DATA EVALUATION RECORD
SEEDLING EMERGENCE EC_{25} TEST
§123-1(a) (TIER II)

1. CHEMICAL: Prothioconazole formulation PC Code No.: 113961

2. TEST MATERIAL: JAU 6476 480SC Purity: 414 g a.i./L

Common name: Prothioconazole formulation
Active Ingredient: Prothioconazole
Chemical: IUPAC name: 2-[2-(1-Chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxypropyl]-2,4-dihydro-3*H*-1,2,4,-triazole-3-thione
CAS name: 2-[2-(1-Chlorocyclopropyl)-3-(2-chlorophenyl)-2-hydroxypropyl]-2,4-dihydro-3*H*-1,2,4,-triazole-3-thione
CAS No.: 178928-70-6
Synonyms: JAU6476

3. CITATION:

Author: Sabbert, T.J.

Title: Tier 2 Seedling Emergence Non-target Phytotoxicity Study Using JAU 6476 480SC

Study Completion Date: March 16, 2004

Laboratory: Bayer CropScience
Research and Development Department
Ecotoxicology
17745 South Metcalf
Dtilwell, Kansas 66085-9104

Sponsor: Bayer CropScience
2 T.W. Alexander Drive
Research Triangle Park, North Carolina 27709

Laboratory Report ID: 200952

MRID No.: 46246050

DP Barcode: D303495

4. REVIEWED BY: John Marton, Staff Scientist, Dynamac Corporation

Signature: **Date:** 8/10/04

APPROVED BY: Teri Myers, Ph.D., Staff Scientist, Dynamac Corporation

Signature: **Date:** 9/7/04

5. APPROVED BY: Kevin Costello, Geologist, OPP/EFED/ERB-III

Signature: **Date:**

6. SECONDARY REVIEW BY:

Émilie Larivière, Evaluation Officer, HC/PMRA/EAD
Signature: **Date:** 9/7/05
9/7/05
Christopher J. Salice, EPA/EFED/ERB-IV
Signature: **Date:** 7/17/05
7-17-05

7. STUDY PARAMETERS:

Scientific Name of Test Organism: Dicots: *Cucumis sativus*
Monocots: None

Definitive Study Duration: 21 days

Type of Concentrations: Nominal

8. CONCLUSIONS:

Seedling emergence was studied on cucumber after application of JAU 6476 480SC typical end use formulation (Prothioconazole) at 19, 38, 76, 153, and 305 g a.i./ha. By 21 days, the percent inhibitions for emergence were 0, 0, 2, 0, 0, and 2% for the pooled control, 19, 38, 76, 153, and 305 g a.i./ha treatment groups, respectively. Minor phytotoxic effects of distortion and/or stunting were observed at all treatment levels, as well as in the pooled control group. No parameter showed sensitivity (i.e., inhibition equal to or exceeding 25%), but shoot height and dry weight were significantly reduced as a result of treatment. The NOAEC for shoot height and dry weight were 38 and 305 g a.i./ha. The EC_{25} for all parameters was >305 g a.i./ha

This study is classified as ACCEPTABLE. The single species tested in this study was the only species to display sensitivity in a previously conducted Tier I study (MRID 46246049) This study is scientifically sound and it fulfills the guideline requirements for a seedling emergence study (Subdivision J, §123-1 (TIER II)).

Most sensitive dicot: Cucumber
Most sensitive parameter: None

Shoot height
NOAEC: 38 g a.i./ha
EC_{05}: 91 g a.i./ha 95% C.I.: 12-710 g a.i./ha
EC_{25}: >305 g a.i./ha 95% C.I.: N/A
Slope: 0.544±0.312

Dry weight
NOAEC: 305 g a.i./ha
EC_{05}: 29 g a.i./ha 95% C.I.: 1.2-740 g a.i./ha
EC_{25}: >305 g a.i./ha 95% C.I.: N/A
Slope: 0.612±0.404

9. ADEQUACY OF THE STUDY:

A. Classification: ACCEPTABLE

B. Rationale: This study is scientifically sound and it fulfills the guideline requirements for a seedling emergence study (Subdivision J, §123-1 (TIER II)).

C. Repairability: N/A

10. GUIDELINE DEVIATIONS:

None

11. SUBMISSION PURPOSE: This study was submitted to provide data on the phytotoxicity of Prothioconazole formulation to non-target crop species after pre-emergent application for the purpose of chemical registration.

