FILE 080805
COPY 123-1a

MRID No. 410359-04

DATA EVALUATION RECORD

1. **CHEMICAL:** Prometryn.
Shaughnessey No. 080805.

2. **TEST MATERIAL:** Prometryn Technical (Triazine Herbicide); 2,4-bis(isopropylamino)-6-(metylthio)-s-triazine; Sample No. FL-870991; CAS Registry No. 7287-19-6; 98.1% active ingredient; a white to tan powder.

3. **STUDY TYPE:** Non-Target Plants: Seed germination/Seedling Emergence Phytotoxicity tests - Tier 2. Species tested: Soybean, Lettuce, Carrot, Tomato, Cucumber, Cabbage, Oat, Ryegrass, Corn, and Onion.

Guideline: 123-1(a)

4. **CITATION:** Cañez, V.M, Jr. 1988. Prometryn: Tier 2 seed germination/seedling emergence nontarget phytotoxicity test. Laboratory Study No. LR88-13B. Conducted by Pan Agricultural Labs, Inc., Madera, CA. Submitted by Ciba-Geigy Corporation, Greensboro, NC. MRID No. 410359-04.

5. **REVIEWED BY:**

Pim Kosalwat, Ph.D.
Senior Scientist
KBN Engineering and
Applied Sciences, Inc.

Signature: P. Kosalwat
Date: June 28, 1990

6. **APPROVED BY:**

Michael L. Whitten, M.S.
Wildlife Toxicologist
KBN Engineering and
Applied Sciences, Inc.

Signature: Michael L. Whitten
Date: 6-28-90

Henry T. Craven, M.S.
Supervisor, EEB/HED
USEPA

Signature: Raphael C. Petrus 5/8/91
Date: Charles Lewis 5/8/91

2028318

36 hrs

7. **CONCLUSIONS:**

Seed Germination: This study is scientifically sound and fulfills the guideline requirements for a Tier-2 seed germination test using non-target plants. Seed germination of all test species treated with Prometryn concentrations up to 1.6 lb ai/A was comparable to the control. Treatment of seeds up to 1.6 lb ai/A did not have any significant effects on radicle length of all test species, except oat. No dose-response relationship was observed in any test species, except tomato and oat. The NOEC, EC25, and EC50 values for oat, the most sensitive species to Prometryn, were 0.8, 0.9, and >1.6 lb ai/A, respectively. The EC25 and EC50 values for tomato were greater than 1.6 lb ai/A.

Seedling Emergence: This study is scientifically sound and fulfills the guideline requirements for a Tier-2 seedling emergence test using non-target plants. Carrot was the least sensitive species to Prometryn. Treatment of carrot seeds with Prometryn concentrations up to 1.6 lb ai/A did not have any effects on any parameters measured. However, dose-response was found in percentage seedling emergence of carrot with EC25 and EC50 values of 0.336 and >1.6 lb ai/A, respectively. Cabbage was the most sensitive species to Prometryn with NOEC, EC25, and EC50 values of 0.038, 0.014, and 0.03 lb ai/A, respectively. Crops listed in order of increasing sensitivity to Prometryn based on NOEC, EC25, and EC50 values are as follows:

NOEC (lb ai/A): Carrot (1.6) < soybean = tomato = ryegrass = corn (0.2) < oat (0.075) < lettuce = cucumber = onion = cabbage (0.038).

EC25 (lb ai/A): Corn (0.384) < carrot (0.336) < soybean (0.31) < ryegrass (0.24) < tomato (0.16) < onion (0.095) < oat (0.07) < cucumber (0.067) < lettuce (0.04) < cabbage (0.014).

EC50 (lb ai/A): Carrot (2.36) < corn (1.79) < soybean (0.778) < ryegrass (0.39) < tomato (0.308) < onion (0.236) < oat (0.17) < cucumber (0.16) < lettuce (0.13) < cabbage (0.03).

The results indicate that a Tier-3 study is required.

8. **RECOMMENDATIONS:** A Tier-3 study is required.

9. **BACKGROUND:**

10. **DISCUSSION OF INDIVIDUAL TESTS:** N/A.

11. **MATERIALS AND METHODS:**

A. **Test Plants:** Dicotyledon plants were represented by six species from six families (i.e., soybean, lettuce, carrot, tomato, cucumber, and cabbage). Monocotyledon plants were represented by four species from two families (i.e., corn, oat, ryegrass, and onion). Cultivars, lot number, and germination ratings were provided in the report.

B. **Test System:**

Seed Germination: Two pieces of filter paper were placed in the top portion of a plastic petri plate (100 x 15 mm). The test solutions were prepared with water from a well located at the testing facility. Seven milliliters of the test solution were added to each plate.

Ten seeds of each crop were added to each petri plate after the test solution was absorbed into the paper. The plates were then placed in plastic boxes (12.25 x 9.0 x 4.1 inches) in which the lids were sealed with parafilm to prevent moisture loss. The petri plates were incubated in the dark at 25 $\pm$ 1°C for six to seven days.

Seedling Emergence: Seeds of each crop were planted in plastic pots (7.5 x 7.5 x 6.0 cm), filled with sterilized soil obtained from the laboratory facility. A plexiglass template was used to create planting holes in the soil, thus allowing for uniform planting depth and seed distribution. An analysis of the soil was provided in the report. Each treatment replicate was placed on an aluminum tray (6.125 x 31.125 cm). The spray plot was 3.21 x 1.67 ft (i.e., 5.35 ft^2).

Soybean and corn were planted at a depth of 2.5 cm, while the remaining eight species were planted at a depth of 1.3 cm. All applications were performed with a belt sprayer equipped with a single nozzle. A nozzle height of 12 inches and a nozzle pressure ranging from 38 to 66 psi were used. The test spray solutions were prepared by dissolving prometryn technical in acetone and water. The plants were sprayed at the equivalent of 468 L/ha (50 gpa) of water.

The pots were watered three times a day and a total of 26.15 ml of water was used to irrigate each pot per day. On days in which environmental conditions reduced the irrigation requirements, pots were watered one to two times daily for an average of 8.72 and 17.4 ml/pot/day, respectively.

C. **Dosage:** Prometryn was applied at the rates of 0, 0.1, 0.2, 0.4, 0.8, and 1.6 lb ai/A to all crops in the seed germination test. In the seedling emergence test, Prometryn was applied to all crops at the above rates and at rates of 0, 0.019, 0.038, 0.075, 0.15, and 0.3 lb ai/A to lettuce, cucumber, cabbage, oat, and onion. Treatment application rates were adjusted for the percent purity of the test material (98.1%).

D. **Design:**

Seed Germination: Each treatment/crop combination was replicated three times (i.e., 10 seeds/plate, 3 plates/treatment). After six or seven days of incubation, the seeds were removed from the petri plates and the radicle lengths were measured to the nearest millimeter. Percent seed germination and mean radicle length were calculated for all germinated seeds. Seeds were considered germinated if the radicle was $\geq$5 mm in length.

Seedling Emergence: Each crop/treatment combination was replicated three times (i.e., 10 seeds/pot, 3 pots/treatment level). The percentage of the ten seeds planted in each pot which emerged was calculated for each treatment. After treatment, the pots were randomized within crops and among treatments and placed in an on-site greenhouse.

The percentage of the ten seeds planted in each pot which emerged was calculated for each treatment. Seedling height and phytotoxicity ratings were recorded at 7, 14, and 21 days after treatment for all species and also 28 days for carrot and ryegrass. Twenty-one days after treatment (28 days for carrot and ryegrass), the plants within treatment replicates (pots) were cut at the soil level and dried in a pre-weighed paper bag at 70°C for a minimum of 48 hours. After drying, the dry weight of the plant material was recorded.

The phytotoxicity ratings evaluated five observable toxic effects: 0-indicates no effect; 1-indicates

slight plant effect; 2-indicates a moderate effect, e.g., mild stunting or chlorosis; 3-indicates a severe effect; and 4-indicates a total effect or plant death.

Temperature, relative humidity, photoperiod, and illuminance during the period of growth were provided in the report.

E. **Statistics:** All data were entered into a Lotus 1-2-3 spreadsheet. The spreadsheet calculated replicate means, treatment means, standard deviations, and analysis of variance tables. Treatment means were used to calculate the percent detrimental effect resulting from the treatment. The percent detrimental effect was calculated using the following equation:

$$\% \text{ effect} = \frac{(\text{treatment mean} - \text{control mean})}{\text{control mean}} \times 100$$

An analysis of variance table was constructed using the Lotus 1-2-3 raw data spreadsheet. A one-way analysis of variance (ANOVA) model for data with equal subsamples was used to analyze data from the seed germination (radicle length and percent germination) and seedling emergence (percent emergence) tests. A one-way ANOVA model for data with unequal subsamples was used to analyze the seedling height data and phytotoxicity rating data. Treatment mean separation was achieved using either MSTAT or the Lotus 1-2-3 spreadsheet. The percent detrimental effect values were entered into an MSTAT probit analysis program to calculate EC values.

12. **REPORTED RESULTS:**

Seed Germination: Table A (attached) summarizes the lowest values of NOEC, EC25, and EC50, along with the parameters in which these concentrations were observed. Treatment of seeds with Prometryn at the equivalent of 1.6 lb ai/A did not result in a significant effect ($p \leq 0.05$) on radicle length or percentage of seed germination in any of the plant species tested (Tables 6 and 7, attached). All plant species exhibited an NOEC at 1.6 lb ai/A.

None of the species tested, except tomato and oat, exhibited a dose response for inhibition of radicle length by Prometryn. The EC25 values for tomato and oat were 5.23 and 0.869 lb ai/A, while the EC50 values were 53.4 and 1.70 lb ai/A, respectively. Treatment with prometryn did not result in a dose-response curve for seed germination, therefore probit analysis could not be conducted.

Seedling Emergence: Table B (attached) lists the lowest NOEC, EC25, and EC50, along with the parameters in which these concentrations were observed. Detailed results for each specific parameter are described below.

Phytotoxicity rating: At the 14- and 21-day observation periods, many of the emerged seedlings had died as a result of treatment with the higher rates of Prometryn. Species listed (with NOECs in lb ai/A) in order of increasing sensitivity to Prometryn, based on phytotoxicity rating NOECs are as follows:

Carrot ($\geq$1.6) < corn (0.8) < soybean = ryegrass (0.4) < oat (0.3) < tomato (0.2) < lettuce = onion (0.15) < cucumber = cabbage (0.1).

