length 67
COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
09:18 Wednesday, February 11, 1998

General Linear Models Procedure
Class Level Information

Class	Levels	Values
DOSE	4	0 0.016 0.0036 0.0068

Number of observations in data set = 24

NOTE: Due to missing values, only 12 observations can be used in this analysis.

soybean shoot length 68
COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
09:18 Wednesday, February 11, 1998

General Linear Models Procedure

Dependent Variable: RESPONSE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	1097.080000	365.693333	79.05	0.0001
Error	8	37.006667	4.625833		
Corrected Total	11	1134.086667			

R-Square	C.V.	Root MSE	RESPONSE Mean
0.967369	10.56027	2.150775	20.36667

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DOSE	3	1097.080000	365.693333	79.05	0.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DOSE	3	1097.080000	365.693333	79.05	0.0001

soybean shoot length 69
COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
09:18 Wednesday, February 11, 1998

General Linear Models Procedure

Level of DOSE	N	RESPONSE Mean	RESPONSE SD
0	3	30.9333333	1.65630110
0.016	3	6.7333333	1.40118997
0.0036	3	27.5333333	2.98384539
0.0068	3	16.2666667	2.21208800

soybean shoot length 70
COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
09:18 Wednesday, February 11, 1998

General Linear Models Procedure

Dunnett's One-tailed T tests for variable: RESPONSE

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 8 MSE= 4.625833
Critical Value of Dunnett's T= 2.416
Minimum Significant Difference= 4.2435

Comparisons significant at the 0.05 level are indicated by '***'.

DOSE Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
0.0036 - 0	-7.644	-3.400	0.844	
0.0068 - 0	-18.910	-14.667	-10.423	***
0.016 - 0	-28.444	-24.200	-19.956	***

turnip shoot length
File: tur Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Control	3	12.400	12.400	12.400
2	0.0018 lb ae/A	3	11.733	11.733	11.733
3	0.0036 lb ae/A	3	6.167	6.167	6.167
4	0.0068 lb ae/A	3	4.667	4.667	4.667
5	0.016 lb ae/A	3	3.367	3.367	3.367
6	0.028 lb ae/A	3	2.067	2.067	2.067

turnip shoot length
File: tur Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Control	12.400				
0.0018 lb ae/A	11.733	0.816		1.78	k= 1, v=12
0.0036 lb ae/A	6.167	7.630	*	1.87	k= 2, v=12
0.0068 lb ae/A	4.667	9.466	*	1.90	k= 3, v=12
0.016 lb ae/A	3.367	11.057	*	1.92	k= 4, v=12
0.028 lb ae/A	2.067	12.649	*	1.93	k= 5, v=12

s = 1.001
Note: df used for table values are approximate when v > 20.

0.0018 lb ae/A > EC_{25}, ∴ NOEL = probit EC_5 = 0.0001 lb ae/A

turnip shoot length

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence Limits	Upper 95% Confidence Limits
EC 1.00	0.0000	0.0000	0.0001
EC 5.00	0.0001	0.0000	0.0003
EC10.00	0.0002	0.0000	0.0006
EC15.00	0.0004	0.0000	0.0009
EC50.00	0.0036	0.0018	0.0052
EC85.00	0.0367	0.0233	0.0907
EC90.00	0.0636	0.0355	0.2147
EC95.00	0.1436	0.0652	0.7808
EC99.00	0.6616	0.2007	8.9389

EC_{25} = 0.0008 16 ae/A

turnip shoot length 71
09:18 Wednesday, February 11, 1998

OBS	CONC	LOG_CONC	Y1	Y2	Y3	Y4	Y5	Y6
1	0.0000	.	13.0	12.8	11.4	.	.	.
2	0.0036	-2.44370	7.7	4.5	6.3	.	.	.
3	0.0068	-2.16749	5.0	4.1	4.9	.	.	.
4	0.0160	-1.79588	4.5	2.8	2.8	.	.	.
5	0.0280	-1.55284	2.2	2.5	1.5	.	.	.

turnip shoot length 72
MODEL: COUNT = C0 * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
WEIGHTED REGRESSION
09:18 Wednesday, February 11, 1998

Non-Linear Least Squares Iterative Phase
Dependent Variable COUNT Method: Gauss-Newton

Iter	LOG_EC50	SIGMA	C0	Weighted SS
0	-2.444000	0.971000	12.400000	2.008420
1	-2.447472	0.969207	12.391189	2.017406
2	-2.447468	0.969197	12.391186	2.017407
3	-2.447468	0.969196	12.391186	2.017407

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable COUNT

Source	DF	Weighted SS	Weighted MS
Regression	3	86.000000000	28.666666667
Residual	12	2.017406994	0.168117250
Uncorrected Total	15	88.017406994	
(Corrected Total)	14	27.011404539	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval Lower	Upper
LOG_EC50	-2.44746756	0.12279909077	-2.715024188	-2.179910931
SIGMA	0.96919643	0.16045771443	0.619588590	1.318804274
C0	12.39118612	0.83279273680	10.576683946	14.205688290

Asymptotic Correlation Matrix

Corr	LOG_EC50	SIGMA	C0
LOG_EC50	1	-0.766799084	-0.645975679
SIGMA	-0.766799084	1	0.2467840375
C0	-0.645975679	0.2467840375	1

turnip shoot length 73
MODEL: COUNT = C0 * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
SUMMARY OF NONLINEAR REGRESSION
09:18 Wednesday, February 11, 1998

OBS	CONC	LOG_EC50	SIGMA	C0	RESID_SS	EC50
1	0	-2.44747	0.96920	12.3912	2.01741	.0035689

turnip shoot length 74
MODEL: YOUNG = C0 * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
WEIGHTED REGRESSION
09:18 Wednesday, February 11, 1998