12. 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: cucumber Monocots: N/A
Number of plants per repetition:	40 seeds total, 2 seeds/pot, 5 pots/rep, 4 reps/treatment level
Source of seed and historical % germination of seed:	See Appendix 2 p. 27 for seed source information. Historical % germination not reported.

B. Test System

Guideline Criteria	Reported Information
Solvent:	N/A
Site of test:	Seedling emergence: Greenhouse at Bayer Research Park, Stilwell, Kansas.
Planting method/type of pot:	Seedling emergence: The planting containers were plastic pots with drainage holes (10.5 cm diameter by 12 cm tall). The growth medium was steam-pasteurized sandy loam with organic content of approximately 2.4% and an approximate pH of 5.8.
Method of application:	Seedling emergence: A spray chamber equipped with an overhead nozzle was used for application.
Method of watering:	Seedling emergence: After test application, pots were initially hand watered at the soil surface to establish the continuous water column, then the pots were subirrigated with capillary mats.
Growth stage at application:	Seedling emergence: Soil surface

C. Test Design

Guideline Criteria	Reported Information
Dose range: 2x or 3x	2x
Doses: At least 5	19, 38, 76, 153, and 305 g a.i./ha

Guideline Criteria	Reported Information
Controls: Negative and solvent	Control and blank formulation control
Replicates per dose: At least 3	4 replicates
Test duration: 14 days	21 days
Were observations made at least weekly?	Yes
Maximum dosage rate:	The maximum formulated product label use rate was equivalent to a field application rate of 305g a.i./ha.

13. REPORTED RESULTS:

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	Yes
Was a NOAEC observed for each species?	Yes
Phytotoxic observations:	Yes, the phytotoxic observations of stunting, and distortion were reported.
Were initial chemical concentrations measured? (Optional)	Yes, Appendix IV, pp. 29-35
Were adequate raw data included?	Mean percent emergence, mean percent survival, mean shoot height, mean weight, and mean damage from phytotoxicity ratings.

Results for the most sensitive parameter of each species

Results Synopsis

Seedling emergence

Crop	Day 21 Emergence		Shoot length		Dry weight		Percent Survival		Most sensitive parameter
	NOAEC	EC_{25}	NOAEC	EC_{25}	NOAEC	EC_{25}	NOAEC	EC_{25}	
Cucumber	305	>305	305	>305	153	>305	305	>305	None

ND = Not determined
* Units are g a.i./ha

Morphological Observations

By 21 days, the 19, 38, 76, 153, and 305 g a.i./ha treatment group percent inhibitions of emergence were 0, 2, 0, 0, and 2 % respectively, compared to the pooled control.

By 21 days, the % inhibition of the % survival was 3, 3, 2, 3, and 3 % for the 19, 38, 76, 153, and 305 g a.i./ha treatment groups respectively, compared to the pooled control.

By 21 days, the % inhibition of plant shoot height was 5, 0, 9, 5, and 9 % for the 19, 38, 76, 153, and 305 g a.i./ha treatment groups respectively, compared to the pooled control.

By 21 days, the % inhibition of plant dry weight was 8, 0, 11, 11, and 16 % for the 19, 38, 76, 153, and 305 g a.i./ha treatment groups respectively, compared to the pooled control.

By 21 days, the mean damage % was 9, 4, 1, 15, 10, and 13 % for the pooled control, 19, 38, 76, 153, and 305 g a.i./ha treatment groups respectively.

Statistical Results

Statistical Method: Comparison of the controls was performed prior to performing the definitive statistical analysis by using a two-tailed planned comparison t-test. Assumptions of normality and homogeneity of variance were tested with the Shapiro-Wilk statistic and Levene's test, respectively. The control mean was compared to the treatment means using the Dunnett's test.

Cucumber
Most Sensitive Endpoint: None

NOAEC: 153 g a.i./ha (dry weight); 305 g a.i./ha (other endpoints)
EC_{25}: >305 g a.i./ha 95% C.I.: N/A
EC_{50}: >305 g a.i./ha 95% C.I.: N/A
Slope: Not reported

14. REVIEWER'S VERIFICATION OF STATISTICAL RESULTS:

Statistical Method: Shoot height and dry weight data satisfied the assumptions of ANOVA (i.e., normal distribution and homogeneity of variances). As a result, the NOAEC was determined using ANOVA (dry weight), followed by Bonferroni's t-test (shoot height). These analyses were conducted using TOXSTAT statistical software. The EC_{05} values and their 95% confidence intervals and slopes were determined using the Probit method via Nuthatch statistical software. The EC_{25} values could be visually determined, as inhibition did not exceed 25% in this study.

