

File

10-16-95

DATA EVALUATION RECORD
SEEDLING EMERGENCE EC₂₅ TEST
GUIDELINE 123-1a (TIER II)

1. **CHEMICAL:** Sulfentrazone (129081)
2. **TEST MATERIAL:** Sulfentrazone technical; 94.2%
3. **CITATION:**
Author: Chetram, R.S.
Date: 1992
Title: Tier 2 seed germination/seedling emergence
nontarget phytotoxicity study using F6285
technical
Laboratory: Pan-Agricultural Laboratories, Inc.,
Madera, CA
Lab. Report #: BL91-473
Sponsor: FMC Corporation, Princeton, NJ
MRID No.: 433454-11 (report)
437836-01 (raw data)

4. **REVIEWED BY:**

William Erickson
Biologist
EEB/EFED/EPA

Signature: *W. Erickson*

Date: *10/13/95*

5. **APPROVED BY:**

Harry Craven
Section Head 4
EEB/EFED/EPA

Signature: *Harry F. Craven*

Date: *10/16/95*

6. **STUDY PARAMETERS/RESULTS SYNOPSIS:**

Duration of Study: 21 days
Crops: oat, ryegrass, corn, onion,
soybean, lettuce, tomato, radish,
cabbage, cucumber
Most sensitive species: lettuce
Measurement endpoint: dry weight
Seedling emergence EC₂₅: 0.010 lb ai/acre
95% CI: 0.0041-0.026 lb ai/acre
NOEC: 0.006 lb ai/acre
Slope: 1.73
Seed germination EC₂₅: >0.5 lb ai/acre (all crops)
NOEC: 0.50 lb ai/acre (all crops)

7. **CONCLUSION:** The study is scientifically sound and fulfills the guideline requirement for a Tier 2 plant emergence study.

The seed germination portion of the study also is scientifically sound, but the Agency no longer requires seed germination testing.

8. ADEQUACY OF THE STUDY: Core.
9. MAJOR GUIDELINE DEVIATIONS: None.
10. MATERIALS AND METHODS:

Test Organisms:

Guideline Criteria	Reported Information
Species: (6 dicots in 4 families including soybean and rootcrop; 4 monocots in 2 families including corn)	Monocots: corn, ryegrass, oat, onion Dicots: soybean, tomato, cucumber, cabbage, radish, lettuce
No. seeds/rep.: (10) No. reps/dose: (3)	10 4
Source & % germination of seed reported?	yes

Test System:

Guideline Criteria	Reported Information
Solvent:	acetone
Test site:	growth chamber
Soil type:	pasteurized sandy loam (0.3% organic matter) with perlite added to facilitate drainage
Fertilizer:	none reported
Pot size and description:	petri dishes for germination test; plastic pots (7.5 x 7.5 x 6.0 cm) for emergence test
No. species per pot:	1
No. seeds per pot:	10
Method of pesticide application:	pipetted for germination; for emergence, applied to soil with an overhead flat-fan nozzle (TeeJet 800-E)

Guideline Criteria	Reported Information
Watering method and frequency:	hand watered after treatment; then irrigated 4X daily for 2 min. duration with low volume misting system; as growth progressed, pots placed under low volume nozzle sprinkler system and irrigated 4x daily for duration of 2 min.
Test duration:	14 days for emergence
Growth stage at application: (seed)	seed

Test Design:

Guideline Criteria	Reported Information
Dose range: (2X or 3X)	3X
Doses: (at least 5)	5 (6 for oat and ryegrass in emergence test)
Controls: (negative and solvent)	solvent only
Parameters observed and measured	% germination % emergence plant height dry weight phytotoxicity survival
Maximum labeled application rate:	0.375 lb ai/acre (from label)

11. REPORTED RESULTS:

Guideline Criteria	Reported Information
NOEC Observed?	yes
Measured Initial Chemical Concentrations? (optional)	yes
Raw data included? (Y/N)	yes (lettuce data in MRID# 433454-11; others in MRID# 437836-01)
Quality Assurance Measures?	yes

Seed germination: Nominal concentrations were 0, 0.006, 0.019, 0.056, 0.167, and 0.50 ppm. "Due to lack of significant treatment effects or detrimental effect levels below 25%, a regression analysis was not conducted, therefore, EC₂₅ and EC₅₀ values were not determined for the ten crops."

Seedling emergence: The measurement endpoint (survival, plant height, or plant dry weight) with the most sensitive EC₂₅ value is tabulated below for each of the 10 species. The most sensitive monocot and dicot species are highlighted in bold.

Statistical Methods: EC₂₅ - regression analysis
NOEC - Dunnett's Test

Species	Endpoint	EC ₂₅ (lb ai/A)	NOEC (lb ai/A)
Monocots			
corn	dry weight	0.051*	0.167
ryegrass	dry weight	0.048	0.019
oat	dry weight	0.023	0.019
onion	plant height	0.028	0.019
Dicots			
soybean	dry weight	0.30	0.056
lettuce	dry weight	0.011	0.006
cabbage	dry weight	0.047**	0.056
radish	dry weight	0.039	0.019
cucumber	dry weight	0.036	0.019
tomato	dry weight	0.0084	0.006

*extrapolated value

**EC₅₀ value was lower than NOEC due to variability between replications

Phytotoxicity: Phytotoxicity was rated on a scale from 0 to 5, with 0 indicating no injury and 5 indicating moribund or dead plant. NOEC values (lb ai/acre) based on increasing sensitivity to the test material are as follows:

soybean = cabbage (0.167) < lettuce = radish =
tomato = cucumber = ryegrass = corn = onion (0.019) <
oat (0.006)

12. REVIEWER'S ANALYSIS:

Seed germination: Germination was inhibited 0-16% at a nominal test concentration of 0.50 lb ai/acre, which exceeds the labelled maximum application rate of 0.375 lb ai/acre. Therefore, an EC_{25} cannot be determined, and the NOEC is 0.50 lb ai/acre.