Non-Linear Least Squares Iterative Phase
Dependent Variable COUNT Method: Gauss-Newton

Iter	LOG_EC25	SIGMA	C0	Weighted SS
0	-3.087000	0.971000	12.400000	1.999027
1	-3.101234	0.969294	12.391099	2.017298

2	-3.101182	0.969197	12.391188	2.017407
3	-3.101181	0.969196	12.391186	2.017407
4	-3.101181	0.969196	12.391186	2.017407

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable COUNT

Source	DF	Weighted SS	Weighted MS
Regression	3	86.000000000	28.666666667
Residual	12	2.017406994	0.168117250
Uncorrected Total	15	88.017406994	
(Corrected Total)	14	27.011404543	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval Lower	Upper
LOG_EC25	-3.10118086	0.21719701101	-3.574413191	-2.627948528
SIGMA	0.96919643	0.16045771414	0.619588590	1.318804272
C0	12.39118612	0.83279273671	10.576683944	14.205688288

Asymptotic Correlation Matrix

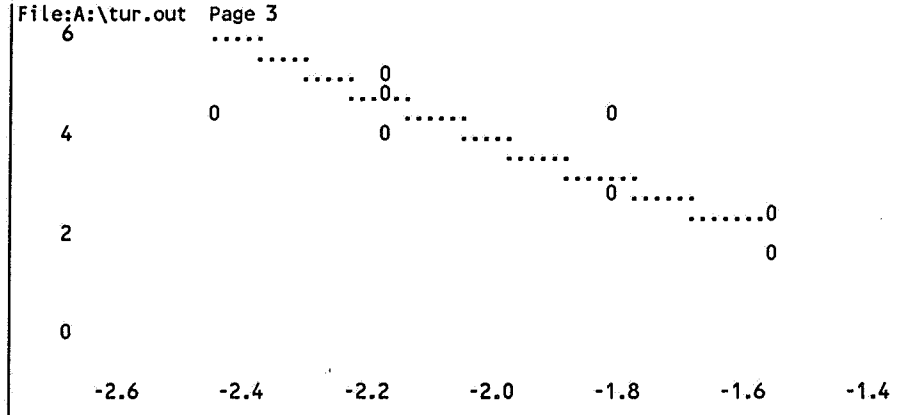
Corr	LOG_EC25	SIGMA	C0
LOG_EC25	1	-0.931823844	-0.488192503
SIGMA	-0.931823844	1	0.2467840378
C0	-0.488192503	0.2467840378	1

turnip shoot length 75
MODEL: YOUNG = C0 * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
SUMMARY OF NONLINEAR REGRESSION
09:18 Wednesday, February 11, 1998

OBS	CONC	LOG_EC25	SIGMA	C0	RESID_SS	EC25
1	0	-3.10118	0.96920	12.3912	2.01741	.00079217

turnip shoot length 76
MODEL: YOUNG = C0 * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
09:18 Wednesday, February 11, 1998

Plot of COUNT*LOG_CONC. Symbol used is '0'.
Plot of PRED*LOG_CONC. Symbol used is '.'.



NOTE: 916 obs had missing values. 861 obs hidden.

turnip shoot length 77
COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
09:18 Wednesday, February 11, 1998

General Linear Models Procedure
Class Level Information

Class	Levels	Values
DOSE	5	0 0.016 0.028 0.0036 0.0068

Number of observations in data set = 30

NOTE: Due to missing values, only 15 observations can be used in this analysis.

turnip shoot length 78
COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
09:18 Wednesday, February 11, 1998

General Linear Models Procedure

Dependent Variable: RESPONSE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	194.4466667	48.6116667	50.60	0.0001
Error	10	9.6066667	0.9606667		
Corrected Total	14	204.0533333			

R-Square	C.V.	Root MSE	RESPONSE Mean
0.952921	17.09540	0.980136	5.733333

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DOSE	4	194.4466667	48.6116667	50.60	0.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F

DOSE	4	194.4466667	48.6116667	50.60	0.0001

turnip shoot length 79
COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
09:18 Wednesday, February 11, 1998

General Linear Models Procedure

Level of DOSE	N	RESPONSE Mean	RESPONSE SD
0	3	12.4000000	0.87177979
0.016	3	3.3666667	0.98149546
0.028	3	2.0666667	0.51316014
0.0036	3	6.1666667	1.60416126
0.0068	3	4.6666667	0.49328829

turnip shoot length 80
COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
09:18 Wednesday, February 11, 1998

General Linear Models Procedure

Dunnett's One-tailed T tests for variable: RESPONSE

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 10 MSE= 0.960667
Critical Value of Dunnett's T= 2.466
Minimum Significant Difference= 1.9731

Comparisons significant at the 0.05 level are indicated by '***'.

DOSE Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
0.0036 - 0	-8.2065	-6.2333	-4.2602	***
0.0068 - 0	-9.7065	-7.7333	-5.7602	***
0.016 - 0	-11.0065	-9.0333	-7.0602	***
0.028 - 0	-12.3065	-10.3333	-8.3602	***

corn phyto

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence Limits	Upper Confidence Limits
EC 1.00	0.0017		
EC 5.00	0.0030		
EC10.00	0.0041		
EC15.00	0.0050		
EC50.00	0.0121		
EC85.00	0.0293		
EC90.00	0.0361		
EC95.00	0.0491		
EC99.00	0.0877		

EC_{25} = 0.0069 lb ae/A

Oat shoot length
File: oat Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Control	3	30.967	30.967	30.967
2	0.0068 lb ae/A	2	28.650	28.650	28.650
3	0.016 lb ae/A	3	24.700	24.700	24.700
4	0.028 lb ae/A	3	24.433	24.433	24.433
5	0.058 lb ae/A	3	19.767	19.767	19.767
6	0.11 lb ae/A	3	15.467	15.467	15.467
7	0.22 lb ae/A	3	11.667	11.667	11.667

Oat shoot length
File: oat Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Control	30.967				
0.0068 lb ae/A	28.650	1.804	*	1.77	k= 1, v=13
0.016 lb ae/A	24.700	5.455	*	1.86	k= 2, v=13
0.028 lb ae/A	24.433	5.687	*	1.89	k= 3, v=13
0.058 lb ae/A	19.767	9.749	*	1.90	k= 4, v=13
0.11 lb ae/A	15.467	13.491	*	1.91	k= 5, v=13
0.22 lb ae/A	11.667	16.799	*	1.92	k= 6, v=13

s = 1.407
Note: df used for table values are approximate when v > 20.