Results synopsis

Crop	Emergence*			Shoot length			Dry weight			Survival			Most sensitive parameter
	NOAEC	EC_{05}	EC_{25}	NOAEC	EC_{05}	EC_{25}	NOAEC	EC_{05}	EC_{25}	NOAEC	EC_{05}	EC_{25}	
Cucumber	305	>305	>305	38[a]	91	>305	305[b]	29	>305	305	>305	>305	None

[a] The reviewer's estimate was lower than the study authors'.
[b] The reviewer's estimate was higher than the study authors'.
*units are g a.i./ha

EC_x values, confidence intervals, and slopes

Species	Shoot length*					Dry weight*				
	EC_{05}	Confidence interval	EC_{25}	Confidence interval	Slope	EC_{05}	Confidence interval	EC_{25}	Confidence interval	Slope
Cucumber	91	12-710	>305	N/A	0.544	29	1.2-740	>305	N/A	0.612

[a]The reviewer's estimate was lower than the study authors'.
[b] The reviewer's estimate was higher than the study authors'.
*units are g a.i./ha

Most sensitive dicot: Cucumber
Most sensitive parameter: None

Shoot height

NOAEC: 38 g a.i./ha
EC_{05}: 91 g a.i./ha 95% C.I.: 12-710 g a.i./ha
EC_{25}: >305 g a.i./ha 95% C.I.: N/A
Slope: 0.544±0.312

Dry weight
NOAEC: 305 g a.i./ha
EC_{05}: 29 g a.i./ha 95% C.I.: 1.2-740 g a.i./ha
EC_{25}: >305 g a.i./ha 95% C.I.: N/A
Slope: 0.612±0.404

15. REVIEWER'S COMMENTS:

The reviewer's conclusions were similar to the study author's. No endpoint exhibited sensitivity to treatment (i.e., inhibition did not exceed 25%). The reviewer's NOAEC value for shoot height was lower than the study author's, while the reviewer's NOAEC for dry weight was higher than the study author's. The reviewer's analysis provided EC_{05} values and slopes for shoot height and dry weight, which are reported in the Conclusions section.

The definitive study was conducted from March 9, 2001 to March 30, 2001. The average temperatures ranged from 14.5 to 42.5°C and the relative humidity % ranged from 8.5 to 85.4%. The greenhouse photoperiod setting was 14 hour light/10 hour dark with supplemental light.

This study was conducted in accordance with USEPA Good Laboratory Practice Regulations (Title 40, Part 160) and included a Quality Assurance statement. The study is classified as ACCEPTABLE.

16. REFERENCES:

Excel. 1997. Microsoft Corporation. Seattle, Washington, USA.

Kratkg, B. A and Warren, G. E., 1971, The Use of Three Simple, Rapid, Bioassays on Forty-Two Herbicides, Weed Research, 11, 257-262.

SAS Institute. 1996. SAS/BASE/STAT, Version 6.12. Cary, North Carolina.

Sebaugh, Jeanne. 1999. Sebaugh Information Services, Columbia, Missouri, USA.

USEPA, 1982. Pesticide Assessment Guidelines, Subdivision J- Hazard Evaluation: Non-Target Plants. EPA-540/9-82-020. Office of Pesticide Programs, Washington, D.C. 55pp.

USEPA, 1986. Standard Evaluation Procedure, Non-Target Plants: Seed Germination, Seedling Emergence, and Vegetative Vigor- Tier I. EPA-540/9-86-134. Office of Pesticide Programs, Washington, D.C.

USEPA, 1989. Pesticide Programs; Good Laboratory Practice Standards; Final Rule (40 CFR Part 160). Federal Register, Vol. 54, No. 158: 34067-34074.