Seedling emergence:

Statistical Methods: EPA/OPP/EFED Nuthatch Program
(results attached) EC_{25} - weighted nonlinear regression
NOEC - Williams' Test

Species	Endpoint	EC_{25} (lb ai/A)	NOEC (lb ai/A)
Monocots			
corn	dry weight	0.067	0.167
ryegrass	dry weight	0.038	0.019
oat	dry weight	0.017	0.019
onion	plant height	0.019	0.019
Dicots			
soybean	dry weight	0.35	0.006
lettuce	dry weight	0.010	0.006
cabbage	dry weight	0.067	0.056
radish	dry weight	0.036	0.019
cucumber	dry weight	0.039	0.019
tomato	dry weight	0.013	0.006

Most sensitive dicot: lettuce
Endpoint: dry weight
 EC_{25} : 0.010 lb ai/acre
95% C.L.: 0.0041-0.026 lb ai/acre
NOEC: 0.006 lb ai/acre
Slope: 1.73

Most sensitive monocot: oat
Endpoint: dry weight
 EC_{25} : 0.017 lb ai/acre
95% C.L.: 0.0090-0.031 lb ai/acre
NOEC: 0.019
Slope: 1.45

12. **REVIEWER'S COMMENTS/CONCLUSIONS:** The study is scientifically sound and fulfills the guideline requirement for a Tier 2 plant emergence study. Seed germination testing is no longer required by the Agency. In the emergence study, lettuce and oat were the most sensitive dicot and monocot species, respectively, but tomato ($EC_{25} = 0.013$ lb ai/acre, dry weight) and onion ($EC_{25} = 0.019$ lb ai/acre, plant height) were almost as sensitive.

Program: NUTHATCH
Path : C:\NUTHATCH
Date : 10/11/95

Toxicity measurement for continuous endpoints, using weighted nonlinear regression, weighting proportional to predicted means.

Reference

R.D. Bruce and D.J. Versteeg. 1992. A statistical procedure for modeling continuous toxicity data. Env. Tox. and Chem. 11:1485-1494.

ONI-HT.DAT : ONION PLANT HEIGHT

Raw data:

ONION PLANT HEIGHT

6
4
4
4
4
3
CONTROL
74
70
61
67
0.006
74
91
74
74
75
0.019
54
51
67
65
0.056
35
20
44
43
0.167
15
16
13
17
0.50
8
9
12

ONI-HT.DAT : ONION PLANT HEIGHT

Williams Test

[One-Sided Test for Decrease, alpha = 0.050000]

Dose Isotone T-bar P-value Significance
Means

0 73.3
0.006 73.3 -1.035 N.S.
0.019 59.3 1.726 N.S.
0.056 35.5 6.41 <0.005 *
0.167 15.3 10.4 <0.005 *
0.5 9.67 10.65 <0.005 *

***=Significant; "N.S."=Not Significant.

Estimates of EC₅₀

Parameter	Estimate	95% Bounds	Lower	Upper	Std.Err.	Lower Bound /Estimate
EC1	0.0014	0.00035	0.0054		0.28	0.25
EC5	0.0041	0.0014	0.012		0.23	0.34
EC25	0.019	0.0096	0.039		0.15	0.50
EC50	0.057	0.036	0.090		0.096	0.63

Slope = 1.44 Std.Err. = 0.186

!!!Poor fit: p = 0.014 based on DF= 3.0 17.

ONI-HT.DAT : ONION PLANT HEIGHT

Dose	#Reps.	Observed vs. Predicted Treatment Group Means				%Change
		Obs. Mean	Pred. Mean	Obs. -Pred.	%Control	
0.00	4.00	68.0	75.5	-7.53	100.	0.00
0.00600	4.00	78.5	69.5	9.02	92.0	8.01
0.0190	4.00	59.3	56.9	2.37	75.3	24.7
0.0560	4.00	35.5	38.0	-2.53	50.4	49.6
0.167	4.00	15.3	18.9	-3.65	25.0	75.0
0.500	3.00	9.67	6.58	3.09	8.71	91.3

!!!Warning: EC1 not bracketed by doses evaluated.

!!!Warning: EC5 not bracketed by doses evaluated.

Analysis of Weighted Variance

Source	SS	DF	MS
Residual	34.931	20.000	1.7465
Means Lack-of-Fit	15.929	3.0000	5.3097
Within Groups	19.001	17.000	1.1177

Directly-fitted parameters and Asymptotic Covariances

Parameter	Estimate	Std.Err.	Correlations
Control Mean	75.528	5.0289	1.0000
Log10 EC50	-1.2456	0.095781	-0.79130
Bruce&V. SIGMA	0.69505	0.089857	0.57408
Starting Values	73.250	-1.2676	0.72525

ONI-WT.DAT : ONION PLANT WEIGHT

Raw data:

ONION PLANT WEIGHT

6
4

Goodness of fit: $p = 0.48$ based on $DF = 3.0$ 17.

ONI-WT.DAT : ONION PLANT WEIGHT

Observed vs. Predicted Treatment Group Means					
Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -pred.	%Control
0.00	4.00	0.0320	0.0357	-0.00368	100.0
0.00600	4.00	0.0370	0.0355	0.00153	99.4
0.0190	4.00	0.0355	0.0318	0.00371	89.1
0.0560	4.00	0.0163	0.0182	-0.00195	51.0
0.167	4.00	0.00450	0.00414	0.000358	11.6
0.500	3.00	0.000333	0.000277	5.58e-05	0.778

Analysis of Weighted Variance

Source	SS	DF	MS
Residual	0.033902	20.000	0.0016951
Means Lack-of-Fit	0.0045035	3.0000	0.0015012
Within Groups	0.029398	17.000	0.0017293

Directly-fitted parameters and Asymptotic Covariances

Parameter	Estimate	Std.Err.	Correlations
Control Mean	= 0.035682	0.0026796	1.0000 -0.63342 0.43699
log10 EC50	= -1.2820	0.079423	-0.63342 1.0000 -0.68455
Bruce&V. SIGMA	= 0.38895	0.065466	0.43699 -0.68455 1.0000
Starting Values	0.034833	-1.2758	0.40428

LET-WT.DAT : LETTUCE PLANT WEIGHT

Raw data:

LETTUCE PLANT WEIGHT

5	0.204
4	0.210
4	0.228
4	0.205
4	0.006
4	0.175
4	0.224
4	0.238
4	0.178
4	0.019
4	0.058
4	0.119
4	0.125
4	0.146
4	0.056
4	0.110
4	0.021
4	0.031
4	0.104
4	0.167
4	0.015

ONI-WT.DAT : ONION PLANT WEIGHT

Williams Test

[One-Sided Test for Decrease, $\alpha = 0.050000$]

Dose Isotone T-bar P-value Significance

Dose	Isotone Means	T-bar	P-value	Significance
0	0.0348	-0.6414	N.S.	
0.006	0.0348	-0.6414	N.S.	
0.019	0.0348	-0.6414	N.S.	
0.056	0.0163	3.566	<0.005	*
0.167	0.0045	6.226	<0.005	*
0.5	0.000333	6.637	<0.005	*