NOEL = EC_5 = 0.004 16 ae/A

oat shoot length

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence	Upper Limits
EC 1.00	0.0011	0.0004	0.0022
EC 5.00	0.0043	0.0022	0.0069
EC10.00	0.0089	0.0054	0.0128
EC15.00	0.0146	0.0097	0.0196
EC50.00	0.1153	0.0899	0.1585
EC85.00	0.9124	0.5387	1.9825
EC90.00	1.4883	0.8134	3.6452
EC95.00	3.0731	1.4943	9.0086
EC99.00	11.9716	4.6566	49.3662

EC_{25} = 0.030 lb ae/A

oat shoot length 31
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OBS	CONC	LOG_CONC	Y1	Y2	Y3	Y4	Y5	Y6
1	0.0000	.	30.0	30.5	32.4	.	.	.
2	0.0068	-2.16749	28.8	28.5	.	.	.	.
3	0.0160	-1.79588	23.4	25.0	25.7	.	.	.
4	0.0280	-1.55284	23.8	26.9	22.6	.	.	.
5	0.0580	-1.23657	19.1	20.8	19.4	.	.	.
6	0.1100	-0.95861	17.0	14.6	14.8	.	.	.
7	0.2200	-0.65758	10.0	13.0	12.0	.	.	.

oat shoot length 32
MODEL: COUNT = CO * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
WEIGHTED REGRESSION
09:18 Wednesday, February 11, 1998

Non-Linear Least Squares Iterative Phase
Dependent Variable COUNT Method: Gauss-Newton

Iter	LOG_EC50	SIGMA	CO	Weighted SS
0	-0.938000	0.870000	30.970000	1.649025
1	-0.934272	0.876806	30.871829	1.646117
2	-0.934278	0.877017	30.873110	1.646086
3	-0.934280	0.877023	30.873157	1.646086
4	-0.934280	0.877023	30.873159	1.646086

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable COUNT

Source	DF	Weighted SS	Weighted MS
Regression	3	438.30000000	146.10000000
Residual	17	1.64608558	0.09682856
Uncorrected Total	20	439.94608558	
(Corrected Total)	19	45.16161515	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval Lower	Upper
LOG_EC50	-0.93427968	0.04567496593	-1.030644863	-0.837914490
SIGMA	0.87702284	0.07872140761	0.710936170	1.043109517
CO	30.87315884	0.93745350600	28.895316488	32.851001198

Asymptotic Correlation Matrix

Corr	LOG_EC50	SIGMA	CO
LOG_EC50	1	-0.351654927	-0.792703588
SIGMA	-0.351654927	1	0.6188924235
CO	-0.792703588	0.6188924235	1

oat shoot length 33
MODEL: COUNT = CO * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
SUMMARY OF NONLINEAR REGRESSION
09:18 Wednesday, February 11, 1998

OBS	CONC	LOG_EC50	SIGMA	CO	RESID_SS	EC50
1	0	-0.93428	0.87702	30.8732	1.64609	0.11634

oat shoot length 34
MODEL: YOUNG = CO * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
WEIGHTED REGRESSION
09:18 Wednesday, February 11, 1998

Non-Linear Least Squares Iterative Phase
Dependent Variable COUNT Method: Gauss-Newton

Iter	LOG_EC25	SIGMA	CO	Weighted SS
0	-1.522000	0.870000	30.970000	1.648251
1	-1.525617	0.876784	30.871568	1.646088
2	-1.525816	0.877016	30.873102	1.646086
3	-1.525823	0.877023	30.873157	1.646086
4	-1.525823	0.877023	30.873159	1.646086

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable COUNT

Source	DF	Weighted SS	Weighted MS
Regression	3	438.30000000	146.10000000
Residual	17	1.64608558	0.09682856
Uncorrected Total	20	439.94608558	
(Corrected Total)	19	45.16161515	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval Lower	Upper
LOG_EC25	-1.52582281	0.08130889368	-1.697368573	-1.354277054
SIGMA	0.87702284	0.07872140756	0.710936170	1.043109516
CO	30.87315884	0.93745350569	28.895316482	32.851001191

Asymptotic Correlation Matrix

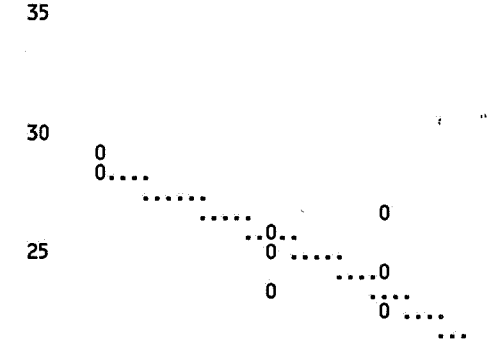
Corr	LOG_EC25	SIGMA	CO
LOG_EC25	1	-0.850566597	-0.849450962
SIGMA	-0.850566597	1	0.6188924237
CO	-0.849450962	0.6188924237	1