APPENDIX I. OUTPUT FROM REVIEWER'S STATISTICAL VERIFICATION:

shoot height
File: 6050h Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	21.783	4.357	5.237
Within (Error)	22	18.301	0.832	
Total	27	40.084		

Critical F value = 2.66 (0.05,5,22)
Since F > Critical F REJECT Ho:All groups equal

shoot height
File: 6050h Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	GRPS 1&2 POOLED	20.088	20.088		
2	19	19.125	19.125	1.723	
3	38	20.675	20.675	-1.052	
4	76	18.150	18.150	3.469	*
5	153	19.100	19.100	1.768	
6	305	18.325	18.325	3.155	*

Bonferroni T table value = 2.51 (1 Tailed Value, P=0.05, df=22,5)

shoot height
File: 6050h Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL

1	GRPS 1&2 POOLED	8			
2	19	4	1.401	7.0	0.962
3	38	4	1.401	7.0	-0.587
4	76	4	1.401	7.0	1.938
5	153	4	1.401	7.0	0.987
6	305	4	1.401	7.0	1.763

shoot height
File: 6050h Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	GRPS 1&2 POOLED	8	20.088	20.088	20.088
2	19	4	19.125	19.125	19.900
3	38	4	20.675	20.675	19.900
4	76	4	18.150	18.150	18.625
5	153	4	19.100	19.100	18.625
6	305	4	18.325	18.325	18.325

shoot height
File: 6050h 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
GRPS 1&2 POOLED	20.088				
19	19.900	0.336		1.72	k= 1, v=22
38	19.900	0.336		1.80	k= 2, v=22
76	18.625	2.618	*	1.83	k= 3, v=22
153	18.625	2.618	*	1.84	k= 4, v=22
305	18.325	3.156	*	1.85	k= 5, v=22

s = 0.912
Note: df used for table values are approximate when v > 20.

Estimates of EC%

Parameter	Estimate	95% Bounds Lower	95% Bounds Upper	Std.Err.	Lower Bound /Estimate
EC5	91.	12.	7.1E+02	0.43	0.13
EC10	4.2E+02	76.	2.4E+03	0.36	0.18
EC25	5.5E+03	58.	5.2E+05	0.96	0.011
EC50	9.6E+04	23.	4.0E+08	1.8	0.00024

Slope = 0.544 Std.Err. = 0.362

!!!Poor fit: p = 0.011 based on DF= 3.0 22.

6050H : shoot height

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	Pred. %Control	%Change
0.00	8.00	20.1	20.1	0.00410	100.	0.00
19.0	4.00	19.1	19.6	-0.518	97.8	2.19
38.0	4.00	20.7	19.4	1.24	96.8	3.21
76.0	4.00	18.1	19.2	-1.01	95.4	4.57
153.	4.00	19.1	18.8	0.301	93.6	6.40
305.	4.00	18.3	18.3	-0.0108	91.3	8.70

!!!Warning: EC10 not bracketed by doses evaluated.

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

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

dry weight
File: 6050w Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	4.103	0.821	2.201
Within (Error)	22	8.205	0.373	
Total	27	12.308		

Critical F value = 2.66 (0.05,5,22)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

dry weight
File: 6050w Transform: NO TRANSFORMATION

BONFERRONI T-TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	GRPS 1&2 POOLED	6.250	6.250		
2	19	5.719	5.719	1.420	
3	38	6.268	6.268	-0.047	
4	76	5.556	5.556	1.856	
5	153	5.555	5.555	1.859	
6	305	5.266	5.266	2.632	*

Bonferroni T table value = 2.51 (1 Tailed Value, P=0.05, df=22,5)

Estimates of EC%

Parameter	Estimate	95% Bounds Lower	95% Bounds Upper	Std.Err.	Lower Bound /Estimate
EC5	29.	1.2	7.4E+02	0.68	0.040
EC10	1.1E+02	18.	7.1E+02	0.39	0.16
EC25	1.1E+03	80.	1.6E+04	0.56	0.072
EC50	1.4E+04	43.	4.6E+06	1.2	0.0031

Slope = 0.612 Std.Err. = 0.404

Goodness of fit: p = 0.44 based on DF= 3.0 22.

6050W : dry weight

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	Pred. %Control	%Change
0.00	8.00	6.25	6.24	0.0137	100.	0.00
19.0	4.00	5.72	5.99	-0.272	96.1	3.94
38.0	4.00	6.27	5.88	0.391	94.2	5.77
76.0	4.00	5.56	5.72	-0.167	91.8	8.23
153.	4.00	5.55	5.52	0.0315	88.6	11.4
305.	4.00	5.27	5.28	-0.0119	84.6	15.4

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

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

Data Evaluation Report on the acute toxicity of Prothioconazole formulation to terrestrial vascular plants (seedling emergence and vegetative vigour)

EAD Assessment of USEPA DER

Reviewer: Émilie Larivière (#1269); PMRA Date: September 7, 2005

PMRA Submission Number: 2004-0844

Study Type: Acute Toxicity to Non-Target Plants- Laboratory Studies with the End-Use Product

Sabbert, T.J. 2004. Tier 2 seedling emergence non-target phytotoxicity study using JAU 6476 480SC. Bayer CropScience, RTP, NC. Bayer Report 200952.