***=Significant; "N.S."=Not Significant.

Estimates of EC₅₀

Parameter	Estimate	95% Bounds Lower	Upper	Std.Err.	Lower Bound /Estimate
EC1	0.0071	0.0025	0.020	0.21	0.36
EC5	0.013	0.0057	0.030	0.17	0.44
EC25	0.031	0.018	0.054	0.11	0.58
EC50	0.057	0.039	0.084	0.079	0.68

Slope = 2.57 Std.Err. = 0.433

LET-WT.DAT : LETTUCE PLANT WEIGHT

Williams Test

[One-Sided Test for Decrease, alpha = 0.050000]

Dose	Isotone Means	T-bar P-value	Significance
0	0.212		
0.006	0.204	0.3605	N.S.
0.019	0.112	4.495	<0.005
0.056	0.0665	6.546	<0.005
0.167	0.0163	8.81	<0.005

***=Significant; "N.S."=Not Significant.

Estimates of EC₅₀

Parameter	Estimate	95% Bounds	Std.Err.	Lower Bound /Estimate
EC1	0.0011	Lower 0.0020	Upper 0.0068	0.36
EC5	0.0028	0.00069	0.012	0.29
EC25	0.010	0.0041	0.026	0.19
EC50	0.025	0.014	0.048	0.13

Slope = 1.73 Std.Err. = 0.334

Goodness of fit: p = 0.52 based on DF= 2.0 15.

LET-WT.DAT : LETTUCE PLANT WEIGHT

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	%Control	%Change
0.00	4.00	0.212	0.218	-0.00616	100.	0.00
0.00600	4.00	0.204	0.188	0.0162	86.1	13.9
0.0190	4.00	0.112	0.128	-0.0157	58.6	41.4
0.0560	4.00	0.0665	0.0601	0.00637	27.6	72.4
0.167	4.00	0.0163	0.0171	-0.000829	7.84	92.2

!!!Warning: EC1 not bracketed by doses evaluated.

!!!Warning: EC5 not bracketed by doses evaluated.

Analysis of Weighted Variance

Source	SS	DF	MS
Residual	0.20260	17.000	0.011918
Means Lack-of-Fit	0.016869	2.0000	0.0084344
Within Groups	0.18574	15.000	0.012382

Directly-fitted parameters and Asymptotic Covariances

Parameter Estimate Std.Err. Correlations

Control Mean = 0.21791 0.023738 1.0000 -0.76642 0.52985

TOM-HT.DAT : TOMATO PLANT HEIGHT

Raw data:

TOMATO PLANT HEIGHT

5
4
4
4
4
CONTROL
82
89
81
82
0.006
93
83
81
82
0.019
51
70
69
71
0.056
53
46
41
47
0.50
25
9
24
8

TOM-HT.DAT : TOMATO PLANT HEIGHT

Williams Test

[One-Sided Test for Decrease, alpha = 0.050000]

Dose	Isotone Means	T-bar P-value	Significance
0	84.1		
0.006	84.1	-0.1262	N.S.
0.019	65.3	3.684	<0.005
0.056	46.8	7.418	<0.005
0.5	16.5	13.52	<0.005

***=Significant; "N.S."=Not Significant.

Estimates of EC₅₀

Parameter	Estimate	95% Bounds	Std.Err.	Lower Bound /Estimate
Control Mean	84.1	Lower 84.1	Upper 84.1	

EC1 0.00074 0.00014 0.0040 0.35 0.19
 EC5 0.0029 0.00078 0.011 0.27 0.27
 EC25 0.021 0.0089 0.047 0.17 0.44
 EC50 0.080 0.046 0.14 0.11 0.58

Slope = 1.14 Std.Err. = 0.150

Goodness of fit: p = 0.35 based on DF= 2.0 15.

TOM-HT.DAT : TOMATO PLANT HEIGHT

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	%Control	%Change
0.00	4.00	83.5	86.9	-3.41	100.	0.00
0.00600	4.00	84.8	78.3	6.46	90.1	9.92
0.0190	4.00	65.3	66.2	-0.997	76.2	23.8
0.0560	4.00	46.8	49.6	-2.80	57.0	43.0
0.500	4.00	16.5	15.8	0.744	18.1	81.9

!!!Warning: EC1 not bracketed by doses evaluated.

!!!Warning: EC5 not bracketed by doses evaluated.

Analysis of Weighted Variance

Source	SS	DF	MS
Residual	27.057	17.000	1.5916
Means Lack-of-Fit	3.5040	2.0000	1.7520
Within Groups	23.553	15.000	1.5702

Directly-fitted parameters and Asymptotic Covariances

Parameter	Estimate	Std.Err.	Correlations
Control Mean	= 86.908	5.4073	1.0000
Log10 EC50	= -1.0972	0.11321	-0.79724
Bruce&V. SIGMA	= 0.87450	0.11434	0.59049
Starting Values	86.125	-1.0943	0.90528

LET-HT.DAT : LETTUCE PLANT HEIGHT

Raw data:

LETTUCE PLANT HEIGHT

	Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	%Control	%Change
5	0.00	4.00	41.3	41.7	-0.435	100.	0.00
4	0.00600	4.00	40.5	39.7	0.750	95.4	4.64
4	0.0190	4.00	35.0	35.2	-0.224	84.5	15.5
4	0.0560	4.00	27.0	27.2	-0.189	65.2	34.8
38	0.167	4.00	17.0	16.9	0.0981	40.5	59.5

!!!Warning: EC1 not bracketed by doses evaluated.

Analysis of Weighted Variance

Source	SS	DF	MS
Residual	14.063	17.000	0.82724

32 0.056
 15
 24
 37 0.167
 20
 12
 18
 18

LET-HT.DAT : LETTUCE PLANT HEIGHT

Williams Test

tOne-Sided Test for Decrease, alpha = 0.0500000 J

Dose	Isotone Means	T-bar P-value	Significance
0	41.3		
0.006	40.5	0.2119	N.S.
0.019	35	1.766	N.S.
0.056	27	4.026	<0.005 *
0.167	17	6.852	<0.005 *

***=Significant; "N.S."=Not Significant.

Estimates of EC%

Parameter	Estimate	95% Bounds	Std.Err.	Lower Bound /Estimate	Upper Bound /Estimate
EC1	0.0020	0.00022	0.017	0.45	0.11
EC5	0.0064	0.0013	0.032	0.33	0.20
EC25	0.034	0.015	0.079	0.17	0.43
EC50	0.11	0.070	0.17	0.094	0.63

Slope = 1.33 Std.Err. = 0.314

Goodness of fit: p = 0.95 based on DF= 2.0 15.