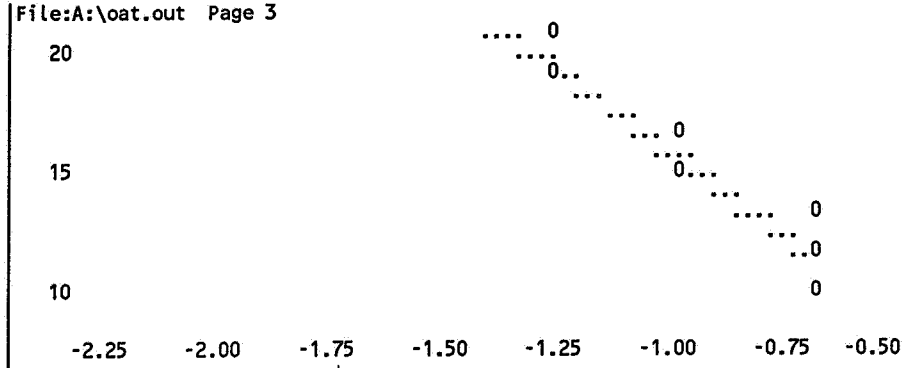
oat shoot length 35
MODEL: YOUNG = CO * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
SUMMARY OF NONLINEAR REGRESSION
09:18 Wednesday, February 11, 1998

OBS	CONC	LOG_EC25	SIGMA	CO	RESID_SS	EC25
1	0	-1.52582	0.87702	30.8732	1.64609	0.029797

oat shoot length 36
MODEL: YOUNG = CO * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
09:18 Wednesday, February 11, 1998

Plot of COUNT*LOG_CONC. Symbol used is '0'.
Plot of PRED*LOG_CONC. Symbol used is '.'.





NOTE: 1541 obs had missing values., 1471 obs hidden.

General Linear Models Procedure
Class Level Information

Class	Levels	Values
DOSE	7	0 0.11 0.22 0.016 0.028 0.058 0.0068

Number of observations in data set = 42

NOTE: Due to missing values, only 20 observations can be used in this analysis.

General Linear Models Procedure

Dependent Variable: RESPONSE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	832.4871667	138.7478611	70.08	0.0001
Error	13	25.7383333	1.9798718		
Corrected Total	19	858.2255000			

R-Square	C.V.	Root MSE	RESPONSE Mean
0.970010	6.420621	1.407079	21.91500

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DOSE	6	832.4871667	138.7478611	70.08	0.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DOSE	6	832.4871667	138.7478611	70.08	0.0001

General Linear Models Procedure

Level of DOSE	N	RESPONSE Mean	RESPONSE SD
0	3	30.9666667	1.26622799
0.11	3	15.4666667	1.33166562
0.22	3	11.6666667	1.52752523
0.016	3	24.7000000	1.17898261
0.028	3	24.4333333	2.21885857
0.058	3	19.7666667	0.90737717
0.0068	2	28.6500000	0.21213203

General Linear Models Procedure

Dunnett's One-tailed T tests for variable: RESPONSE

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 13 MSE= 1.979872
Critical Value of Dunnett's T= 2.561

Comparisons significant at the 0.05 level are indicated by '***'.

DOSE Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
0.0068 - 0	-5.606	-2.317	0.973	
0.016 - 0	-9.209	-6.267	-3.324	***
0.028 - 0	-9.476	-6.533	-3.591	***
0.058 - 0	-14.142	-11.200	-8.258	***
0.11 - 0	-18.442	-15.500	-12.558	***
0.22 - 0	-22.242	-19.300	-16.358	***

onion shoot length
File: oni Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Control	3	7.967	7.967	8.400
2	0.016 lb ae/a	3	8.833	8.833	8.400
3	0.028 lb ae/A	3	7.267	7.267	7.267
4	0.058 lb ae/A	3	6.567	6.567	6.567
5	0.11 lb ae/A	3	5.533	5.533	5.533
6	0.22 lb ae/A	3	4.767	4.767	4.767

onion shoot length
File: oni Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Control	8.400				
0.016 lb ae/a	8.400	0.871		1.78	k= 1, v=12
0.028 lb ae/A	7.267	1.406		1.87	k= 2, v=12
0.058 lb ae/A	6.567	2.813	*	1.90	k= 3, v=12
0.11 lb ae/A	5.533	4.888	*	1.92	k= 4, v=12
0.22 lb ae/A	4.767	6.429	*	1.93	k= 5, v=12

s = 0.610
Note: df used for table values are approximate when v > 20.

NOEL = 0.028 lb ae/A

onion shoot length

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence	Upper Limits
EC 1.00	0.0043	0.0008	0.0098
EC 5.00	0.0150	0.0053	0.0253
EC10.00	0.0292	0.0145	0.0426
EC15.00	0.0460	0.0281	0.0617
EC50.00	0.3109	0.2119	0.6375
EC85.00	2.1028	0.9114	11.5566
EC90.00	3.3052	1.2788	23.0846
EC95.00	6.4596	2.1093	64.4410
EC99.00	22.6991	5.3782	443.1144

$EC_{25} = 0.091$ lb ae/A

onion shoot length 41
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OBS	CONC	LOG_CONC	Y1	Y2	Y3	Y4	Y5	Y6
1	0.000	.	8.4	7.9	7.6	.	.	.
2	0.028	-1.55284	7.0	7.1	7.7	.	.	.
3	0.058	-1.23657	7.2	6.6	5.9	.	.	.
4	0.110	-0.95861	5.1	4.7	6.8	.	.	.
5	0.220	-0.65758	4.7	4.3	5.3	.	.	.

onion shoot length 42
MODEL: COUNT = C0 * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
WEIGHTED REGRESSION
09:18 Wednesday, February 11, 1998

Non-Linear Least Squares Iterative Phase
Dependent Variable COUNT Method: Gauss-Newton