Percent seedling emergence: Treatment with 1.6 lb ai/A Prometryn resulted in a significant decrease ($p \leq 0.05$) in the number of established seedlings at the 21-day observation period in all species except soybean, carrot, cucumber, and oat. Treatment with Prometryn resulted in death of many emerged seedlings and is represented as a decrease in percent emergence. Crops listed (with NOECs in lb ai/A) in order of increasing sensitivity to Prometryn based on percent emergence NOECs are as follows:

Soybean = carrot = cucumber = oat ($\geq$1.6) < corn (0.8) < onion (0.3) < ryegrass = tomato (0.2) < lettuce (0.15) < cabbage (0.075).

Soybean, cucumber, oat, and corn did not exhibit a dose-response curve, therefore, probit analysis could not be conducted on these species. Species listed (with EC50s in lb ai/A) in order of increasing sensitivity to Prometryn based on percent emergence EC50 values are as follows:

Carrot (3.21) < ryegrass (0.545) < tomato (0.410) < onion (0.317) < lettuce (0.157) < cabbage (0.129).

Plant height: All species, except carrot, exhibited a significant decrease in plant height at the 21-day observation period following treatment with 1.6 lb ai/A Prometryn. Species listed (with NOECs in lb ai/A) in order of increasing sensitivity to Prometryn based on plant height NOEC values are as follows:

Carrot ($\geq$1.6) < corn (0.8) < soybean = ryegrass (0.4) < oat (0.3) < tomato (0.2) < cucumber (0.15) < lettuce (0.075) < cabbage = onion (0.038).

Carrot did not exhibit a plant height dose response to Prometryn. Crops listed (with EC50s in lb ai/A) in order of increasing sensitivity to Prometryn based on EC50 values are as follows:

Corn (4.12) < soybean (0.959) < oat (0.590) < ryegrass (0.491) < tomato (0.425) < cucumber (0.284) < onion (0.247) < lettuce (0.168) < cabbage (0.094).

Plant dry weight: A significant effect in dry weight was not detected for carrot and ryegrass. Species listed (with NOECs in lb ai/A) in order of increasing sensitivity to Prometryn based on dry weight NOEC values are as follows:

Carrot = ryegrass ($\geq$1.6) < onion (0.3) < soybean = tomato = corn (0.2) < cabbage (0.1) < oat (0.075) < cucumber = lettuce (0.038).

Carrot and ryegrass seedlings did not exhibit a plant dry weight response to Prometryn, therefore, probit analysis could not be conducted. Species listed (with EC50s in lb ai/A) in order of increasing sensitivity to Prometryn based on dry weight EC50 values are as follows:

Corn (1.79) < soybean (0.778) < tomato (0.308) < oat (0.282) < onion (0.236) < lettuce (0.189) < cucumber (0.160) < cabbage (0.062).

13. **STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:**
No conclusions were made by the author. The study was inspected by the Quality Assurance Unit of Pan-Agricultural Labs, Inc. on several occasions to assure compliance with Good Laboratory Practice (GLP) Standards.

14. **REVIEWER'S DISCUSSION AND INTERPRETATION OF STUDY RESULTS:**

A. **Test Procedure:** The test procedures followed the SEP and Subdivision J guidelines with the following exceptions:

- A germination pretest was not conducted to determine the germination potential of the seeds.
- All plants in each replicate were weighed together, then the total weight was divided by the total number of plants to obtain each replicate mean value. The plants should have been individually weighed so the variation among plants within each replicate could be accounted for in the statistical analysis of the data.

The following discrepancies are also noted:

- For phytotoxicity ratings of cabbage, the NOEC value from the first test (0.1 lb ai/A) rather than the value from the second test (0.038 lb ai/A) was used by the author (Table 11, attached). While phytotoxicity rating at 0.1 lb ai/A was not significant different from the control values, the test is not considered valid since most plants died before day 21. Therefore, the NOEC value for cabbage should be determined from the second test (i.e., 0.038 lb ai/A).

- Table 19 (attached) shows two series of onion testing, the NOEC values determined from the first test and second test were 0.1 and 0.3 lb ai/A, respectively. Typically, the highest NOEC value is accepted. However, although percentage of onion seedlings emerging at 0.3 lb ai/A in the second test was not significantly different from the control value, the percentage detrimental effect was rather high (32%). In addition, the first test showed a significant difference between the percentage emergence at 0.2 lb ai/A (46% detrimental effect) and the control value. In the reviewer's opinion, 0.1 lb ai/A should be chosen as the NOEC value for onion percentage emergence.

- The author reported the NOEC value of $\geq$1.6 lb ai/A for those species that were not significantly affected by any treatment concentrations. Those NOEC values should have been listed as 1.6 lb ai/A since we can only conclude from this study that the NOEC was equal to (but not greater than) 1.6 lb ai/A.

B. **Statistical Analysis:** Statistical analyses were conducted on selected data by the reviewer using the analysis of variance with multiple comparison tests (i.e., Tukey's and Dunnett's for tests with equal samples, Tukey's and Bonferroni's for tests with unequal samples). All printouts are attached. The results are in general agreement with those presented by the author, except for the following:

- Oat radicle length was found to be significantly affected by 1.6 lb ai/A Prometryn ($p < 0.01$); the author found no differences between control and any treatment levels (Table 4, attached). Based

on the reviewer's analysis, the NOEC for oat radicle length was 0.8 lb ai/A.

- Prometryn concentrations of 0.2-0.8 lb ai/A were found by the reviewer to significantly affect onion radicle length when compared to the control ($p \leq 0.05$), while the author found no differences between control and any treatment levels (Table 5, attached).

- Based on phytotoxicity rating, ryegrass was significantly affected by Prometryn concentrations of $\geq$0.4 lb ai/A ($p \leq 0.01$); the author found that only concentrations $\geq$0.8 lb ai/A significantly affected ryegrass (Table 12, attached). The NOEC value, based on ryegrass phytotoxicity rating, was therefore 0.2 lb ai/A.

- Phytotoxicity ratings of corn when treated with 0.8 and 1.6 lb ai/A Prometryn were significantly higher than the control value ($p \leq 0.01$); the author found that only 1.6 lb ai/A affected corn, based on this parameter (Table 13, attached). The NOEC for corn phytotoxicity ratings was determined by the reviewer to be 0.4 lb ai/A.

- Ryegrass height was found to be significantly reduced at Prometryn concentrations $\geq$0.4 lb ai/A ($p \leq 0.05$); the author found that only concentrations $\geq$0.8 lb ai/A significantly affected ryegrass height when compared to the control (Table 24, attached). Based on the reviewer's analysis, the NOEC for ryegrass height was 0.2 lb ai/A.

The EC25 and EC50 values for selected species were calculated by the reviewer using a regression analysis (attached). The results are also in general agreement with the author.

C. **Discussion/Results:** The following results are summarized based on the lowest values obtained from the author's and reviewer's statistical analyses.

Seed Germination: Seed germination of all test species treated with Prometryn concentrations up to 1.6 lb ai/A was comparable to the control (Table 7, attached). Treatment of seeds up to 1.6 lb ai/A did not have any significant effects on radicle length of all test species, except oat. No dose-response relationship was

observed in any test species, except tomato and oat. The NOEC, EC25, and EC50 values for oat, the most sensitive species to Prometryn, were 0.8, 0.75, and >1.6 lb ai/A, respectively. The EC25 and EC50 values for tomato were greater than 1.6 lb ai/A. Table A (attached) lists the lowest NOEC, EC25, and EC50 values for seed germination study.

Seedling Emergence:

Phytotoxicity Rating: Based on phytotoxicity rating, the most sensitive species to Prometryn was cabbage with an NOEC value of 0.038 lb ai/A, while the least sensitive species was carrot with an NOEC of 1.6 lb ai/A (Table 32, attached). The remaining eight species had NOEC values ranging from 0.15 to 0.4 lb ai/A.

Percentage of Emerged Seedlings: Soybean, cucumber, and oat were not affected by Prometryn concentrations up to 1.6 lb ai/A and no dose-response relationship was observed (Table 33, attached). These three species appear to be the least sensitive species tested. The NOEC for carrot was determined to be 1.6 lb ai/A; however, its EC25 value obtained from the regression analysis was 0.34 lb ai/A. The most sensitive species was cabbage with NOEC, EC25, and EC50 values of 0.075, 0.08, and 0.129 lb ai/A, respectively.

Plant Height: Based on plant height, cabbage appears to be the most sensitive species with NOEC, EC25, and EC50 values of 0.038, 0.05, and 0.08 lb ai/A, respectively (Table 34, attached). Carrot was not affected by Prometryn concentrations up to 1.6 lb ai/A and appears to the least sensitive species with no dose response to the concentration range tested. Soybean, lettuce, tomato, cucumber, oat, ryegrass, and onion had NOEC ranging from 0.038 to 0.4 lb ai/A, EC25 ranging from 0.087 to 0.58 lb ai/A, and EC50 ranging from 0.027 to 0.97 lb ai/A. Corn had an NOEC, EC25, and EC50 of 0.8, 1.21, and >1.6 lb ai/A, respectively.

Plant Dry Weight: Based on plant dry weight, Prometryn concentrations up to 1.6 lb ai/A did not have any significant effect on carrot and ryegrass and no dose-response relationship was observed (Table 35, attached). The most sensitive species appears to be cabbage with NOEC, EC25, and EC50 values of 0.038, 0.014, and 0.03 lb ai/A, respectively. Soybean, lettuce, tomato, cucumber, oat, and onion had NOEC ranging from 0.038 to 0.3 lb ai/A, EC25 ranging from 0.036 to 0.31 lb ai/A, and EC50 ranging from 0.13 to

0.778 lb ai/A. Corn had NOEC, EC25, and EC50 values of 0.2, 0.384, and 1.79 lb ai/A, respectively.

Table B (attached) lists the lowest NOEC, EC25, and EC50 values for seedling emergence study. The study results indicate that a Tier-3 study is required.

D. **Adequacy of the Study:**

(1) Classification: Core.

(2) Rationale: The study followed the approved protocol for toxicity tests on seed germination/seedling emergence of non-target plants. Minor deviations observed are not believed to significantly affect the validity of the study.

(3) Repairability: N/A.

15. **COMPLETION OF ONE-LINER:** N/A.