LET-HT.DAT : LETTUCE PLANT HEIGHT

Observed vs. Predicted Treatment Group Means

Directly-fitted parameters and Asymptotic Covariances

Parameter	Estimate	Std.Err.	Correlations
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Control Mean = 41.685 2.5940 1.0000 -0.69345 0.60974
Log10 EC50 = -0.95730 0.093682 -0.69345 1.0000 -0.28096
Bruce&V. SIGMA = 0.75249 0.17794 0.60974 -0.28096 1.0000
Starting Values 41.250 -0.94471 0.74752

TOM-WT.DAT : TOMATO PLANT WEIGHT

Raw data:

TOMATO PLANT WEIGHT

4
4
4
4
CONTROL
0.335
0.390
0.415
0.374
0.006
0.255
0.316
0.368
0.377
0.019
0.173
0.308
0.091
0.310
0.056
0.078
0.010
0.076
0.038

TOM-WT.DAT : TOMATO PLANT WEIGHT

Williams Test

[One-Sided Test for Decrease, alpha = 0.050000]

Dose Isotone T-bar P-value Significance

Means

0 0.378
0.006 0.329 1.077 N.S.
0.019 0.221 3.436 <0.005 *
0.056 0.0505 7.133 <0.005 *

***=Significant; "N.S."=Not Significant.

Estimates of ECx

0.829

Parameter	Estimate	95% Bounds Lower Upper	Std.Err.	Lower Bound /Estimate
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Slope = 2.74 Std.Err. = 0.673

Goodness of fit: p = 0.62 based on DF= 1.0 12.

TOM-WT.DAT : TOMATO PLANT WEIGHT

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	%Control	%Change
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0.00 4.00 0.378 0.367 0.0119 100. 0.00

0.00600 4.00 0.329 0.346 -0.0169 94.4 5.64
0.0190 4.00 0.221 0.214 0.00629 58.4 41.6
0.0560 4.00 0.0505 0.0519 -0.00137 14.1 85.9

!!!Warning: EC1 not bracketed by doses evaluated.

!!!Warning: EC5 not bracketed by doses evaluated.

Analysis of Weighted Variance

Source	SS	DF	MS
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Residual 0.26603 13.000 0.020464
Means Lack-of-Fit 0.0057288 1.0000 0.0057288
Within Groups 0.26030 12.000 0.021692

Directly-fitted parameters and Asymptotic Covariances

Parameter	Estimate	Std.Err.	Correlations
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Control Mean = 0.36655 0.036951 1.0000 -0.69662 0.49853
Log10 EC50 = -1.6435 0.092044 -0.69662 1.0000 -0.70070
Bruce&V. SIGMA = 0.36481 0.089516 0.49853 -0.70070 1.0000
Starting Values 0.37850 -1.6743 0.38215

OAT-WT.DAT : OAT PLANT WEIGHT

Raw data:

OAT PLANT WEIGHT

7
4
4
4
4
4
4
CONTROL
0.503
0.603
0.658
0.741
0.721
0.002
0.519
0.829

0.759
0.769
0.006
0.744
0.628
0.569
0.762
0.019
0.545
0.568
0.612
0.617
0.056
0.387
0.389
0.166
0.326
0.167
0.116
0.078
0.112
0.157
0.50
0.054
0.091
0.074
0.091

Mean
0.00
0.00200
0.00600
0.0190
0.0560
0.167
0.500
0.681
0.719
0.676
0.586
0.317
0.116
0.0775
0.726
0.710
0.658
0.526
0.339
0.160
0.0526
-0.0449
0.00937
0.0177
0.0596
-0.0221
-0.0446
0.0249
100
97.8
90.7
72.5
46.7
22.1
7.24

!!!Warning: ECI not bracketed by doses evaluated.

Source SS DF MS
Residual 0.41929 25.000 0.016771
Means Lack-of-Fit 0.14324 4.0000 0.035811
Within Groups 0.27604 21.000 0.013145

Directly-fitted parameters and Asymptotic Covariances

Parameter Estimate Std.Err. Correlations
Control Mean = 0.72568 0.040141 1.0000 -0.75330 0.56029
log10 EC50 = -1.3086 0.088178 -0.75330 1.0000 -0.72462
Bruce&V. SIGMA = 0.69112 0.079721 0.56029 -0.72462 1.0000
Starting Values 0.69988 -1.3149 0.68612

OAT-WT.DAT : OAT PLANT WEIGHT

Williams Test

[One-Sided Test for Decrease, alpha = 0.050000]

Dose Isotone T-bar P-value Significance

0 0.7 -0.338 N.S.
0.002 0.7 0.0837 N.S.
0.006 0.676 0.0837 N.S.
0.019 0.586 1.683 N.S.
0.056 0.317 6.429 <0.005 *
0.167 0.116 9.986 <0.005 *
0.5 0.0775 10.66 <0.005 *

***=Significant; "N.S."=Not Significant.

Estimates of EC%

Parameter Estimate 95% Bounds Lower Upper
EC1 0.0012 0.00036 0.0041
EC5 0.0036 0.0014 0.0094
EC25 0.017 0.0090 0.031
EC50 0.049 0.032 0.075 0.088 0.66

Slope = 1.45 Std.Err. = 0.167

Goodness of fit: p = 0.057 based on DF= 4.0 21.

OAT-WT.DAT : OAT PLANT WEIGHT

Observed vs. Predicted Treatment Group Means

Dose #Reps. Obs. Pred. Obs. Pred. %Change

0.006
0.380
0.444
0.462
0.517
0.019
0.405
0.353
0.449
0.361
0.056
0.353
0.379
0.283
0.420
0.167
0.082
0.012
0.233
0.119

CAB-WT.DAT : CABBAGE PLANT WEIGHT

Williams Test

[One-Sided Test for Decrease, alpha = 0.050000]

Dose Isotone T-bar P-value Significance

0 0.447 -0.08601 N.S.
0.006 0.447 1.091 N.S.
0.019 0.392 1.806 N.S.
0.056 0.359 7.123 <0.005
0.167 0.112 7.123 <0.005 *

***Significant; "N.S." = Not Significant.

Estimates of EC_x

Parameter	Estimate	95% Bounds Lower Upper	Std.Err.	Lower Bound /Estimate
EC1	0.021	0.0063 0.071	0.25	0.30
EC5	0.034	0.013 0.086	0.19	0.39
EC25	0.067	0.038 0.12	0.11	0.58
EC50	0.11	0.077 0.15	0.067	0.72

Slope = 3.31 Std.Err. = 0.946

Goodness of fit: p = 0.68 based on DF= 2.0 15.