Iter	LOG_EC50	SIGMA	C0	Weighted SS
0	-0.509000	0.800000	7.970000	0.798000
1	-0.473853	0.858093	8.009773	0.781814
2	-0.472364	0.857062	8.004378	0.781498
3	-0.472336	0.857202	8.004546	0.781501
4	-0.472338	0.857189	8.004531	0.781501
5	-0.472338	0.857190	8.004532	0.781501
6	-0.472338	0.857190	8.004532	0.781501

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable COUNT

Source	DF	Weighted SS	Weighted MS
Regression	3	96.300000000	32.100000000
Residual	12	0.781500634	0.065125053
Uncorrected Total	15	97.081500634	
(Corrected Total)	14	4.008960769	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval Lower	Upper
LOG_EC50	-0.472337800	0.11681829729	-0.7268633799	-0.2178122203
SIGMA	0.857190402	0.22420796565	0.3686824900	1.3456983133
C0	8.004532366	0.40960683328	7.1120744280	8.8969903041

Asymptotic Correlation Matrix

Corr	LOG_EC50	SIGMA	C0
LOG_EC50	1	0.5177882535	-0.291684517
SIGMA	0.5177882535	1	0.542226373
C0	-0.291684517	0.542226373	1

onion shoot length 43
MODEL: COUNT = C0 * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
SUMMARY OF NONLINEAR REGRESSION
09:18 Wednesday, February 11, 1998

OBS	CONC	LOG_EC50	SIGMA	C0	RESID_SS	EC50
1	0	-0.47234	0.85719	8.00453	0.78150	0.33703

onion shoot length 44
MODEL: YOUNG = C0 * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
WEIGHTED REGRESSION
09:18 Wednesday, February 11, 1998

Non-Linear Least Squares Iterative Phase
Dependent Variable COUNT Method: Gauss-Newton

Iter	LOG_EC25	SIGMA	C0	Weighted SS
0	-1.040000	0.800000	7.970000	0.790097
1	-1.052300	0.858815	8.010032	0.781612
2	-1.050421	0.857019	8.004327	0.781496
3	-1.050511	0.857205	8.004550	0.781501
4	-1.050504	0.857189	8.004531	0.781501
5	-1.050504	0.857191	8.004533	0.781501
6	-1.050504	0.857190	8.004532	0.781501

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable COUNT

Source	DF	Weighted SS	Weighted MS
Regression	3	96.300000000	32.100000000
Residual	12	0.781500634	0.065125053
Uncorrected Total	15	97.081500634	
(Corrected Total)	14	4.008960770	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval Lower	Upper
LOG_EC25	-1.050504153	0.13498654023	-1.3446149918	-0.7563933140
SIGMA	0.857190399	0.22420796503	0.3686824889	1.3456983095
C0	8.004532363	0.40960683309	7.1120744254	8.8969903007

Asymptotic Correlation Matrix

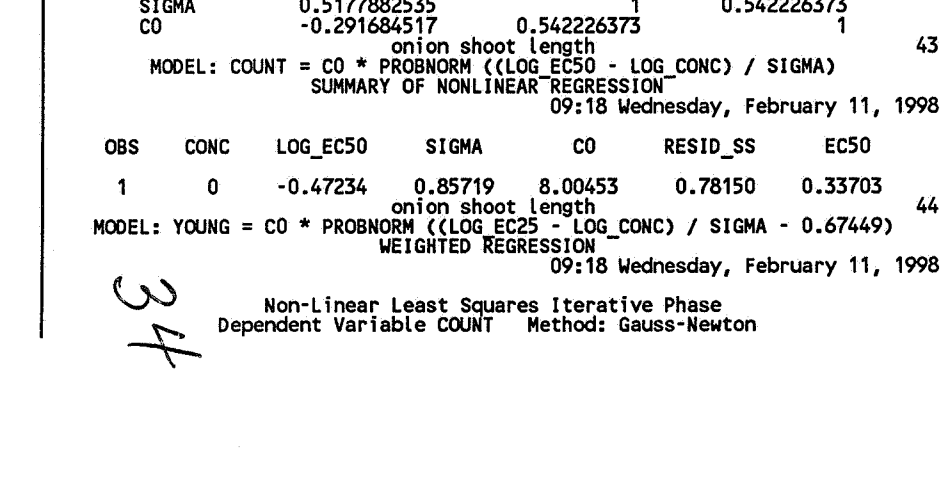
Corr	LOG_EC25	SIGMA	C0
LOG_EC25	1	-0.672206935	-0.859884477
SIGMA	-0.672206935	1	0.542226374
C0	-0.859884477	0.542226374	1

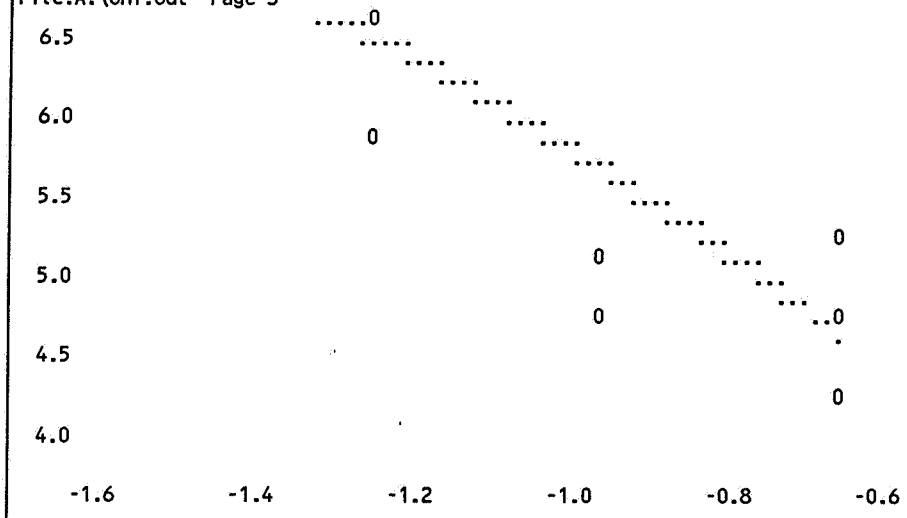
onion shoot length 45
MODEL: YOUNG = C0 * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
SUMMARY OF NONLINEAR REGRESSION
09:18 Wednesday, February 11, 1998