Table B. Seedling Emergence Study

The following table lists the lowest observed no-effect concentration, EC_{25} and EC_{50} values (expressed in lb/a), along with the parameter in which these concentrations were observed.

Plant Species	No-effect Concentration		Parameter[y]	EC_{25}		Parameter	EC_{50}		Parameter	
Soybean	0.2		dw	0.338	0.31	dw dw	0.778		dw	dw
Lettuce	0.038		dw	0.079	0.04	dw dw	0.157	0.13	pe	dw
Carrot	≥1.6[z]	1.6	all	0.336		pe	3.21	2.36	pe	pe
Tomato	0.2		all	0.202	0.16	dw dw	0.308		dw	
Cucumber	0.038		dw	0.067		dw	0.160		dw	
Cabbage	0.038		ph, pr	0.036	0.014	dw dw	0.062	0.03	dw	dw
Oat	0.075		dw	0.150	0.07	dw dw	0.282	0.17	dw	dw
Ryegrass	0.2		pe, pr, ph	0.289	0.24	pe ph	0.491	0.39	ph	ph
Corn	0.2		dw	0.384		dw	1.79		dw	
Onion	0.038		ph	0.095		ph	0.236		dw	

[y] ph - plant height measurements, pe - percentage of seedlings emerged, pr - phytotoxicity ratings, dw - dry weight determination, all - all parameters measured

[z] The actual no-effect level may be greater than or equal to the highest treatment concentration treated of 1.6 lb ai/a.

Lower values calculated by the reviewer are in red ink.

Table 11. Mean phytotoxicity rating[x] of cabbage plants 7, 14, and 21 days after treatment of the soil surface with prometryn (FL-870991).

Plant Species	Treatment (lb ai/a)	Days Affer Treatment[y] 7	14	21
Cabbage	0.0	0.0 A	0.0 C	0.0 A
	0.1	0.0 A	1.6 B	0.1 A
	0.2	0.0 A	4.0 A	
	0.4	0.0 A	4.0 A	
	0.8	0.0 A	4.0 A	
	1.6	0.0 A	4.0 A	
Cabbage	0.0	0.0 A	0.1 C	0.0 B
	0.019	0.0 A	0.2 C	0.2 B
	0.038 NOEC	0.0 A	0.3 C	0.1 B
	0.075	0.0 A	2.8 B	3.8 A
	0.15	0.0 A	3.9 A	4.0 A
	0.3	0.0 A	4.0 A	4.0 A

Probably not valid bec. most plants died.

[x] Phytotoxicity ratings were based on a 0-4 scale, with 0 = no effect, 1 = slight effect limited to one leaf, 2 = moderate effect on whole plant, 3 = severe effect on whole plant, and 4 = total effect or plant death.

[y] Treatment concentrations not listing a phytotoxicity rating illustrate a treatment in which all of the emerging plants were completely decomposed.

[z] The number of observations and the standard deviation of each treatment mean can be found in the raw data calculation sheets (Attachment 1). Means for each plant species and observation date not followed by the same letter differ significantly according to Duncan's New Multiple Range Test ($p \leq 0.05$).

Table 12. Mean phytotoxicity rating[y] of oat plants 7, 14, and 21 days and ryegrass plants 7, 14, 21, and 28 days after treatment of the soil surface with prometryn (FL-870991).

Plant Species	Treatment (lb ai/a)	Days After Treatment 7	14	21	28	
Oat	0.0	0.0 A[z]	0.0 C	0.0 C		
	0.1	0.0 A	0.1 C	0.2 C		
	0.2	0.0 A	0.8 BC	1.9 B		
	0.4	0.0 A	1.7 B	4.0 A		
	0.8	0.0 A	2.8 A	4.0 A		
	1.6	0.0 A	2.6 A	4.0 A		
Oat	0.0	0.0 A	0.0 A	0.0 A		
	0.019	0.0 A	0.0 A	0.0 A		
	0.038	0.1 A	0.0 A	0.0 A		
	0.075	0.0 A	0.0 A	0.0 A		
	0.15	0.0 A	0.0 A	0.0 A		
	0.3	0.0 A	0.0 A	0.0 A		
Ryegrass	0.0	0.0 A	0.0 C	0.0 C	0.0 B	
	0.1	0.0 A	0.1 C	0.0 C	0.0 B	
	0.2	0.0 A	0.8 BC	0.6 BC	0.5 B	
	0.4	0.0 A	2.0 B	2.0 B	0.9 B	*
	0.8	0.0 A	3.7 A	3.7 A	3.6 A	*
	1.6	0.1 A	3.8 A	3.8 A	3.3 A	*

[y] Phytotoxicity ratings were based on a 0-4 scale, with 0 = no effect, 1 = slight effect limited to one leaf, 2 = moderate effect on whole plant, 3 = severe effect on whole plant, and 4 = total effect or plant death.

[z] The number of observations and the standard deviation of each treatment mean can be found in the raw data calculation sheets (Attachment 1). Means for each plant species and observation date not followed by the same letter differ significantly according to Duncan's New Multiple Range Test ($p \leq 0.05$).

* = determined to be different from the control by the reviewer.

Table 13. Mean phytotoxicity rating[x] of corn and onion plants 7, 14, and 21 days after treatment of the soil surface with prometryn (FL-870991).

Plant Species	Treatment (lb ai/a)	Days After Treatment[y] 7	14	21
Corn	0.0	0.0 B[z]	0.0 A	0.0 B
	0.1	0.0 B	0.3 A	0.1 B
	0.2	0.1 A	0.2 A	0.2 B
	0.4	0.0 B	0.3 A	0.2 B
	0.8	0.0 B	0.4 A	0.9 B *
	1.6	0.0 B	0.4 A	2.0 A *
Onion	0.0	0.0 A	0.0 C	0.0 C
	0.1	0.0 A	0.1 C	0.0 C
	0.2	0.0 A	1.8 B	0.9 B
	0.4	0.0 A	2.5 AB	3.1 A
	0.8	0.0 A	3.7 A	
	1.6	0.0 A	3.7 A	3.0 A
Onion	0.0	0.0 A	0.0 B	0.0 B
	0.019	0.0 A	0.0 B	0.1 B
	0.038	0.0 A	0.0 B	0.0 B
	0.075	0.0 A	0.0 B	0.1 B
	0.15	0.0 A	0.3 B	0.5 AB
	0.3	0.0 A	1.3 A	1.1 A

[x] Phytotoxicity ratings were based on a 0-4 scale, with 0 = no effect, 1 = slight effect limited to one leaf, 2 = moderate effect on whole plant, 3 = severe effect on whole plant, and 4 = total effect or plant death.

[y] Treatment concentrations not listing a phytotoxicity rating illustrate a treatment in which all of the emerging plants were completely decomposed.

[z] The number of observations and the standard deviation of each treatment mean can be found in the raw data calculation sheets (Attachment 1). Means for each plant species and observation date not followed by the same letter differ significantly according to Duncan's New Multiple Range Test ($p \leq 0.05$).

* = determined to be different from the control by the reviewer.

Table 19. Percentage of corn and onion seedlings emerging[x] 7, 14, and 21 days after treatment of the soil surface with prometryn (FL-870991). The percent detrimental effect[y] of each treatment was calculated.

		Days After Treatment					
		7		14		21	
Species	(lb ai/a)	% Emergence	% Effect	% Emergence	% Effect	% Emergence	% Effect
Corn	0.0	93 A[z]		93 A		93 A	
	0.1	87 A	- 7	90 A	- 4	93 A	0
	0.2	97 A	4	97 A	4	93 A	0
	0.4	93 A	0	100 A	7	100 A	7
	0.8	97 A	4	100 A	7	97 A	4
	1.6	100 A	7	97 A	4	77 B	- 18
Onion	0.0	87 A		93 A		93 A	
	0.1 NOEC	80 A	- 8	97 A	4	97 A	4
	0.2	70 A	- 19	83 A	- 11	50 B	- 46
	0.4	57 A	- 35	90 A	- 4	23 BC	- 75
	0.8	70 A	- 19	77 A	- 18	0 C	-100
	1.6	67 A	- 23	90 A	- 4	7 C	- 93
Onion	0.0	77 A		83 A		83 A	
	0.019	70 A	- 9	80 A	- 4	80 A	4
	0.038	83 A	9	90 A	8	90 A	
	0.075	90 A	17	87 A	4	87 A	4
	0.15	80 A	4	87 A	4	87 A	4
	0.3	80 A	4	80 A	- 4	57 A	- 32

[x] Ten seeds were planted in each pot prior to treatment.

[y] Percent detrimental effect was calculated from the raw data which was compiled using Lotus 1-2-3 software. Percent effect, variance, and standard deviation of each treatment was calculated on the raw data calculation sheets.

[z] The number of observations, variance, and standard deviation of each treatment can be found in the raw data calculation sheets (Attachment 1). Means for each plant species and observation date not followed by the same letter differ significantly according to Duncan's New Multiple Range Test ($p \leq 0.05$).

HT

Table 24. Height[x] of oat seedlings emerging 7, 14, and 21 days and ryegrass seedlings emerging 7, 14, 21 and 28 days after treatment of the soil surface with prometryn (FL-870991). The percent detrimental effect[y] of each treatment was calculated.

		Days After Treatment								
		7		14		21		28		
Species	(lb ai/a)	Plant Height (mm)	% Effect	Plant Height (mm)	% Effect	Plant Height (mm)	% Effect	Plant Height (mm)	% Effect	
Oat	0.0	51 A[z]		130 AB		208 AB				
	0.1	45 A	- 11	138 A	6	220 A	6			
	0.2	47 A	- 6	112 BC	- 14	157 B	- 25			
	0.4	46 A	- 10	97 CD	- 25	86 C	- 59			
	0.8	48 A	- 6	89 D	- 31	81 C	- 61			
	1.6	44 A	- 13	86 D	- 34	75 C	- 64			
Oat	0.0	104 A		269 A		334 A				
	0.019	104 A	0	278 A	3	348 A	4			
	0.038	111 A	7	267 A	- 1	341 A	2			
	0.075	113 A	9	276 A	3	345 A	3			
	0.15	110 A	6	263 A	- 2	340 A	2			
	0.3	104 A	0	253 A	- 6	333 A	0			
Ryegrass	0.0	17 A		78 A		142 A		162 A		
	0.1	15 A	- 15	63 B	- 20	138 A	- 3	169 A	4	
	0.2 NOEC	17 A	- 1	45 C	- 42	86 B	- 39	131 A	- 19	
	0.4	21 A	24	44 C	- 44	69 B	- 51	122 A	- 25	*
	0.8	22 A	28	33 CD	- 58	22 C	- 84	17 B	- 90	*
	1.6	16 A	- 9	25 D	- 69	21 C	- 86	20 B	- 88	* reviewer

[x] Plants were extended to their maximum height and measured to the nearest millimeter.