CAB-WT.DAT : CABBAGE PLANT WEIGHT

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	%Control	%Change
0.00	4.00	0.443	0.431	0.0120	100.	0.00
0.00600	4.00	0.451	0.431	0.0200	100.	0.00178
0.0190	4.00	0.392	0.428	-0.0359	99.3	0.659
0.0560	4.00	0.359	0.354	0.00433	82.3	17.7
0.167	4.00	0.112	0.112	-0.000551	26.0	74.0

Analysis of Weighted Variance

Source	SS	DF	MS
Residual	0.34199	17.000	0.020117
Means Lack-of-Fit	0.017330	2.0000	0.0086652
Within Groups	0.32466	15.000	0.021644

Directly-fitted parameters and Asymptotic Covariances

Parameter	Estimate	Std.Err.	Correlations
Control Mean	= 0.43071	0.027889	1.0000 -0.55900 0.40464
log10 EC50	= -0.97168	0.066921	-0.55900 1.0000 -0.63305
Bruce&V. SIGMA	= 0.30240	0.086486	0.40464 -0.63305 1.0000
Starting Values	0.44675	-1.0419	0.41590

SOY-WT.DAT : SOYBEAN PLANT WEIGHT

Raw data:

SOYBEAN PLANT WEIGHT

6
4
4
4
4
4
4
CONTROL
2.315
2.084
2.520
2.530
0.006
2.357
2.530
2.104
1.812
0.019
1.819
1.916
1.504
2.002
0.056
2.349
2.195
2.103
2.027
0.167
1.874
1.703
1.892
2.091
0.50
1.591
1.580
1.537
1.006

SOY-WT.DAT : SOYBEAN PLANT WEIGHT

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Page 5

Williams Test

[One-Sided Test for Decrease, alpha = 0.050000 1]

Dose	Isotone Means	T-bar	P-value	Significance
0	2.31			
0.006	2.15	1.101	N.S.	*
0.019	1.99	2.2	0.024	*
0.056	1.99	2.2	0.025	*
0.167	1.89	2.877	0.0059	*
0.5	1.38	6.363	<0.005	*

***=Significant; "N.S."=Not Significant.

Estimates of EC%					
Parameter	Estimate	95% Bounds Lower	Upper	Std.Err.	Lower Bound /Estimate
EC1	0.047	0.0059	0.37	0.43	0.13
EC5	0.11	0.028	0.42	0.28	0.26
EC25	0.35	0.22	0.55	0.094	0.64
EC50	0.80	0.44	1.5	0.12	0.55

Slope = 1.88 Std.Err. = 0.796

!!!Poor fit: p = 0.030 based on DF= 3.0 18.

SOY-WT.DAT : SOYBEAN PLANT WEIGHT

Observed vs. Predicted Treatment Group Means						
Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	%Control	%Change
0.00	4.00	2.31	2.12	0.197	100.	0.00
0.00600	4.00	2.15	2.12	0.0354	100.	0.00309
0.0190	4.00	1.81	2.11	-0.303	99.9	0.110
0.0560	4.00	2.17	2.08	0.0842	98.5	1.47
0.167	4.00	1.89	1.91	-0.0151	90.1	9.94
0.500	4.00	1.38	1.38	0.00153	65.1	34.9

!!!Warning: EC50 not bracketed by doses evaluated.

Analysis of Weighted Variance			
Source	SS	DF	MS
Residual	0.68723	21.000	0.032725
Means Lack-of-Fit	0.26332	3.0000	0.087772
Within Groups	0.42391	18.000	0.023550

Directly-fitted parameters and Asymptotic Covariances			
Parameter	Estimate	Std.Err.	Correlations
Control Mean	2.1154	0.072816	1.0000
log10 EC50	-0.095119	0.12395	0.082978
Bruce&V. SIGMA	0.53093	0.22439	0.45979
Starting Values	2.3122	0.11580	1.3900

OAT-HT.DAT : OAT PLANT HEIGHT

Raw data:

OAT PLANT HEIGHT

7
4
4
4
4
4
4
CONTROL
195
198
201
184
0.002
188
210
197
214
0.006
193
190
200
231
0.019
175
186
201
187
0.056
164
157
121
153
0.167
92
72
95
104
0.50
85
73
79
95

OAT-HT.DAT : OAT PLANT HEIGHT

Williams Test

[One-Sided Test for Decrease, alpha = 0.050000]

Dose \ Isotone Means T-bar P-value Significance

0 200 -0.5798 N.S.
0.002 200 -0.5798 N.S.
0.006 200 0.7529 N.S.
0.019 187 4.751 <0.005 *
0.056 149 10.77 <0.005 *
0.167 90.8 11.58 <0.005 *
0.5 83

***=Significant; "N.S."=Not Significant.

Estimates of EC%

Parameter	Estimate	95% Bounds	Std.Err.	Lower Bound	Upper Bound
EC1	0.00099	0.00017	0.0057	0.37	0.17
EC5	0.0048	0.0013	0.018	0.27	0.27
EC25	0.045	0.022	0.089	0.15	0.50
EC50	0.21	0.14	0.31	0.079	0.69

Slope = 0.999 Std.Err. = 0.142

!!!Poor fit: p = 0.0028 based on DF= 4.0 21.
OAT-WT.DAT : OAT PLANT HEIGHT

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	%Change
0.00	4.00	195	206	-11.8	100
0.00200	4.00	202	202	0.431	97.8
0.00600	4.00	204	194	9.85	93.9
0.0190	4.00	187	176	11.5	85.2
0.0560	4.00	149	148	0.742	71.7
0.167	4.00	90.8	111	-20.7	54.0
0.500	4.00	83.0	73.0	9.95	35.4

!!!Warning: EC1 not bracketed by doses evaluated.