OBS	CONC	LOG_EC25	SIGMA	C0	RESID_SS	EC25
1	0	-1.05050	0.85719	8.00453	0.78150	0.089022

onion shoot length 46
MODEL: YOUNG = C0 * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
09:18 Wednesday, February 11, 1998

Plot of COUNT*LOG_CONC. Symbol used is '0'.
Plot of PRED*LOG_CONC. Symbol used is '.'.





NOTE: 920 obs had missing values. 840 obs hidden.

COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
09:18 Wednesday, February 11, 1998

General Linear Models Procedure
Class Level Information

Class	Levels	Values
DOSE	5	0 0.11 0.22 0.028 0.058

Number of observations in data set = 30

NOTE: Due to missing values, only 15 observations can be used in this analysis.

COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
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General Linear Models Procedure

Dependent Variable: RESPONSE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	19.95066667	4.98766667	11.20	0.0010
Error	10	4.45333333	0.44533333		
Corrected Total	14	24.40400000			

R-Square	C.V.	Root MSE	RESPONSE Mean
0.817516	10.39460	0.667333	6.420000

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Source	DF	Type I SS	Mean Square	F Value	Pr > F
DOSE	4	19.95066667	4.98766667	11.20	0.0010

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DOSE	4	19.95066667	4.98766667	11.20	0.0010

COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
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General Linear Models Procedure

Level of DOSE	N	RESPONSE Mean	RESPONSE SD
0	3	7.96666667	0.40414519
0.11	3	5.53333333	1.11504858
0.22	3	4.76666667	0.50332230
0.028	3	7.26666667	0.37859389
0.058	3	6.56666667	0.65064071

COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
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General Linear Models Procedure

Dunnett's One-tailed T tests for variable: RESPONSE

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 10 MSE= 0.445333
Critical Value of Dunnett's T= 2.466
Minimum Significant Difference= 1.3434

Comparisons significant at the 0.05 level are indicated by '***'.

DOSE Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
0.028 - 0	-2.0434	-0.7000	0.6434	
0.058 - 0	-2.7434	-1.4000	-0.0566	***
0.11 - 0	-3.7768	-2.4333	-1.0899	***
0.22 - 0	-4.5434	-3.2000	-1.8566	***

Ryegrass
~~oat~~ shoot length
File: rye Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Control	3	13.333	13.333	13.333
2	0.0018 lb ae/A	3	12.933	12.933	12.933
3	0.0036 lb ae/A	3	11.467	11.467	11.467
4	0.0068 lb ae/A	3	7.900	7.900	7.900
5	0.016 lb ae/A	3	7.633	7.633	7.633
6	0.028 lb ae/A	3	6.433	6.433	6.433
7	0.058 lb ae/A	3	4.433	4.433	4.433
8	0.11 lb ae/A	3	4.200	4.200	4.200

Ryegrass
~~oat~~ shoot length
File: rye Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Control	13.333				
0.0018 lb ae/A	12.933	0.620		1.75	k= 1, v=16
0.0036 lb ae/A	11.467	2.895	*	1.83	k= 2, v=16
0.0068 lb ae/A	7.900	8.426	*	1.86	k= 3, v=16
0.016 lb ae/A	7.633	8.839	*	1.87	k= 4, v=16
0.028 lb ae/A	6.433	10.700	*	1.88	k= 5, v=16
0.058 lb ae/A	4.433	13.802	*	1.89	k= 6, v=16
0.11 lb ae/A	4.200	14.163	*	1.89	k= 7, v=16

s = 0.790
Note: df used for table values are approximate when v > 20.

NOEL = 0.0018 lb ae/A

ryegrass shoot length

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence Limits	Upper 95% Confidence Limits
EC 1.00	0.0003	0.0001	0.0006
EC 5.00	0.0010	0.0003	0.0018
EC10.00	0.0019	0.0009	0.0032
EC15.00	0.0031	0.0016	0.0047
EC50.00	0.0232	0.0180	0.0309
EC85.00	0.1729	0.1033	0.3976
EC90.00	0.2783	0.1522	0.7466
EC95.00	0.5631	0.2691	1.9065
EC99.00	2.1123	0.7791	11.1362

EC_{25} = 0.0064 lb ae/A

ryegrass shoot length 51
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OBS	CONC	LOG_CONC	Y1	Y2	Y3	Y4	Y5	Y6
1	0.0000	.	13.20	13.4	13.40	.	.	.
2	0.0036	-2.44370	11.20	11.4	11.80	.	.	.
3	0.0114	-1.94310	8.15	7.5	7.65	.	.	.
4	0.0280	-1.55284	5.10	6.6	7.60	.	.	.
5	0.0580	-1.23657	4.90	4.2	4.20	.	.	.

ryegrass shoot length 52
MODEL: COUNT = CO * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
WEIGHTED REGRESSION
09:18 Wednesday, February 11, 1998

Non-Linear Least Squares Iterative Phase
Dependent Variable COUNT Method: Gauss-Newton

Iter	LOG_EC50	SIGMA	CO	Weighted SS
0	-1.634000	0.840000	13.330000	0.970254
1	-1.646274	0.916235	13.487380	0.922650
2	-1.643918	0.912889	13.463805	0.922377
3	-1.644062	0.913254	13.464982	0.922401
4	-1.644048	0.913218	13.464864	0.922398
5	-1.644049	0.913222	13.464876	0.922399
6	-1.644049	0.913221	13.464875	0.922399
7	-1.644049	0.913221	13.464875	0.922399