[y] Percent detrimental effect was calculated from the raw data which was compiled using Lotus 1-2-3 software. Percent effect, variance, and standard deviation of each treatment was calculated on the raw data calculation sheets.

[z] The number of observations, variance, and standard deviation of each treatment can be found in the raw data calculation sheets (Attachment 1). Means for each plant species and observation date not followed by the same letter differ significantly according to Duncan's New Multiple Range Test ($p \leq 0.05$).

* = determined to be significantly different from the control.

Table 32. Statistical no-effect concentration[y] and the mean phytotoxicity rating[z] at that concentration (lb ai/a) of prometryn (FL-870991) on emerged seedlings prior to plant harvest.

Test Plant	No-effect Concentration	Mean Phytotoxicity Rating
Soybean	0.4[y]	0.7[z]
Lettuce	0.15	1.2
Carrot	≥1.6 1.6	0.1
Tomato	0.2	0.1
Cucumber	0.1	0.4
Cabbage	~~0.1~~ 0.038	0.1
Oat	0.3	0.0
Ryegrass	~~0.4~~ 0.2	~~0.9~~ 0.5
Corn	~~0.8~~ 0.4	~~0.9~~ 0.2
Onion	0.15	0.5

[y] Highest treatment concentration which was statistically similar to the control, according to Duncan's New Multiple Range Test ($p \leq 0.05$).

[z] Phytotoxicity ratings were based on a 0-4 scale, with 0 = no effect, 1 = slight effect limited to one leaf, 2 = moderate effect on whole plant, 3 = severe effect on whole plant, and 4 = total effect or plant death.

Reviewer's values are in red ink.

Table 33. Statistical no-effect concentration[y] (lb ai/a) of prometryn (FL-870991) on the percentage of emerged seedlings, along with EC_{25} and EC_{50} values.

Test Plant	No-effect Concentration	EC_{25}	EC_{50}
Soybean	≥1.6 1.6	ND[z]	ND
Lettuce	0.15	0.095 0.15	0.157 0.25
Carrot	≥1.6 1.6	0.336 0.41	3.21 2.36
Tomato	0.2	0.274 0.30	0.410 0.50
Cucumber	≥1.6 1.6	ND	ND
Cabbage	0.075	0.080 0.12	0.129 0.19
Oat	≥1.6 1.6	ND	ND
Ryegrass	0.2	0.289 0.26	0.545 0.53
Corn	0.8	ND	ND
Onion	~~0.3~~ 0.1 Should use NOEC from 1st test.	0.188 0.08	0.317 0.20

[y] Highest treatment concentration which was statistically similar to the control, according to Duncan's New Multiple Range Test ($p \leq 0.05$).

[z] A dosage response curve was not evident or the highest treatment concentration tested (1.6 lb ai/a) did not result in a significant effect level, therefore a probit analysis could not be conducted to determine EC_{25} or EC_{50} values.

Table 34. Statistical no-effect concentration[y] (lb ai/a) of prometryn (FL-870991) on emerged seedlings plant height, along with EC_{25} and EC_{50} values.

Test Plant	No-effect Concentration	EC_{25}		EC_{50}	
Soybean	0.4	0.573	0.58	0.959	0.97
Lettuce	0.075	0.087	0.13	0.168	0.27
Carrot	~~>1.6~~ 1.6	ND[z]		ND	
Tomato	0.2	0.272	0.33	0.425	0.56
Cucumber	0.15	0.127	0.17	0.284	0.29
Cabbage	0.038	0.060	0.05	0.094	0.08
Oat	0.3	0.226	0.12	0.590	0.51
Ryegrass	~~0.4~~ 0.2	0.292	0.24	0.491	0.39
Corn	0.8	1.23	1.21	4.12	4.00
Onion	0.038	0.095	0.09	0.247	0.30

[y] Highest treatment concentration which was statistically similar to the control, according to Duncan's New Multiple Range Test ($p \leq 0.05$).

[z] A dosage response curve was not evident or the highest treatment concentration tested (1.6 lb ai/a) did not result in a significant effect level, therefore a probit analysis could not be conducted to determine EC_{25} or EC_{50} values.

Table 35. Statistical no-effect concentration[y] (lb ai/a) of prometryn (FL-870991) on the percentage of emerged seedling dry weight, along with EC_{25} and EC_{50} values.

Test Plant	No-effect Concentration	EC_{25}	EC_{50}
Soybean	0.2	0.338 0.31	0.778 0.89
Lettuce	0.038	0.079 0.04	0.189 0.13
Carrot	≥1.6 1.6	ND[z]	ND
Tomato	0.2	0.202 0.16	0.308 0.31
Cucumber	0.038	0.067 0.08	0.160 0.19
Cabbage	0.1	0.036 0.014	0.062 0.03
Oat	0.075	0.150 0.07	0.282 0.17
Ryegrass	≥1.6 1.6	ND	ND
Corn	0.2	0.384 0.40	1.79 1.83
Onion	0.3	0.155 0.11	0.236 0.17

[y] Highest treatment concentration which was statistically similar to the control, according to Duncan's New Multiple Range Test ($p \leq 0.05$).

[z] A dosage response curve was not evident or the highest treatment concentration tested (1.6 lb ai/a) did not result in a significant effect level, therefore a probit analysis could not be conducted to determine EC_{25} or EC_{50} values.

Analysis of Variance File: txrye28 Date: 05-31-1989

FILTER: None

Ryegrass

N's, means and standard deviations based on dependent variable: TOX

Phytotoxicity Ratings

* Indicates statistics are collapsed over this factor

Factors: T	R	Trt (lb ai/A)	N	Mean	S.D.
*	*		110	0.6455	1.3104
1	*	0	28	0.0000	0.0000
2	*	0.1	29	0.0000	0.0000
3	*	0.2	24	0.4583	1.0206
4	*	0.4	16	0.9375	1.3401
5	*	0.8	7	3.5714	0.7868
6	*	1.6	6	3.3333	0.8165
*	1		43	0.7209	1.4528
*	2		35	0.4286	0.9482
*	3		32	0.7813	1.4532
1	1		9	0.0000	0.0000
1	2		10	0.0000	0.0000
1	3		9	0.0000	0.0000
2	1		9	0.0000	0.0000
2	2		10	0.0000	0.0000
2	3		10	0.0000	0.0000
3	1		8	0.0000	0.0000
3	2		8	0.3750	0.7440
3	3		8	1.0000	1.5119
4	1		10	0.4000	0.6992
4	2		4	0.7500	0.5000
4	3		2	4.0000	0.0000
5	1		4	3.7500	0.5000
5	2		1	4.0000	0.0000
5	3		2	3.0000	1.4142
6	1		3	4.0000	0.0000
6	2		2	2.5000	0.7071
6	3		1	3.0000	0.0000

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Fmax for testing homogeneity of between subjects variances: Not defined

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Analysis of Variance Dependent variable: TOX

Source	df	SS (H)	MSS	F	P
Between Subjects	109	187.1727			
T (TRT)	5	129.2293	25.8459	84.096	0.0000
R (REP)	2	3.8064	1.9032	6.193	0.0030
TR	10	25.8621	2.5862	8.415	0.0000
Subj w Groups	92	28.2750	0.3073		

Ryegrass phytotox. rating

Analysis of Variance File: txrye28 Date: 05-31-1989

FILTER: None

Post-hoc tests for factor T (TRT)

Level	Mean	Level	Mean
1	0.000	6	3.333
2	0.000		
3	0.458		
4	0.938		
5	3.571		

Comparison	Tukey-A*	Bon-ferroni	Dunnett (unequal sample #)
1 = 2			
1 < 3		0.0567	
1 < 4	0.0100	0.0000	0.0100
1 < 5	0.0100	0.0000	0.0100
1 < 6	0.0100	0.0000	0.0100
2 < 3		0.0529	N.A.
2 < 4	0.0100	0.0000	N.A.
2 < 5	0.0100	0.0000	N.A.
2 < 6	0.0100	0.0000	N.A.
3 < 4			N.A.
3 < 5	0.0100	0.0000	N.A.
3 < 6	0.0100	0.0000	N.A.
4 < 5	0.0100	0.0000	N.A.
4 < 6	0.0100	0.0000	N.A.
5 > 6			N.A.

} * different from control (1 < 4, 1 < 5, 1 < 6)

* The only possible P-values are .01, .05 or .10 (up to 0.1000).
A blank means the P-value is greater than 0.1000.

For Dunnett's test only the P-values .05 and .01 are possible
and only for comparisons with the control mean (level 1).

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Post-hoc tests for factor R (REP)

Level	Mean
1	0.721
2	0.429
3	0.781

Comparison	Tukey-A*	Bon-ferroni	Dunnett
1 > 2	0.1000	0.0682	
1 < 3			
2 < 3	0.0500	0.0325	N.A.

* The only possible P-values are .01, .05 or .10 (up to 0.1000).
A blank means the P-value is greater than 0.1000.

For Dunnett's test only the P-values .05 and .01 are possible
and only for comparisons with the control mean (level 1).