Analysis of Weighted Variance

Source	SS	DF	MS
Residual	54.799	25.000	2.1920
Means Lack-of-Fit	28.582	4.0000	7.1455
Within Groups	26.217	21.000	1.2484

Directly-fitted parameters and Asymptotic Covariances

Parameter	Estimate	Std.Err.	Correlations
Control Mean	206.28	8.1120	1.0000
log10 EC50	-0.67573	0.079162	-0.72692
Bruce&V. SIGMA	1.0011	0.14244	0.63948
Starting Values	200.08	-0.68002	1.2053

RAD-WT.DAT : RADISH PLANT WEIGHT

Raw data:

RADISH PLANT WEIGHT

4	0.701
4	0.777
4	0.714
4	0.515
4	0.006
4	0.682
4	0.727

0.686
0.673
0.019
0.609
0.611
0.585
0.507
0.056
0.518
0.564
0.293
0.441

RAD-WT.DAT : RADISH PLANT WEIGHT

Williams Test
tOne-Sided Test for Decrease, alpha = 0.050000]

Dose	Isotone Means	T-bar P-value	Significance
0	0.684	-0.125	N.S.
0.006	0.684	1.619	N.S.
0.019	0.578	3.651	<0.005
0.056	0.454		*

***=Significant; "N.S."=Not Significant.

Estimates of EC%

Parameter	Estimate	95% Bounds	Std.Err.	Lower Bound	Upper Bound
EC1	0.0027	0.00010	0.073	0.66	0.038
EC5	0.0079	0.00089	0.070	0.44	0.11
EC25	0.036	0.016	0.079	0.16	0.46
EC50	0.10	0.043	0.25	0.18	0.42

Slope = 1.48 Std.Err. = 0.725

Goodness of fit: p = 0.49 based on DF= 1.0 12.

RAD-WT.DAT : RADISH PLANT WEIGHT

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	%Change
0.00	4.00	0.677	0.690	-0.0132	100
0.00600	4.00	0.892	0.866	0.0255	96.6
0.0190	4.00	0.578	0.594	-0.0161	86.1
0.0560	4.00	0.454	0.450	0.00379	65.3

!!!Warning: EC1 not bracketed by doses evaluated.

!!!Warning: EC50 not bracketed by doses evaluated.

Analysis of Weighted Variance

Source	SS	DF	MS
Residual	0.17068	13.000	0.013129
Means Lack-of-Fit	0.0068010	1.0000	0.0068010
Within Groups	0.16388	12.000	0.013656

Raw data:

CUCUMBER PLANT WEIGHT

6
4
4
4
4
4
3
CONTROL
1.441
1.540
1.481
1.345
0.006
1.524
1.605
1.320
1.502
0.019
1.419
1.410
1.367
1.399
0.056
1.080
0.630
1.119
0.801
0.167
0.261
0.459
0.579
0.079
0.50
0.096
0.035
0.050

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EC25 0.039 0.025 0.089 0.65
EC50 0.079 0.059 0.11 0.061 0.75

Slope = 2.21 Std.Err. = 0.264

Goodness of fit: $p = 0.96$ based on $DF = 3.0$ 17.

CUC-WT.DAT : CUCUMBER PLANT WEIGHT

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	Pred. %Control	%Change
0.00	4.00	1.45	1.49	-0.0359	100.	0.00
0.00600	4.00	1.49	1.48	0.0102	99.3	0.681
0.0190	4.00	1.40	1.36	0.0401	91.3	8.67
0.0560	4.00	0.920	0.933	-0.0130	62.7	37.3
0.167	4.00	0.345	0.349	-0.00444	23.5	76.5
0.500	3.00	0.0603	0.0563	0.00400	3.79	96.2

Analysis of Weighted Variance

Source	SS	DF	MS
Residual	0.65416	20.000	0.032708
Means Lack-of-Fit	0.010280	3.0000	0.0034268
Within Groups	0.64388	17.000	0.037876

Directly-fitted parameters and Asymptotic Covariances

Parameter	Estimate	Std.Err.	Correlations
Control Mean	= 1.4876	0.075644	1.0000 -0.66292 0.46688
Log10 EC50	= -1.1050	0.060590	-0.66292 1.0000 -0.67766
Bruce&V. SIGMA	= 0.45270	0.054127	0.46688 -0.67766 1.0000
Starting Values	1.4697	-1.1005	0.42683

RYE-WT.DAT : RYEGRASS PLANT WEIGHT

Raw data:

RYEGRASS PLANT WEIGHT

7
4
4
4
4
4
4
4
CONTROL
0.076
0.094
0.113
0.098
0.002
0.091
0.094
0.089
0.147
0.006
0.109
0.122
0.119

CUC-WT.DAT : CUCUMBER PLANT WEIGHT

Williams Test

[One-Sided Test for Decrease, $\alpha = 0.050000$]

Dose	Isotone Means	T-bar P-value	Significance
------	------------------	---------------	--------------

0 1.47
0.006 1.47 -0.1775 N.S.
0.019 1.4 0.5226 N.S.
0.056 0.92 5.244 *
0.167 0.345 10.92 *
0.5 0.0603 12.7 <0.005

***=Significant; "N.S."=Not significant.

Estimates of EC₅₀

Parameter	Estimate	95% Bounds Lower Upper	Std.Err. /Estimate	Lower Bound Estimate
EC1	0.0069	0.0030 0.016	0.17	0.44
EC5	0.014	0.0073 0.027	0.14	0.52

18

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 0.084
 0.019
 0.092
 0.095
 0.101
 0.132
 0.056
 0.040
 0.066
 0.089
 0.060
 0.167
 0.030
 0.033
 0.047
 0.024
 0.50
 0.012
 0.012
 0.006
 0.025

Analysis of Weighted Variance				
Source	SS	DF	MS	
Residual	0.10442	25.000	0.0041769	
Means Lack-of-Fit	0.014524	4.0000	0.0036309	
Within Groups	0.089898	21.000	0.0042809	

Directly-fitted parameters and Asymptotic Covariances

Parameter	Estimate	Std.Err.	Correlations
Control Mean	= 0.10565	0.0063821	1.0000
Log10 EC50	= -1.0173	0.094443	-0.67264
Bruce&V. SIGMA	= 0.59232	0.097988	0.48318
Starting Values	0.10350	-1.0674	0.66011

RAD-HT.DAT : RADISH PLANT HEIGHT

Raw data:

RADISH PLANT HEIGHT

4
4
4
4
4
4
CONTROL
55
58
53
53
53
53
54
50
57
0.019
48
54
44
53
0.056
41
45
39
39

RAD-HT.DAT : RADISH PLANT HEIGHT

Williams Test

[One-Sided Test for Decrease, alpha = 0.050000]

Dose	Isotone Means	T-bar P-value	Significance
------	---------------	---------------	--------------

0.084
 0.019
 0.092
 0.095
 0.101
 0.132
 0.056
 0.040
 0.066
 0.089
 0.060
 0.167
 0.030
 0.033
 0.047
 0.024
 0.50
 0.012
 0.012
 0.006
 0.025

RYE-WT.DAT : RYEGRASS PLANT WEIGHT

Williams Test

[One-Sided Test for Decrease, alpha = 0.050000]

Dose	Isotone Means	T-bar P-value	Significance
------	---------------	---------------	--------------

0
0.002
0.006
0.019
0.056
0.167
0.5

***=Significant; "N.S."=Not Significant.

Estimates of EC%

Parameter	Estimate	95% Bounds	Lower	Upper	Std.Err.	Lower Bound	Upper Bound
EC1	0.0040	0.00097	0.017	0.30	0.30	0.24	0.24
EC5	0.010	0.0034	0.031	0.23	0.23	0.33	0.33
EC25	0.038	0.019	0.077	0.15	0.15	0.50	0.50
EC50	0.096	0.061	0.15	0.094	0.094	0.64	0.64

Slope = 1.69 Std.Err. = 0.279

Goodness of fit: p = 0.51 based on DF= 4.0 21.