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable COUNT

Source	DF	Weighted SS	Weighted MS
Regression	3	130.30000000	43.43333333
Residual	12	0.92239861	0.07686655
Uncorrected Total	15	131.22239861	
(Corrected Total)	14	19.50722647	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval Lower	Upper
LOG_EC50	-1.64404879	0.06750936379	-1.791139279	-1.496958310
SIGMA	0.91322126	0.10947957212	0.674685416	1.151757112
CO	13.46487492	0.57868831992	12.204019523	14.725730309

Asymptotic Correlation Matrix

Corr	LOG_EC50	SIGMA	CO
LOG_EC50	1	-0.465513994	-0.8157288
SIGMA	-0.465513994	1	0.4888704602
CO	-0.8157288	0.4888704602	1

ryegrass shoot length 53
MODEL: COUNT = CO * PROBNORM ((LOG_EC50 - LOG_CONC) / SIGMA)
SUMMARY OF NONLINEAR REGRESSION
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OBS	CONC	LOG_EC50	SIGMA	CO	RESID_SS	EC50
1	0	-1.64405	0.91322	13.4649	0.92240	0.022696

ryegrass shoot length 54
MODEL: YOUNG = CO * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
WEIGHTED REGRESSION
09:18 Wednesday, February 11, 1998

Non-Linear Least Squares Iterative Phase

Dependent Variable COUNT Method: Gauss-Newton

Iter	LOG_EC25	SIGMA	CO	Weighted SS
0	-2.193000	0.840000	13.330000	0.961443
1	-2.264236	0.916784	13.487837	0.922331
2	-2.259613	0.912851	13.463690	0.922375
3	-2.260047	0.913258	13.464994	0.922401
4	-2.260004	0.913218	13.464863	0.922398
5	-2.260008	0.913222	13.464876	0.922399
6	-2.260007	0.913221	13.464875	0.922399
7	-2.260007	0.913221	13.464875	0.922399

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable COUNT

Source	DF	Weighted SS	Weighted MS
Regression	3	130.30000000	43.43333333
Residual	12	0.92239861	0.07686655
Uncorrected Total	15	131.22239861	
(Corrected Total)	14	19.50722646	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval Lower	Upper
LOG_EC25	-2.26000741	0.12104354119	-2.523739015	-1.996275797
SIGMA	0.91322126	0.10947957217	0.674685417	1.151757112
CO	13.46487492	0.57868831997	12.204019524	14.725730310

Asymptotic Correlation Matrix

Corr	LOG_EC25	SIGMA	CO
LOG_EC25	1	-0.86968234	-0.753191228
SIGMA	-0.86968234	1	0.4888704601
CO	-0.753191228	0.4888704601	1

ryegrass shoot length 55
MODEL: YOUNG = CO * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
SUMMARY OF NONLINEAR REGRESSION
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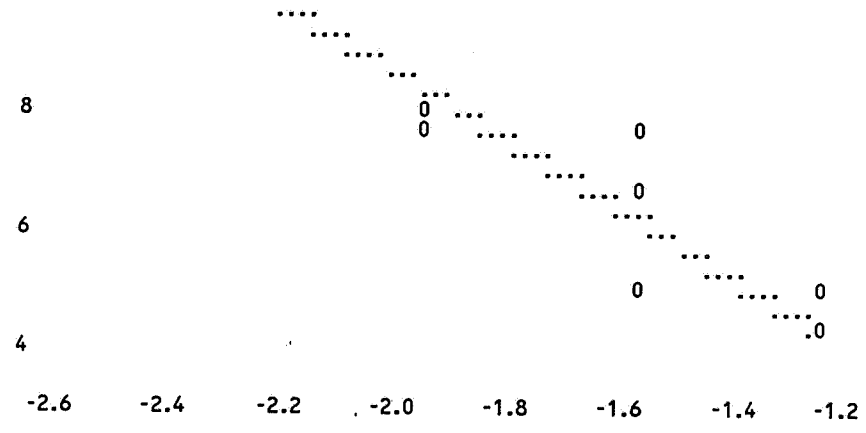
OBS	CONC	LOG_EC25	SIGMA	CO	RESID_SS	EC25
1	0	-2.26001	0.91322	13.4649	0.92240	.0054953

ryegrass shoot length 56
MODEL: YOUNG = CO * PROBNORM ((LOG_EC25 - LOG_CONC) / SIGMA - 0.67449)
09:18 Wednesday, February 11, 1998

Plot of COUNT*LOG_CONC. Symbol used is '0'.
Plot of PRED*LOG_CONC. Symbol used is '.'.



NOTE: 1233 obs had missing values. 1160 obs hidden.

ryegrass shoot length 57
COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
09:18 Wednesday, February 11, 1998

General Linear Models Procedure
Class Level Information

Class	Levels	Values
DOSE	5	0 0.028 0.058 0.0036 0.0114

Number of observations in data set = 30

NOTE: Due to missing values, only 15 observations can be used in this analysis.

ryegrass shoot length 58
COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
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General Linear Models Procedure

Dependent Variable: RESPONSE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	160.0040000	40.0010000	101.57	0.0001
Error	10	3.9383333	0.3938333		
Corrected Total	14	163.9423333			

R-Square	C.V.	Root MSE	RESPONSE Mean
0.975977	7.224422	0.627561	8.686667

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DOSE	4	160.0040000	40.0010000	101.57	0.0001

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Source	DF	Type III SS	Mean Square	F Value	Pr > F
DOSE	4	160.0040000	40.0010000	101.57	0.0001

ryegrass shoot length 59
COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
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General Linear Models Procedure

Level of DOSE	N	RESPONSE Mean	RESPONSE SD
0	3	13.3333333	0.11547005
0.028	3	6.4333333	1.25830574
0.058	3	4.4333333	0.40414519
0.0036	3	11.4666667	0.30550505
0.0114	3	7.7666667	0.34034296

ryegrass shoot length 60
COMPARISON OF MEANS FOR NOEL DETERMINATION
TEST IF TREATMENT IS LESS THAN CONTROL
09:18 Wednesday, February 11, 1998

General Linear Models Procedure

Dunnett's One-tailed T tests for variable: RESPONSE

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 10 MSE= 0.393833
Critical Value of Dunnett's T= 2.466
Minimum Significant Difference= 1.2634

Comparisons significant at the 0.05 level are indicated by '***'.