Analysis of Variance   File: txcrn21   Date: 05-30-1989

FILTER: None

Corn Phytotoxicity Ratings

N's, means and standard deviations based on dependent variable: TOX

* Indicates statistics are collapsed over this factor

Factors: T	R	Trt (lb ai/A)	N	Mean	S.D.
*	*		166	0.5241	1.1842
1	*	0	28	0.0000	0.0000
2	*	0.1	28	0.1429	0.3563
3	*	0.2	28	0.1786	0.7724
4	*	0.4	30	0.2000	0.6644
5	*	0.8	29	0.8621	1.2740
6	*	1.6	23	2.0435	1.8944
*	1		57	0.6140	1.2643
*	2		46	0.5652	1.2763
*	3		63	0.4127	1.0416
1	1		9	0.0000	0.0000
1	2		9	0.0000	0.0000
1	3		10	0.0000	0.0000
2	1		10	0.1000	0.3162
2	2		9	0.1111	0.3333
2	3		9	0.2222	0.4410
3	1		10	0.4000	1.2649
3	2		8	0.0000	0.0000
3	3		10	0.1000	0.3162
4	1		10	0.0000	0.0000
4	2		10	0.6000	1.0750
4	3		10	0.0000	0.0000
5	1		10	0.6000	0.6992
5	2		2	0.0000	0.0000
5	3		17	1.1176	1.5363
6	1		8	3.0000	1.4142
6	2		8	2.3750	1.9955
6	3		7	0.5714	1.5119

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Fmax for testing homogeneity of between subjects variances: Not defined

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Analysis of Variance   Dependent variable: TOX

Source	df	SS (H)	MSS	F	P
Between Subjects	165	231.4036			
T (TRT)	5	74.6631	14.9326	17.429	0.0000
R (REP)	2	1.7197	0.8599	1.004	0.3664
TR	10	28.2223	2.8222	3.294	0.0007
Subj w Groups	148	126.7984	0.8567		

Corn phytotox. rating

Analysis of Variance File: txcrn21 Date: 05-30-1989

FILTER: None

Post-hoc tests for factor T (TRT)

Level	Mean	Level	Mean
1	0.000	6	2.043
2	0.143		
3	0.179		
4	0.200		
5	0.862		

Comparison	Tukey-A*	Bon-ferroni	~~Dunnett~~
1 < 2			
1 < 3			
1 < 4			
1 < 5	0.0100	0.0090	~~0.0100~~
1 < 6	0.0100	0.0000	~~0.0100~~
2 < 3			N.A.
2 < 4			N.A.
2 < 5	0.1000	0.0585	N.A.
2 < 6	0.0100	0.0000	N.A.
3 < 4			N.A.
3 < 5	0.1000	0.0902	N.A.
3 < 6	0.0100	0.0000	N.A.
4 < 5	0.1000		N.A.
4 < 6	0.0100	0.0000	N.A.
5 < 6	0.0100	0.0000	N.A.

unequal sample #

} * different from control

* The only possible P-values are .01, .05 or .10 (up to 0.1000).
A blank means the P-value is greater than 0.1000.

For Dunnett's test only the P-values .05 and .01 are possible
and only for comparisons with the control mean (level 1).

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Post-hoc tests for factor R (REP)

Level	Mean
1	0.614
2	0.565
3	0.413

Comparison	Tukey-A*	Bon-ferroni	Dunnett
1 > 2			
1 > 3			
2 > 3			N.A.

* The only possible P-values are .01, .05 or .10 (up to 0.1000).
A blank means the P-value is greater than 0.1000.

For Dunnett's test only the P-values .05 and .01 are possible
and only for comparisons with the control mean (level 1).

Analysis of Variance File: emcar Date: 06-21-1989

FILTER: None Carrot % Emergence

N's, means and standard deviations based on dependent variable: EMERGE

* Indicates statistics are collapsed over this factor

Factors: T	Trt (lb ai/A)	N	Mean	S.D.
*		18	53.8889	15.3925
1	0	3	70.0000	10.0000
2	0.1	3	66.6667	15.2753
3	0.2	3	50.0000	20.0000
4	0.4	3	46.6667	5.7735
5	0.8	3	43.3333	15.2753
6	1.6	3	46.6667	5.7735

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Fmax for testing homogeneity of between subjects variances: 12.00
Number of variances= 6 df per variance= 2.

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Analysis of Variance Dependent variable: EMERGE

Source	df	SS (H)	MSS	F	P
Between Subjects	17	4027.7781			
T (TRT)	5	1961.1113	392.2223	2.277	0.1119
Subj w Groups	12	2066.6667	172.2222		

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Post-hoc tests for factor T (TRT)

Level	Mean	Level	Mean
1	70.000	6	46.667
2	66.667		
3	50.000		
4	46.667		
5	43.333		

Comparison	Tukey-A*	Newman -Keuls*	Dunnett
1 > 2			
1 > 3			
1 > 4			
1 > 5			
1 > 6			
2 > 3			N.A.
2 > 4			N.A.
2 > 5			N.A.
2 > 6			N.A.
3 > 4			N.A.
3 > 5			N.A.
3 > 6			N.A.
4 > 5			N.A.
4 = 6			N.A.
5 < 6			N.A.

* The only possible P-values are .01, .05 or .10 (up to 0.1000).
A blank means the P-value is greater than 0.1000.

For Dunnett's test only the P-values .05 and .01 are possible
and only for comparisons with the control mean (level 1).

Analysis of Variance File: onemerge Date: 06-27-1989

FILTER: None

Onion % Emergence

N's, means and standard deviations based on dependent variable: EMERGE

* Indicates statistics are collapsed over this factor

Factors: T	Trt (lb ai/A)	N	Mean	S.D.
*		18	80.5556	17.3111
1	0	3	83.3333	5.7735
2	0.019	3	80.0000	10.0000
3	0.038	3	90.0000	10.0000
4	0.075	3	86.6667	11.5470
5	0.15	3	86.6667	11.5470
6	0.30	3	56.6667	30.5505

Fmax for testing homogeneity of between subjects variances: 28.00
Number of variances= 6 df per variance= 2.

Analysis of Variance Dependent variable: EMERGE

Source	df	SS (H)	MSS	F	P
Between Subjects	17	5094.4443			
T (TRT)	5	2227.7778	445.5556	1.865	0.1733
Subj w Groups	12	2866.6665	238.8889		

Post-hoc tests for factor T (TRT)

Level	Mean	Level	Mean
1	83.333	6	56.667
2	80.000		
3	90.000		
4	86.667		
5	86.667		

Comparison	Tukey-A*	Dunnett
1 > 2		
1 < 3		
1 < 4		
1 < 5		
1 > 6		
2 < 3		N.A.
2 < 4		N.A.
2 < 5		N.A.
2 > 6		N.A.
3 > 4		N.A.
3 > 5		N.A.
3 > 6		N.A.
4 = 5		N.A.
4 > 6		N.A.
5 > 6		N.A.

* The only possible P-values are .01, .05 or .10 (up to 0.1000). A blank means the P-value is greater than 0.1000.

For Dunnett's test only the P-values .05 and .01 are possible and only for comparisons with the control mean (level 1).

Analysis of Variance File: soyht Date: 06-22-1989

FILTER: None

Soybean Height

N's, means and standard deviations based on dependent variable: HT

* Indicates statistics are collapsed over this factor

Factors: T	R	Trt (lb ai/A)	N	Mean	S.D.
*	*		173	143.8844	62.6037
1	*	0	28	184.7500	33.2250
2	*	0.1	29	188.7931	26.8520
3	*	0.2	27	181.6296	41.7135
4	*	0.4	29	166.2759	51.4552
5	*	0.8	30	96.4333	31.9889
6	*	1.6	30	54.1667	16.3814
*	1		58	149.5345	58.6199
*	2		56	147.3929	63.0298
*	3		59	135.0000	65.9856
1	1		9	177.2222	11.9035
1	2		9	171.0000	51.2762
1	3		10	203.9000	13.9797
2	1		10	202.4000	17.3025
2	2		9	208.5556	10.3696
2	3		10	157.4000	12.5273
3	1		9	159.5556	56.1474
3	2		8	163.3750	7.5958
3	3		10	216.1000	8.7108
4	1		10	194.0000	13.7598
4	2		10	198.1000	11.8551
4	3		9	100.1111	41.7596
5	1		10	109.4000	28.6287
5	2		10	109.8000	31.2581
5	3		10	70.1000	18.5679
6	1		10	58.4000	18.4222
6	2		10	45.2000	11.2527
6	3		10	58.9000	16.2648

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Fmax for testing homogeneity of between subjects variances: 54.64

Number of variances= 18 df per variance= 9.

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Analysis of Variance Dependent variable: HT

Source	df	SS (H)	MSS	F	P
Between Subjects	172	674105.7500			
T (TRT)	5	467280.0000	93456.0000	147.861	0.0000
R (REP)	2	8956.2559	4478.1279	7.085	0.0011
TR	10	99901.3280	9990.1328	15.806	0.0000
Subj w Groups	155	97968.2500	632.0532		

Soybean height

Analysis of Variance File: soyht Date: 06-22-1989

FILTER: None

Post-hoc tests for factor T (TRT)

Level	Mean	Level	Mean
1	184.750	6	54.167
2	188.793		
3	181.630		
4	166.276		
5	96.433		

Comparison	Tukey-A*	Bon-ferroni
1 < 2		
1 > 3		
1 > 4	0.1000	0.0934
1 > 5	0.0100	0.0000
1 > 6	0.0100	0.0000
2 > 3		
2 > 4	0.0500	0.0126
2 > 5	0.0100	0.0000
2 > 6	0.0100	0.0000
3 > 4		
3 > 5	0.0100	0.0000
3 > 6	0.0100	0.0000
4 > 5	0.0100	0.0000
4 > 6	0.0100	0.0000
5 > 6	0.0100	0.0000

} * Sig. diff. from control

same as author

* The only possible P-values are .01, .05 or .10 (up to 0.1000).
A blank means the P-value is greater than 0.1000.

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Post-hoc tests for factor R (REP)

Level	Mean
1	149.534
2	147.393
3	135.000

Comparison	Tukey-A*	Bon-ferroni
1 > 2		
1 > 3	0.0100	0.0064
2 > 3	0.0500	0.0272

* The only possible P-values are .01, .05 or .10 (up to 0.1000).
A blank means the P-value is greater than 0.1000.

Analysis of Variance File: ephcar28 Date: 05-29-1989

Carrot

FILTER: None

N's, means and standard deviations based on dependent variable: ~~EMG~~ Plant Height

* Indicates statistics are collapsed over this factor

Factors: T	R	Trt (lb ai/A)	N	Mean	S.D.
*	*		97	59.3093	13.9242
1	*	0	21	60.1905	15.3056
2	*	0.1	20	59.3000	14.4116
3	*	0.2	15	58.6000	19.3974
4	*	0.4	14	60.8571	10.6833
5	*	0.8	13	58.0000	9.3363
6	*	1.6	14	58.4286	12.6899
*	1		32	58.4375	11.4496
*	2		31	60.3871	12.3469
*	3		34	59.1471	17.3330
1	1		7	57.8571	13.6190
1	2		8	59.0000	15.0902
1	3		6	64.5000	19.0657
2	1		5	58.8000	3.1145
2	2		7	60.7143	10.3395
2	3		8	58.3750	21.5270
3	1		5	67.6000	11.9290
3	2		3	68.3333	11.5902
3	3		7	48.0000	22.1886
4	1		5	59.2000	13.6638
4	2		4	60.2500	12.2577
4	3		5	63.0000	7.8740
5	1		6	56.0000	9.5499
5	2		4	61.2500	11.8708
5	3		3	57.6667	7.0946
6	1		4	50.2500	11.7011
6	2		5	56.8000	15.1888
6	3		5	66.6000	6.0249

A total of 83 observations had missing data on a dependent variable or covariate or inappropriate factor level codes.