RYE-WT.DAT : RYEGRASS PLANT WEIGHT

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	%Control	%Change
0.00	4.00	0.0953	0.106	-0.0104	100.	0.00
0.00200	4.00	0.105	0.105	-0.000159	99.8	0.226
0.00600	4.00	0.108	0.103	0.00507	97.9	2.10
0.0190	4.00	0.105	0.0933	0.0117	88.3	11.7

0
0.006
0.019
0.056

56.8
53.5
49.8
41

0.5361
2.144
5.897
<0.005

N.S.
*
*
*

***=Significant; "N.S."=Not Significant.

Estimates of EC%

Parameter	Estimate	95% Bounds		Std.Err.	Lower Bound		Upper Bound
		Lower	Upper		/Estimate		
EC1	0.0037	0.00053	0.026	0.39	0.14		
EC5	0.011	0.0034	0.038	0.24	0.30		
EC25	0.056	0.039	0.080	0.073	0.69		
EC50	0.17	0.075	0.38	0.16	0.44		

Slope = 1.40 Std.Err. = 0.452

Goodness of fit: p = 0.96 based on DF= 1.0 12.

RAD-HT.DAT : RADISH PLANT HEIGHT

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	%Control	%Change
0.00	4.00	54.8	54.7	0.0366	100.	0.00
0.00600	4.00	53.5	53.6	-0.0675	97.9	2.09
0.0190	4.00	49.8	49.7	0.0397	90.9	9.14
0.0560	4.00	41.0	41.0	-0.00872	75.0	25.0

!!!Warning: EC1 not bracketed by doses evaluated.

!!!Warning: EC50 not bracketed by doses evaluated.

Analysis of Weighted Variance

Source	SS	DF	MS
Residual	2.6612	13.000	0.20471
Means Lack-of-Fit	0.00057220	1.0000	0.00057220
Within Groups	2.6606	12.000	0.22172

Directly-fitted parameters and Asymptotic Covariances

Parameter	Estimate	Std.Err.	Correlations	
Control Mean	54.713	1.5237	1.0000	0.31232
Log10 EC50	-0.77239	0.16428	0.31232	1.0000
Bruce&V. SIGMA	0.71239	0.22941	0.61524	0.89608

Starting Values 54.750 -0.83354 0.62460

CRN-HT.DAT : CORN PLANT HEIGHT

Raw data:

CORN PLANT HEIGHT

6
4
4
4
4
4
4

CRN-HT.DAT : CORN PLANT HEIGHT

Williams Test

[One-Sided Test for Decrease, alpha = 0.050000]

Dose Isotone T-bar P-value Significance

0
0.006
0.019
0.056
0.167
0.5

171
171
158
153
141
101

-0.04867
0.7462
1.071
1.882
4.445

N.S.
N.S.
N.S.
0.048
<0.005

***=Significant; "N.S."=Not Significant.

Estimates of EC%

Parameter	Estimate	95% Bounds		Std.Err.	Lower Bound		Upper Bound
		Lower	Upper		/Estimate		
EC1	0.012	0.00073	0.19	0.58	0.062		
EC5	0.041	0.0064	0.26	0.39	0.16		
EC25	0.24	0.12	0.49	0.15	0.50		
EC50	0.84	0.42	1.7	0.15	0.49		

Slope = 1.25 Std.Err. = 0.451

Goodness of fit: p = 0.86 based on DF= 3.0 18.

CRN-HT.DAT : CORN PLANT HEIGHT

Observed vs. Predicted Treatment Group Means

20

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	Pred. %Control	%Change
0.00	4.00	170.	168.	1.90	100.	0.00
0.00600	4.00	171.	167.	4.00	99.6	0.356
0.0190	4.00	158.	165.	-6.32	98.0	1.95
0.0560	4.00	153.	156.	-2.84	93.0	7.00
0.167	4.00	141.	136.	4.67	81.1	18.9
0.500	4.00	101.	103.	-1.41	61.2	38.8

!!!Warning: EC50 not bracketed by doses evaluated.

Analysis of Weighted Variance				
Source	SS	DF	MS	
Residual	58.251	21.000	2.7739	
Means Lack-of-Fit	2.3660	3.0000	0.78866	
Within Groups	55.885	18.000	3.1047	

Directly-fitted parameters and Asymptotic Covariances

Parameter	Estimate	Std.Err.	Correlations	
Control Mean	= 167.85	7.3488	1.0000	0.020109
Log10 EC50	= -0.074760	0.14741	0.020109	1.0000
Bruce&V. SIGMA	= 0.79774	0.28682	0.58831	0.66684
Starting Values	170.50	-0.069834	0.88815	

SOY-HT.DAT : SOYBEAN PLANT HEIGHT

Raw data:

SOYBEAN PLANT HEIGHT

6
4
4
4
4
4
4
4
CONTROL
240
244
265
247
0.0006
267
272
247
201
0.019
210
245
216
219
0.056
234
246
266
251
0.167
238
196

257
250
0.50
263
163
234
164

SOY-HT.DAT : SOYBEAN PLANT HEIGHT

Williams Test				
[One-Sided Test for Decrease, alpha = 0.050000]				
Dose	Isotone Means	T-bar P-value	Significance	
0	249			
0.0006	247	0.1116	N.S.	
0.019	236	0.651	N.S.	
0.056	236	0.651	N.S.	
0.167	235	0.682	N.S.	
0.5	206	2.133	0.029	*

***=Significant; "N.S."=Not Significant.

Estimates of EC%				
Parameter	Estimate	95% Bounds Lower	Upper	Std.Err. Lower Bound /Estimate
EC1	0.12	0.0021	6.8	0.85
EC5	0.25	0.035	1.8	0.41
EC25	0.76	0.21	2.8	0.27
EC50	1.6	0.060	44.	0.69

Slope = 2.04 Std.Err. = 2.71

Goodness of fit: p = 0.53 based on DF= 3.0 18.