DOSE Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
0.0036 - 0	-3.1300	-1.8667	-0.6033	***
0.0114 - 0	-6.8300	-5.5667	-4.3033	***
0.028 - 0	-8.1634	-6.9000	-5.6366	***
0.058 - 0	-10.1634	-8.9000	-7.6366	***

Table 58. Summary of EC_{25}, EC_{50}, r^2 and NOEC values (expressed as measured concentrations in lb A.E./A) determined during emergence tests exposing ten plant species to SAN 836H.

Species	NOEC[a] (lb A.E./A)	EC_{25}[b] (lb A.E./A)	EC_{50}[b] (lb A.E./A)	r^2[b]	Regression Equation[c]
Cabbage					
Percent emergence	0.058	> 0.058	> 0.058	NA[d]	NA
Shoot length	0.0036	0.0072	0.022	0.94	response vs. log concentration
Lower 95% CL[e]		0.0035	0.011		
Upper 95% CL		0.015	0.045		
Corn					
Percent emergence	0.22	> 0.22	> 0.22	NA	NA
Shoot length	0.028	0.17	3.6	0.70	response vs. log concentration
Lower 95% CL		0.038	0.62		
Upper 95% CL		1.1	93		
Cucumber					
Percent emergence	0.058	> 0.058	> 0.058	NA	NA
Shoot length	0.0018	0.0038	0.020	0.77	response vs. log concentration
Lower 95% CL		0.00072	0.0044		
Upper 95% CL		0.017	0.10		
Lettuce					
Percent emergence	0.0068	0.0044	0.023	0.55	response vs. log concentration
Lower 95% CL		0.00026	0.0019		
Upper 95% CL		0.068	0.66		
Shoot length	0.00034[f]	0.0014	0.0078	0.79	response vs. log concentration
Lower 95% CL		0.00027	0.0018		
Upper 95% CL		0.0057	0.035		
Oat					
Percent emergence	0.22	> 0.22	> 0.22	NA	NA
Shoot length	0.0068	0.032	0.12	0.95	probit response vs. log concentration
Lower 95% CL		0.016	0.063		
Upper 95% CL		0.060	0.23		

Table 58. Continued. Summary of EC_{25}, EC_{50}, r^2 and NOEC values (expressed as measured concentrations in lb A.E./A) determined during emergence tests exposing ten plant species to SAN 836H.

Species	NOEC[a] (lb A.E./A)	EC_{25}[b] (lb A.E./A)	EC_{50}[b] (lb A.E./A)	r^2[b]	Regression Equation[c]
Onion					
Percent emergence	0.11	0.12	0.62	0.50	response vs.
Lower 95% CL		0.010	0.065		log concentration
Upper 95% CL		3.5	85		
Shoot length	0.058	0.086	0.33	0.86	response vs.
Lower 95% CL		0.034	0.13		log concentration
Upper 95% CL		0.22	1.0		
Perennial Ryegrass					
Percent emergence	0.11	> 0.11	> 0.11	NA	NA
Shoot length	0.0018	0.0052	0.025	0.89	response vs.
Lower 95% CL		0.0017	0.0085		log concentration
Upper 95% CL		0.015	0.074		
Soybean					
Percent emergence	0.016	> 0.016	> 0.016	NA	NA
Shoot length	0.0036	0.0050	0.0096	0.92	response vs.
Lower 95% CL		0.0012	0.0059		concentration
Upper 95% CL		0.0087	0.014		

Table 58. Continued. Summary of EC_{25}, EC_{50}, r^2 and NOEC values (expressed as measured concentrations in lb A.E./A) determined during emergence tests exposing ten plant species to SAN 836H.

Species	NOEC[a] (lb A.E./A)	EC_{25}[b] (lb A.E./A)	EC_{50}[b] (lb A.E./A)	r^2[b]	Regression Equation[c]
Tomato					
Percent emergence	0.22	> 0.22	> 0.22	NA	NA
Shoot length	0.028	0.10	0.20	0.77	probit response vs.
Lower 95% CL		0.028	0.056		log concentration
Upper 95% CL		0.40	0.91		
Turnip					
Percent emergence	0.016	0.026	0.29	0.37	response vs.
Lower 95% CL		0.00072	0.013		log concentration
Upper 95% CL		49	73		
Shoot length	0.0018	0.0022	0.0060	0.80	response vs.
Lower 95% CL		0.00057	0.0017		log concentration
Upper 95% CL		0.0072	0.020		

[a] NOEC = No-Observed-Effect Concentration
[b] The results for all application rates for each parameter were used to calculate the EC_{25}, EC_{50} and r^2 values.
[c] The type of regression equation used to calculate the EC_{25}, EC_{50} and r^2 values
[d] NA = Not Applicable
[e] CL = Confidence Limit
[f] The NOEC was established by Dunnett's Test to be < 0.0009 lb A.E./A, the lowest application rate tested. Therefore, the EC_{05} of 0.00034 lb A.E./A was calculated to substitute as the NOEC value.