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Fmax for testing homogeneity of between subjects variances: 50.76

Number of variances= 18 df per variance= 4.

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Analysis of Variance Dependent variable: EMG

Source	df	SS (H)	MSS	F	P
Between Subjects	96	18612.7188			
T (TRT)	5	90.5407	18.1081	0.089	0.9939
R (REP)	2	57.1913	28.5956	0.140	0.8706
TR	10	2320.9458	232.0946	1.136	0.3445
Subj w Groups	79	16144.0410	204.3550		

Carrot height

Analysis of Variance   File: ephcar28   Date: 05-29-1989

FILTER: None

Post-hoc tests for factor T (TRT)

Level	Mean	Level	Mean
1	60.190	6	58.429
2	59.300		
3	58.600		
4	60.857		
5	58.000		

Comparison	Tukey-A*	Bon-ferroni	Dunnett
1 > 2			
1 > 3			
1 < 4			
1 > 5			
1 > 6			
2 > 3			N.A.
2 < 4			N.A.
2 > 5			N.A.
2 > 6			N.A.
3 < 4			N.A.
3 > 5			N.A.
3 > 6			N.A.
4 > 5			N.A.
4 > 6			N.A.
5 < 6			N.A.

* The only possible P-values are .01, .05 or .10 (up to 0.1000).
A blank means the P-value is greater than 0.1000.

For Dunnett's test only the P-values .05 and .01 are possible
and only for comparisons with the control mean (level 1).

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Post-hoc tests for factor R (REP)

Level	Mean
1	58.438
2	60.387
3	59.147

Comparison	Tukey-A*	Bon-ferroni	Dunnett
1 < 2			
1 < 3			
2 > 3			N.A.

* The only possible P-values are .01, .05 or .10 (up to 0.1000).
A blank means the P-value is greater than 0.1000.

For Dunnett's test only the P-values .05 and .01 are possible
and only for comparisons with the control mean (level 1).

Analysis of Variance File: phrye28 Date: 05-29-1989

Ryegrass Height

FILTER: None

N's, means and standard deviations based on dependent variable: HT

* Indicates statistics are collapsed over this factor

Factors: T	R	Trt (lb ai/A)	N	Mean	S.D.
*	*		110	134.1000	61.8186
1	*	0	28	161.3929	29.8308
2	*	0.1	29	169.0690	29.2696
3	*	0.2	24	130.9167	52.5033
4	*	0.4	16	122.1250	67.7494
5	*	0.8	7	16.5714	16.5011
6	*	1.6	6	19.5000	7.7653
*	1		43	135.9070	64.9966
*	2		35	131.0286	51.6080
*	3		32	135.0313	69.1103
1	1		9	150.6667	31.0886
1	2		10	164.9000	21.1894
1	3		9	168.2222	36.5300
2	1		9	176.8889	26.1268
2	2		10	158.8000	23.1555
2	3		10	172.3000	36.5028
3	1		8	163.8750	19.5334
3	2		8	107.2500	40.9032
3	3		8	121.6250	70.8700
4	1		10	150.2000	56.0591
4	2		4	108.7500	45.1765
4	3		2	8.5000	4.9497
5	1		4	9.7500	6.7020
5	2		1	9.0000	0.0000
5	3		2	34.0000	25.4558
6	1		3	14.6667	2.5166
6	2		2	23.5000	12.0208
6	3		1	26.0000	0.0000

A total of 70 observations had missing data on a dependent variable or covariate or inappropriate factor level codes.

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Fmax for testing homogeneity of between subjects variances: Not defined

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Analysis of Variance Dependent variable: HT

Source	df	SS (H)	MSS	F	P
Between Subjects	109	416547.8800			
T (TRT)	5	234346.5470	46869.3090	33.262	0.0000
R (REP)	2	9422.2217	4711.1108	3.343	0.0394
TR	10	43141.0470	4314.1045	3.062	0.0021
Subj w Groups	92	129638.0620	1409.1094		

Ryegrass height

Analysis of Variance File: phrye28 Date: 05-29-1989

FILTER: None

Post-hoc tests for factor T (TRT)

Level	Mean	Level	Mean
1	161.393	6	19.500
2	169.069		
3	130.917		
4	122.125		
5	16.571		

Comparison	Tukey-A*	Bon-ferroni	Dunnett
1 < 2			
1 > 3		0.0664	
1 > 4		0.0185	
1 > 5	0.0100	0.0000	0.0100
1 > 6	0.0100	0.0000	0.0100
2 > 3		0.0061	N.A.
2 > 4	0.0500	0.0020	N.A.
2 > 5	0.0100	0.0000	N.A.
2 > 6	0.0100	0.0000	N.A.
3 > 4			N.A.
3 > 5	0.0100	0.0000	N.A.
3 > 6	0.0100	0.0000	N.A.
4 > 5	0.0100	0.0000	N.A.
4 > 6	0.0100	0.0000	N.A.
5 < 6			N.A.

diff. from control

* The only possible P-values are .01, .05 or .10 (up to 0.1000).
A blank means the P-value is greater than 0.1000.

For Dunnett's test only the P-values .05 and .01 are possible
and only for comparisons with the control mean (level 1).

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Post-hoc tests for factor R (REP)

Level	Mean
1	135.907
2	131.029
3	135.031

Comparison	Tukey-A*	Bon-ferroni	Dunnett
1 > 2			
1 > 3			
2 < 3			N.A.

* The only possible P-values are .01, .05 or .10 (up to 0.1000).
A blank means the P-value is greater than 0.1000.

For Dunnett's test only the P-values .05 and .01 are possible
and only for comparisons with the control mean (level 1).

Analysis of Variance File: EMPHON21 Date: 05-29-1990

FILTER: None

Onion Height

N's, means and standard deviations based on dependent variable: EMG

* Indicates statistics are collapsed over this factor

Factors: T	R	Trt (lb ai/A)	N	Mean	S.D.
*	*		145	98.6276	38.3985
1	*	0	25	122.6400	40.8125
2	*	0.019	24	116.9167	40.8112
3	*	0.038	27	107.9259	31.1348
4	*	0.075	26	93.2692	28.3839
5	*	0.15	26	73.9615	31.1442
6	*	0.30	17	68.6471	22.1075
*	1		51	99.3726	36.6491
*	2		50	95.3600	36.8758
*	3		44	101.4773	42.4842
1	1		8	135.2500	17.6210
1	2		8	97.8750	55.7352
1	3		9	133.4444	33.2194
2	1		9	112.0000	37.5000
2	2		7	110.7143	49.3143
2	3		8	127.8750	39.6752
3	1		9	107.2222	29.4397
3	2		10	114.9000	30.1568
3	3		8	100.0000	36.0397
4	1		8	96.2500	36.1100
4	2		10	87.2000	25.6723
4	3		8	97.8750	25.2781
5	1		8	81.3750	27.5781
5	2		10	84.2000	23.8505
5	3		8	53.7500	35.9553
6	1		9	65.7778	30.0740
6	2		5	69.4000	8.0498
6	3		3	76.0000	6.5574

A total of 35 observations had missing data on a dependent variable or covariate or inappropriate factor level codes.

Fmax for testing homogeneity of between subjects variances: 72.24
Number of variances= 18 df per variance= 6.

Analysis of Variance Dependent variable: EMG

Source	df	SS (H)	MSS	F	P
Between Subjects	144	212319.8280			
T (TRT)	5	56622.5000	11324.5000	10.242	0.0000
R (REP)	2	561.0118	280.5059	0.254	0.7779
TR	10	14713.3281	1471.3328	1.331	0.2195
Subj w Groups	127	140423.0000	1105.6929		

Onion height

Analysis of Variance File: EMPHON21 Date: 05-29-1990

FILTER: None

Post-hoc tests for factor T (TRT)

Level	Mean	Level	Mean
1	122.640	6	68.647
2	116.917		
3	107.926		
4	93.269		
5	73.962		

Comparison	Tukey-A*	Bon-ferroni	Dunnett
1 > 2			
1 > 3			
1 > 4	0.0500	0.0304	0.0500
1 > 5	0.0100	0.0000	0.0100
1 > 6	0.0100	0.0000	0.0100
2 > 3			N.A.
2 > 4			N.A.
2 > 5	0.0100	0.0000	N.A.
2 > 6	0.0100	0.0000	N.A.
3 > 4			N.A.
3 > 5	0.0100	0.0047	N.A.
3 > 6	0.0100	0.0034	N.A.
4 > 5			N.A.
4 > 6			N.A.
5 > 6			N.A.

unsig. sample *

3 * Sig. diff. from control

Same as author.

* The only possible P-values are .01, .05 or .10 (up to 0.1000). A blank means the P-value is greater than 0.1000.

For Dunnett's test only the P-values .05 and .01 are possible and only for comparisons with the control mean (level 1).

Post-hoc tests for factor R (REP)

Level	Mean
1	99.373
2	95.360
3	101.477

Comparison	Tukey-A*	Bon-ferroni	Dunnett
1 > 2			
1 < 3			
2 < 3			N.A.

* The only possible P-values are .01, .05 or .10 (up to 0.1000). A blank means the P-value is greater than 0.1000.

For Dunnett's test only the P-values .05 and .01 are possible and only for comparisons with the control mean (level 1).

Lettuce % emerging

$Y = 120.5 + 116.3(X)$ $\quad r^2 = 0.89$

Y = % emerging, X = log conc.

$EC50 = 0.25$, $EC25 = 0.15$

Carrot % emerging

$Y = 4.67 + 0.88(X)$ $\quad r^2 = 0.77$

Y = probit, X = log conc.

$EC50 = 2.36$, $EC25 = 0.41$

Tomato % emerging

$r^2 = 0.98$

$Y = 5.90 + 3.01(X)$

Y = probit, X = log conc.

$EC50 = 0.50$, $EC25 = 0.30$

Cabbage % emerging

$r^2 = 0.96$

$Y = 7.26 + 3.19X$

Y = probit, X = log conc.