PMRA DATA CODE: 9.8.6
EPA DP Barcode: D303488
OECD Data Point: IIIA 10.8.1.1
EPA MRID: 46246050
EPA Guideline: 123-1a

Reviewing Agency: US EPA

EAD Executive Summary:

Seedling emergence was studied on cucumber (*Cucumis sativa*) after application of JAU 6476 480SC typical end use formulation (Prothioconazole, 414 g a.i./L) at 19, 38, 76, 153, and 305 g a.i./ha. The study was conducted according to U.S. EPA Guideline 123-1 and was in compliance with USEPA Good Laboratory Practice Regulations (Title 40, Part 160). After 21 days, no treatment-related effect on emergence, survival, shoot height, dry weight was observed, the corresponding percent inhibition ranged from 0-2, 2-3, 0-9, and 0-16% when compared to the pooled controls. Minor phytotoxic effects of distortion and/or stunting were observed at all treatment levels, as well as in the pooled control group. The mean phytotoxicity rating was 3, 4, 1, 15, 10 and 13% in the pooled control, 19, 38, 76, 153 and 305 g a.i./ha treatments, respectively. No parameter showed sensitivity (i.e., inhibition equal to or exceeding 25%). The NOEC for all endpoints (emergence, survival, shoot height, dry weight and phytotoxicity rating) was 305 g a.i./ha. The EC_{25} for all parameters was >305 g a.i./ha. The single species tested in this study was the only species to display sensitivity in a previously conducted Tier I study (Sabbert, 2004; Report No. 200951; MRID 46246049).

Results Synopsis:

Most sensitive dicot: Cucumber
Most sensitive parameter: None

All endpoints (survival, seedling emergence, shoot height, dry weight, phytotoxicity rating)
NOEC: 305 g a.i./ha
EC_{25}: >305 g a.i./ha 95% C.I.: N/A

EAD Comments:

1. The appropriate PMRA information (PMRA Submission Number, PMRA Data Code, PMRA company code, PMRA active ingredient code, PMRA use site category, OECD data point) was added to the PMRA review portion of the DER. The PMRA Submission Number was added to the Header of the DER. Information on the chemical name (IUPAC name, CAS name and synonym) available from the study report, the PMRA Chemistry review and other sources of information was added at the beginning of the DER. The name of the EAD secondary reviewer was added to the front portion of the DER and sections were renumbered accordingly.

2. The scoring system for phytotoxic effects was the following:

0%: No injury/effect; 20%: slight plant effects or effect restricted to one area of the plant (e.g., a leaf); 40%: Moderate effect involving the whole plant - mild stunting, chlorosis; 60%: Severe effect with recovery possible; 80%: Total plant effect (very poor vigor); 100%: Moribund or plant death

3. Upon visual inspection of the data and verification of statistical analyses using ANOVA, the EAD reviewer agrees with the study author as opposed to the EPA reviewer that the effect on shoot height does not appear to be treatment related. The dose-response curve is not monotonic and it appears that the slight differences in shoot height between the different treatement levels is simply due to noise. The EAD reviewer feels the NOEC for shoot height should be 305 g a.i./ha.

The EAD reviewer verified the statistical analyses for dry weight and obtained the same results of the EPA reviewer. No significant difference between the pooled control and any treatment was found. The NOEC for dry weight is determined to be 305 g a.i./ha.

No statistically significant difference was observed between the pooled control and all treatment levels for phytotoxicity rating. The NOEC for phytotoxicity rating is therefore 305 g a.i./ha.

The EC_{25} and EC_{50} are >305 g a.i./ha for all endpoints. The EC_{05} values were not calculated by the EAD reviewer, as the PMRA does not use this value in the risk assessment.