SOY-HT.DAT : SOYBEAN PLANT HEIGHT

Observed vs. Predicted Treatment Group Means				
Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred. %Change
0.00	4.00	249.	242.	7.30
0.00600	4.00	247.	242.	5.05
0.0190	4.00	223.	242.	-19.2
0.0560	4.00	249.	241.	7.89
0.167	4.00	235.	236.	-1.17
0.500	4.00	206.	206.	0.105
				85.2
				14.8

!!!Warning: EC25 not bracketed by doses evaluated.

!!!Warning: EC50 not bracketed by doses evaluated.

Analysis of Weighted Variance				
Source	SS	DF	MS	
Residual	74.717	21.000	3.5580	
Means Lack-of-Fit	8.4544	3.0000	2.8181	
Within Groups	66.263	18.000	3.6813	

Directly-fitted parameters and Asymptotic Covariances

Parameter	Estimate	Std.Err.	Correlations
Control Mean	= 241.70	7.6530	1.0000 0.35423 0.44199
log10 EC50	= 0.21045	0.68840	0.35423 1.0000 0.98169
Bruce&V. SIGMA	= 0.48969	0.64977	0.44199 0.98169 1.0000

Starting Values 249.00 1.1302 1.4340

CRN-WT.DAT : CORN PLANT WEIGHT

Raw data:

CORN PLANT WEIGHT

6

4

4

4

4

4

4

CONTROL

0.296

0.484

0.396

0.408

0.006

0.445

0.343

0.327

0.481

0.019

0.401

0.102

0.384

0.371

0.056

0.118

0.326

0.292

0.352

0.167

0.150

0.348

0.324

0.414

0.50

0.260

0.157

0.135

0.279

CRN-WT.DAT : CORN PLANT WEIGHT

Williams Test

[One-Sided Test for Decrease, alpha = 0.050000]

Dose Isotone T-bar P-value Significance Means

0	0.398	-0.02105	N.S.
0.006	0.398	1.144	N.S.
0.019	0.315	1.48	N.S.
0.056	0.29	1.48	N.S.
0.167	0.29	1.48	N.S.
0.5	0.208	2.641	0.01

***=Significant; "N.S."=Not Significant.

Estimates of EC%

Parameter	Estimate	95% Bounds	Std.Err.	Lower Bound	Upper Bound	/Estimate
EC1	0.00016	6.8E-09	3.9	2.1	4.2E-05	
EC5	0.0019	1.6E-06	2.3	1.5	0.00085	
EC25	0.067	0.0029	1.5	0.66	0.043	
EC50	0.78	0.082	7.3	0.47	0.11	

Slope = 0.632 Std.Err. = 0.381

Goodness of fit: p = 0.58 based on DF= 3.0 18.

CRN-WT.DAT : CORN PLANT WEIGHT

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	Pred. %Control	%Change
0.00	4.00	0.396	0.401	-0.00538	100.	0.00
0.00600	4.00	0.399	0.365	0.0341	90.9	9.09
0.0190	4.00	0.315	0.340	-0.0250	84.6	15.4
0.0560	4.00	0.272	0.307	-0.0350	76.5	23.5
0.167	4.00	0.309	0.266	0.0427	66.4	33.6
0.500	4.00	0.208	0.220	-0.0123	54.8	45.2

!!!Warning: EC1 not bracketed by doses evaluated.

!!!Warning: EC5 not bracketed by doses evaluated.

!!!Warning: EC50 not bracketed by doses evaluated.

Analysis of Weighted Variance

Source	SS	DF	MS
Residual	0.65976	21.000	0.031417
Means Lack-of-Fit	0.066464	3.0000	0.022155
Within Groups	0.59329	18.000	0.032961

Directly-fitted parameters and Asymptotic Covariances

Parameter	Estimate	Std.Err.	Correlations
Control Mean	= 0.40138	0.054391	1.0000 -0.40295 0.60328
log10 EC50	= -0.10970	0.46929	-0.40295 1.0000 0.33365
Bruce&V. SIGMA	= 1.5818	0.95218	0.60328 0.33365 1.0000

Starting Values 0.39750 -0.085374 1.8096

CUC-HT.DAT : CUCUMBER PLANT HEIGHT

Raw data:

CUCUMBER PLANT HEIGHT

6

4
4
4
4
4
3
CONTROL
83
85
83
75
0.006
82
85
79
84
0.019
85
83
81
82
0.056
84
64
79
71
0.167
60
60
57
55
0.50
38
39
54

CUC-HT.DAT : CUCUMBER PLANT HEIGHT

Williams Test

[One-Sided Test for Decrease, alpha = 0.050000]

Dose	Isotone Means	T-bar	P-value	Significance
0	82.3			
0.006	82.3	-0.1955	N.S.	
0.019	82.3	-0.1955	N.S.	
0.056	74.5	1.825	N.S.	
0.167	58	6.125	<0.005	*
0.5	43.7	9.13	<0.005	*

***=Significant; "N.S."=Not Significant.

Estimates of EC_x

Parameter	Estimate	95% Bounds Lower	Upper	Std.Err.	Lower Bound /Estimate
EC1	0.0064	0.0015	0.027	0.30	0.24
EC5	0.023	0.0085	0.063	0.21	0.37
EC25	0.15	0.093	0.23	0.092	0.64
EC50	0.52	0.38	0.71	0.064	0.73

Slope = 1.22 Std.Err. = 0.199

Goodness of fit: p = 0.52 based on DF= 3.0 17.
CUC-HT.DAT : CUCUMBER PLANT HEIGHT

Observed vs. Predicted Treatment Group Means					
Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	%Change
0.00	4.00	81.5	83.4	-1.91	100.
0.00600	4.00	82.5	82.6	-0.143	99.1
0.0190	4.00	82.8	80.1	2.69	96.0
0.0560	4.00	74.5	73.5	1.04	88.1
0.167	4.00	58.0	60.6	-2.58	72.6
0.500	3.00	43.7	42.5	1.20	50.9

!!!Warning: EC50 not bracketed by doses evaluated.

Analysis of Weighted Variance			
Source	SS	DF	MS
Residual	9.4616	20.000	0.47308
Means Lack-of-Fit	1.1382	3.0000	0.37940
Within Groups	8.3234	17.000	0.48961

Directly-fitted parameters and Asymptotic Covariances

Parameter	Estimate	Std.Err.	Correlations
Control Mean	83.411	2.3052	1.0000
Log10 EC50	-0.28229	0.064299	-0.28147
Bruce&V. SIGMA	0.82283	0.13482	0.60393
Starting Values	82.250	-0.25433	0.87228