$EC50 = 0.19$, $EC25 = 0.12$

Ryegrass % emerging

$r^2 = 0.96$

$Y = 5.59 + 2.17(X)$

Y = probit, X = log conc.

$EC50 = 0.53$, $EC25 = 0.26$

Onion % emerging

$r^2 = 0.98$

$Y = 6.19 + 1.69(X)$

Y = probit, X = log conc.

$EC50 = 0.20$, $EC25 = 0.08$

Soybean Height

$Y = 5.04 + 3X$ $\quad r^2 = 0.99$

Y = probit, X = log conc.

EC50 = 0.97 lb ai/A , EC25 = 0.58 lb ai/A

Lettuce Height

$Y = 6.17 + 2.04(X)$ $\quad r^2 = 0.98$

Y = probit, X = log conc.

EC50 = 0.27 , EC25 = 0.13

Tomato height

$Y = 5.73 + 2.87(X)$ $\quad r^2 = 0.94$

Y = probit, X = log conc.

EC50 = 0.56 , EC25 = 0.33

Cucumber Height

$Y = 6.46 + 2.74(X)$ $\quad r^2 = 0.99$

Y = probit, X = log conc.

EC50 = 0.29 , EC25 = 0.17

Cabbage Height

$Y = 8.19 + 2.89(X)$ $\quad r^2 = 0.85$

Y = probit, X = log conc.

EC50 = 0.08 , EC25 = 0.05

Oat Height

$Y = 5.31 + 1.04(X)$ $\quad r^2 = 0.84$

Y = probit x = log conc.

$EC_{50} = 0.51$, $EC_{25} = 0.12$

Ryegrass Height

$Y = 6.24 + 3.05(X)$ $\quad r^2 = 0.77$

Y = probit, X = log conc.

$EC_{50} = 0.39$, $EC_{25} = 0.24$

Corn Height

$Y = 4.22 + 1.29(X)$ $\quad r^2 = 0.96$

Y = probit, X = log conc.

$EC_{50} = 4.0$, $EC_{25} = 1.21$

Onion Height

$Y = 5.68 + 1.31(X)$ $\quad r^2 = 0.98$

Y = probit, X = log conc.

$EC_{50} = 0.30$, $EC_{25} = 0.09$

Soybean weight

$r^2 = 0.97$

$Y = 5.08 + 1.49(X)$

Y = probit, X = log conc.

EC50 = 0.89, EC25 = 0.31

---

lettuce Weight

$r^2 = 0.94$

$Y = 6.16 + 1.33(X)$

Y = probit, X = log conc.

EC50 = 0.13, EC25 = 0.04

Tomato Weight

$r^2 = 0.94$

$Y = 6.21 + 2.4(X)$

Y = probit, X = log conc.

EC50 = 0.31, EC25 = 0.16

Cucumber Weight

$r^2 = 0.98$

$Y = 6.21 + 1.69(X)$

Y = probit, X = log conc.

EC50 = 0.19, EC25 = 0.08

Cabbage Weight

$r^2 = 0.79$

$Y = 7.67 + 1.80(X)$

Y = probit, X = log conc.

EC50 = 0.03, EC25 = 0.014

Oat Weight

$r^2 = 0.88$

$Y = 6.29 + 1.7(X)$

Y = probit, X = log conc.

EC50 = 0.17, EC25 = 0.07

Corn Weight

$r^2 = 0.93$

$Y = 4.73 + 1.01(X)$

Y = probit, X = log conc.

EC50 = 1.83, EC25 = 0.40

Onion Weight

$r^2 = 0.96$

$Y = 7.50 + 3.26(X)$

Y = probit, X = log conc.

EC50 = 0.17, EC25 = 0.11

Table A. Seed Germination Study.

The following table lists the lowest observed no-effect concentration, EC_{25} and EC_{50} values (expressed in lb/a), along with the parameter in which these concentrations were observed.

Plant Species	No-effect Concentration		Parameter[y]	EC_{25}	Parameter	EC_{50}	Parameter
Soybean	≥1.6	1.6	rl,pg	ND[z]		ND	
Lettuce	≥1.6	1.6	rl,pg	ND		ND	
Carrot	≥1.6	1.6	rl,pg	ND		ND	
Tomato	≥1.6	1.6	rl,pg	5.23	rl	53.4	rl
Cucumber	≥1.6	1.6	rl,pg	ND		ND	
Cabbage	≥1.6	1.6	rl,pg	ND		ND	
Oat	~~≥1.6~~	0.8	rl,~~pg~~	0.869	0.75 rl	1.70	1.80 rl
Ryegrass	≥1.6	1.6	rl,pg	ND		ND	
Corn	≥1.6	1.6	rl,pg	ND		ND	
Onion	≥1.6	1.6	rl,pg	ND		ND	

[y] rl - radicle length, pg - percent germination

[z] A dose response curve was not evident following treatment, therefore, probit analysis could not be conducted nor EC_{25} and EC_{50} values calculated.

Reviewer's values are in red ink.

Table 4. Radicle length and the percentage[x] of oat and ryegrass seeds germinated six and seven days, respectively, after treatment with prometryn (FL-870991). The percent detrimental effect[y] was calculated for each treatment.

Plant Species	Treatment (lb ai/a)	Radicle Length (mm)	% Effect	% Germination	% Effect
Oat	0.0	58 A[z]		100 A	
	0.1	67 A	16	100 A	0
	0.2	55 A	- 5	100 A	0
	0.4	58 A	1	100 A	0
	0.8	44 A	- 24	97 A	- 3
	1.6	29 A	- 49 *	73 A	- 27
Ryegrass	0.0	44 A		90 A	
	0.1	56 A	26	100 A	11
	0.2	50 A	12	93 A	4
	0.4	46 A	4	93 A	4
	0.8	43 A	- 2	87 A	- 4
	1.6	36 A	- 19	80 A	- 11

[x] Seeds with radicle lengths exceeding 5 mm were considered germinated.

[y] Percent detrimental effect was calculated from the raw data which was compiled using Lotus 1-2-3 software. Percent effect, variance, and standard deviation of each treatment was calculated on the raw data calculation sheets.

[z] Means for each plant species and parameter measured not followed by the same letter differ significantly according to Duncan's New Multiple Range Test ($p \leq 0.05$).

* determined to be significantly different from the control.

Table 5. Radicle length and the percentage[x] of corn and onion seeds germinated six and seven days, respectively, after treatment with prometryn (FL-870991). The percent detrimental effect[y] was calculated for each treatment.

Plant Species	Treatment (lb ai/a)	Radicle Length (mm)	% Effect	Percent Germination	% Effect
Corn	0.0	76 A[z]		100 A	
	0.1	65 A	- 14	93 A	- 7
	0.2	85 A	12	93 A	- 7
	0.4	61 A	- 19	97 A	- 3
	0.8	75 A	- 1	97 A	- 3
	1.6	79 A	4	87 A	- 13
Onion	0.0	36 A		90 A	
	0.1	29 A	- 19	90 A	0
	0.2	27 A	- 26	87 A	- 4
	0.4	24 A	- 34 *	83 A	- 7
	0.8	27 A	- 25	87 A	- 4
	1.6	31 A	- 14	97 A	7

[x] Seeds with radicle lengths exceeding 5 mm were considered germinated.

[y] Percent detrimental effect was calculated from the raw data which was compiled using Lotus 1-2-3 software. Percent effect, variance, and standard deviation of each treatment was calculated on the raw data calculation sheets.

[z] Means for each plant species and parameter measured not followed by the same letter differ significantly according to Duncan's New Multiple Range Test ($p \leq 0.05$).

* determined to be significantly different from the control

Table 6. Statistical no-effect concentration[z] (lb ai/a) of prometryn (FL-870991) on radicle length, along with EC_{25} and EC_{50} values.

Test Plant	No-effect Concentration	EC_{25}	EC_{50}
Soybean	≥1.6	ND	ND
Lettuce	≥1.6	ND	ND
Carrot	≥1.6	ND	ND
Tomato	≥1.6	5.23	53.4
Cucumber	≥1.6	ND	ND
Cabbage	≥1.6	ND	ND
Oat	≥1.6 0.8	0.869 0.75	1.70 1.80
Ryegrass	≥1.6	ND	ND
Corn	≥1.6	ND	ND
Onion	≥1.6	ND	ND

[z] Highest treatment concentration which was statistically similar to the control, according to Duncan's New Multiple Range Test ($p \leq 0.05$).

Table 7. Statistical no-effect concentration[y] (lb ai/a) of prometryn (FL-870991) on percent seed germination, along with EC_{25} and EC_{50} values.

Test Plant	No-effect Concentration	EC_{25}	EC_{50}
Soybean	≥1.6	ND[z]	ND
Lettuce	≥1.6	ND	ND
Carrot	≥1.6	ND	ND
Tomato	≥1.6	ND	ND
Cucumber	≥1.6	ND	ND
Cabbage	≥1.6	ND	ND
Oat	≥1.6	ND 1.73	ND 3.01
Ryegrass	≥1.6	ND	ND
Corn	≥1.6	ND	ND
Onion	≥1.6	ND	ND

[y] Highest treatment concentration which was statistically similar to the control, according to Duncan's New Multiple Range Test ($p \leq 0.05$).

[z] A dosage response curve was not evident or the highest treatment concentration tested (1.6 lb ai/a) did not result in a significant effect level, therefore a probit analysis could not be conducted to determine EC_{25} and EC_{50} values.

Analysis of Variance File: rloni Date: 06-21-1989

FILTER: None

Onion radicle length

N's, means and standard deviations based on dependent variable: RL

* Indicates statistics are collapsed over this factor

Factors: T	R	Trt (lb ai/A)	N	Mean	S.D.
*	*		165	31.8242	13.1464
1	*	0	27	40.4074	10.7748
2	*	0.1	27	32.5556	10.0243
3	*	0.2	27	30.0000	10.4329
4	*	0.4	26	27.7308	12.9848
5	*	0.8	29	28.0345	17.3976
6	*	1.6	29	32.3103	12.3059
*	1		55	30.9273	13.1640
*	2		54	32.1852	12.5519
*	3		56	32.3571	13.8622
1	1		9	39.2222	14.0426
1	2		9	42.4444	7.7316
1	3		9	39.5556	10.6432
2	1		9	28.7778	12.6568
2	2		8	36.1250	8.0789
2	3		10	33.1000	8.4387
3	1		9	32.8889	7.9285
3	2		9	33.0000	6.8739
3	3		9	24.1111	13.6056
4	1		8	19.8750	9.6279
4	2		9	34.4444	11.6201
4	3		9	28.0000	14.0801
5	1		10	29.2000	17.0476
5	2		9	21.7778	17.9776
5	3		10	32.5000	17.3478
6	1		10	34.2000	10.1193
6	2		10	26.4000	10.2111
6	3		9	36.7778	15.0647

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Fmax for testing homogeneity of between subjects variances: 6.84

Number of variances= 18 df per variance= 8.