This study is classified as ACCEPTABLE. The single species tested in this study was the only species to display sensitivity in a previously conducted Tier I study (Sabbert, 2004; Report No. 200951; MRID 46246049). This study is scientifically sound and it fulfills the data requirements for a seedling emergence study

Statistical analyses of the EAD reviewer:

Shoot height

Height

One Way Analysis of Variance Tuesday, September 06, 2005, 16:04:43

Data source: Data 1 in Notebook

Normality Test: Passed (P > 0.200)

Equal Variance Test: Passed (P = 0.543)

Group Name	N	Missing	Mean	Std Dev	SEM
pooled controls	8	0	20.087	1.117	0.395
19 g a.i./ha	4	0	19.125	1.014	0.507
38 g a.i./ha	4	0	20.675	0.670	0.335
76 g a.i./ha	4	0	18.150	0.915	0.457
153 g a.i./ha	4	0	19.100	0.712	0.356
305 g a.i./ha	4	0	18.325	0.608	0.304

Source of Variation	DF	SS	MS	F	P
Between Groups	5	21.783	4.357	5.237	0.003
Residual	22	18.301	0.832		
Total	27	40.084			

The differences in the mean values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.003).

Power of performed test with alpha = 0.050: 0.906

Multiple Comparisons versus Control Group (Bonferroni t-test):

Comparisons for factor: treatment

Comparison	Diff of Means	t	P	P<0.050
pooled controls vs. 76 g a.i./ha	1.938	3.469	0.011	Yes
pooled controls vs. 305 g a.i./ha	1.762	3.156	0.023	Yes
pooled controls vs. 153 g a.i./ha	0.987	1.768	0.455	No
pooled controls vs. 19 g a.i./ha	0.962	1.723	0.494	Do Not Test
pooled controls vs. 38 g a.i./ha	0.588	1.052	1.000	Do Not Test

A result of "Do Not Test" occurs for a comparison when no significant difference is found between two means that enclose that comparison. For example, if you had four means sorted in order, and found no difference between

means 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed means is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the means, even though one may appear to exist.

Dry Weight

One Way Analysis of Variance Tuesday, September 06, 2005, 13:48:05

Data source: Data 1 in Notebook

Normality Test: Passed (P > 0.200)

Equal Variance Test: Passed (P = 0.531)

Group Name	N	Missing	Mean	Std Dev	SEM
pooled controls	8	0	6.250	0.815	0.288
19 g a.i./ha	4	0	5.719	0.454	0.227
38 g a.i./ha	4	0	6.268	0.457	0.228
76 g a.i./ha	4	0	5.556	0.588	0.294
153 g a.i./ha	4	0	5.555	0.229	0.115
305 g a.i./ha	4	0	5.266	0.609	0.305

Source of Variation	DF	SS	MS	F	P
Between Groups	5	4.103	0.821	2.200	0.091
Residual	22	8.205	0.373		
Total	27	12.308			

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.091).

Power of performed test with alpha = 0.050: 0.339

The power of the performed test (0.339) is below the desired power of 0.800.
You should interpret the negative findings cautiously.

Phytotoxicity rating

One Way Analysis of Variance Wednesday, September 07, 2005, 10:40:20

Data source: Data 1 in Notebook

Normality Test: Passed (P = 0.137)

Equal Variance Test: Passed (P = 0.190)

Group Name	N	Missing	Mean	Std Dev	SEM
pooled controls	8	0	3.125	5.303	1.875
19 g a.i./ha	4	0	3.750	4.787	2.394
38 g a.i./ha	4	0	1.250	2.500	1.250
76 g a.i./ha	4	0	15.000	5.774	2.887
153 g a.i./ha	4	0	10.000	4.082	2.041
305 g a.i./ha	4	0	12.500	8.660	4.330

Source of Variation	DF	SS	MS	F	P
Between Groups	5	707.589	141.518	4.722	0.004
Residual	22	659.375	29.972		
Total	27	1366.964			

The differences in the mean values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.004).

Power of performed test with alpha = 0.050: 0.859

Multiple Comparisons versus Control Group (Bonferroni t-test):

Comparisons for factor: treatment

Comparison	Diff of Means	t	P	P<0.050
pooled controls vs. 76 g a.i./ha	11.875	3.542	0.009	Yes
pooled controls vs. 305 g a.i./ha	9.375	2.796	0.053	No
pooled controls vs. 153 g a.i./ha	6.875	2.051	0.262	Do Not Test
pooled controls vs. 38 g a.i./ha	1.875	0.559	1.000	Do Not Test
pooled controls vs. 19 g a.i./ha	0.625	0.186	1.000	Do Not Test

A result of "Do Not Test" occurs for a comparison when no significant difference is found between two means that enclose that comparison. For example, if you had four means sorted in order, and found no difference between means 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed means is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the means, even though one may appear to exist.