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Analysis of Variance Dependent variable: RL

Source	df	SS (H)	MSS	F	P
Between Subjects	164	28343.8984			
T (TRT)	5	2952.4304	590.4861	3.840	0.0027
R (REP)	2	72.2403	36.1202	0.235	0.7925
TR	10	2715.8159	271.5816	1.766	0.0711
Subj w Groups	147	22603.4102	153.7647		

Onion radicle length

Analysis of Variance File: rlon1 Date: 06-21-1989

FILTER: None

Post-hoc tests for factor T (TRT)

Level	Mean	Level	Mean
1	40.407	6	32.310
2	32.556		
3	30.000		
4	27.731		
5	28.034		

Comparison	Tukey-A*	Bon-ferroni	Dunnett
1 > 2			
1 > 3	0.0500	0.0368	0.0500
1 > 4	0.0100	0.0044	0.0100
1 > 5	0.0100	0.0043	0.0100
1 > 6	not different		
2 > 3			N.A.
2 > 4			N.A.
2 > 5			N.A.
2 > 6			N.A.
3 > 4			N.A.
3 > 5			N.A.
3 < 6			N.A.
4 < 5			N.A.
4 < 6			N.A.
5 < 6			N.A.

(* different from the control — handwritten note beside comparisons 1 > 3, 1 > 4, 1 > 5)

* The only possible P-values are .01, .05 or .10 (up to 0.1000). A blank means the P-value is greater than 0.1000.

For Dunnett's test only the P-values .05 and .01 are possible and only for comparisons with the control mean (level 1).

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Post-hoc tests for factor R (REP)

Level	Mean
1	30.927
2	32.185
3	32.357

Comparison	Tukey-A*	Bon-ferroni	Dunnett
1 < 2			
1 < 3			
2 < 3			N.A.

* The only possible P-values are .01, .05 or .10 (up to 0.1000). A blank means the P-value is greater than 0.1000.

For Dunnett's test only the P-values .05 and .01 are possible and only for comparisons with the control mean (level 1).

Analysis of Variance File: rlrye7 Date: 05-30-1989

Ryegrass
Radicle length

FILTER: None

N's, means and standard deviations based on dependent variable: RL

* Indicates statistics are collapsed over this factor

Factors: T	R	Trt (lb ai/A)	N	Mean	S.D.
*	*		163	50.2025	16.7922
1	*	0	27	49.1111	11.5237
2	*	0.1	30	55.5667	14.8037
3	*	0.2	28	53.0714	17.0096
4	*	0.4	27	49.2593	17.6866
5	*	0.8	26	50.0385	15.0532
6	*	1.6	25	42.9200	22.1603
*	1		56	53.5179	15.0175
*	2		57	51.7895	13.5985
*	3		50	44.6800	20.5222
1	1		9	47.5556	11.4903
1	2		8	49.6250	9.1953
1	3		10	50.1000	14.0274
2	1		10	59.3000	10.9245
2	2		10	55.2000	13.3066
2	3		10	52.2000	19.5323
3	1		8	61.7500	16.3598
3	2		10	49.2000	16.1988
3	3		10	50.0000	17.4165
4	1		9	47.0000	16.8449
4	2		10	54.7000	20.1000
4	3		8	45.0000	15.7661
5	1		10	51.4000	15.1965
5	2		10	50.7000	8.4466
5	3		6	46.6667	23.8886
6	1		10	54.5000	16.3927
6	2		9	50.7778	12.2656
6	3		6	11.8333	9.6833

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Fmax for testing homogeneity of between subjects variances: 8.00

Number of variances= 18 df per variance= 8.

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Analysis of Variance Dependent variable: RL

Source	df	SS (H)	MSS	F	P
Between Subjects	162	45680.3240			
T (TRT)	5	2476.4419	495.2884	2.125	0.0651
R (REP)	2	2661.2415	1330.6207	5.709	0.0041
TR	10	6746.4170	674.6417	2.894	0.0025
Subj w Groups	145	33796.2230	233.0774		

Ryegrass radicle length

Analysis of Variance   File: r1rye7   Date: 05-30-1989

FILTER: None

Post-hoc tests for factor T (TRT)

Level	Mean	Level	Mean
1	49.111	6	42.920
2	55.567		
3	53.071		
4	49.259		
5	50.038		

Comparison	Tukey-A*	Bon-ferroni	~~Dunnett~~
1 < 2			
1 < 3			
1 < 4			
1 < 5			
1 > 6			
2 > 3			N.A.
2 > 4			N.A.
2 > 5			N.A.
2 > 6	0.0500	0.0399	N.A.
3 > 4			N.A.
3 > 5			N.A.
3 > 6			N.A.
4 < 5			N.A.
4 > 6			N.A.
5 > 6			N.A.

* The only possible P-values are .01, .05 or .10 (up to 0.1000).
A blank means the P-value is greater than 0.1000.

For Dunnett's test only the P-values .05 and .01 are possible
and only for comparisons with the control mean (level 1).

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Post-hoc tests for factor R (REP)

Level	Mean
1	53.518
2	51.789
3	44.680

Comparison	Tukey-A*	Bon-ferroni	Dunnett
1 > 2			
1 > 3	0.0100	0.0103	0.0100
2 > 3	0.0500	0.0525	N.A.

* The only possible P-values are .01, .05 or .10 (up to 0.1000).
A blank means the P-value is greater than 0.1000.

For Dunnett's test only the P-values .05 and .01 are possible
and only for comparisons with the control mean (level 1).

Analysis of Variance File: rloat6 Date: 05-30-1989

FILTER: None

Oat Radicle length

N's, means and standard deviations based on dependent variable: RL

* Indicates statistics are collapsed over this factor

Factors: T	R	Trt. (lb ai/A)	N	Mean	S.D.
*	*		171	54.4854	22.2045
1	*	0	30	57.5000	21.0316
2	*	0.1	30	66.9000	18.9779
3	*	0.2	30	54.8000	20.1501
4	*	0.4	30	58.1333	19.4151
5	*	0.8	29	45.4828	27.5326
6	*	1.6	22	39.9091	14.2926
*	1		59	51.3729	25.9521
*	2		60	56.3167	21.7025
*	3		52	55.9038	17.7601
1	1		10	57.9000	18.8293
1	2		10	56.5000	22.6679
1	3		10	58.1000	23.5629
2	1		10	65.3000	12.9533
2	2		10	81.6000	21.2143
2	3		10	53.8000	10.4435
3	1		10	71.0000	20.7096
3	2		10	36.3000	10.2637
3	3		10	57.1000	9.8144
4	1		10	61.8000	25.1652
4	2		10	61.2000	13.5630
4	3		10	51.4000	17.9332
5	1		9	10.5556	5.3877
5	2		10	55.8000	16.7981
5	3		10	66.6000	14.7211
6	1		10	37.6000	6.4498
6	2		10	46.5000	16.2156
6	3		2	18.5000	12.0208

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Fmax for testing homogeneity of between subjects variances: 21.82

Number of variances= 18 df per variance= 7.

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Analysis of Variance Dependent variable: RL

Source	df	SS (H)	MSS	F	P
Between Subjects	170	83816.6880			
T (TRT)	5	12323.1875	2464.6375	8.793	0.0000
R (REP)	2	769.2710	384.6355	1.372	0.2548
TR	10	27837.6309	2783.7632	9.931	0.0000
Subj w Groups	153	42886.5980	280.3046		

Oat radicle length

Analysis of Variance File: rloat6 Date: 05-30-1989

FILTER: None

Post-hoc tests for factor T (TRT)

Level	Mean	Level	Mean
1	57.500	6	39.909
2	66.900		
3	54.800		
4	58.133		
5	45.483		

unequal sample #

Comparison	Tukey-A*	Bon-ferroni	Dunnett
1 < 2			
1 > 3			
1 < 4			
1 > 5	0.1000	0.0983	0.0500
1 > 6	0.0100	0.0041	0.0100
2 > 3	0.1000	0.0868	N.A.
2 > 4			N.A.
2 > 5	0.0100	0.0000	N.A.
2 > 6	0.0100	0.0000	N.A.
3 < 4			N.A.
3 > 5			N.A.
3 > 6	0.0500	0.0280	N.A.
4 > 5	0.1000	0.0640	N.A.
4 > 6	0.0100	0.0025	N.A.
5 > 6			N.A.

* sig. diff. from control

* The only possible P-values are .01, .05 or .10 (up to 0.1000).
A blank means the P-value is greater than 0.1000.

For Dunnett's test only the P-values .05 and .01 are possible
and only for comparisons with the control mean (level 1).

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Post-hoc tests for factor R (REP)

Level	Mean
1	51.373
2	56.317
3	55.904

Comparison	Tukey-A*	Bon-ferroni	Dunnett
1 < 2			
1 < 3			
2 > 3			N.A.

* The only possible P-values are .01, .05 or .10 (up to 0.1000).
A blank means the P-value is greater than 0.1000.

For Dunnett's test only the P-values .05 and .01 are possible
and only for comparisons with the control mean (level 1).

Analysis of Variance File: rlcar7 Date: 05-30-1989

FILTER: None

Carrot

N's, means and standard deviations based on dependent variable: RL Radicle length

* Indicates statistics are collapsed over this factor

Factors: T	R	Trt. (lb ai/A)	N	Mean	S.D.
*	*		138	25.2319	13.3991
1	*	0	21	25.2381	13.6964
2	*	0.1	23	24.2174	16.6977
3	*	0.2	25	27.1600	12.2225
4	*	0.4	24	28.5000	11.4626
5	*	0.8	22	21.7727	12.4554
6	*	1.6	23	24.0435	13.7790
*	1		46	26.7609	13.2467
*	2		47	23.8085	13.8229
*	3		45	25.1556	13.2355
1	1		8	20.1250	10.7496
1	2		9	28.5556	15.0674
1	3		4	28.0000	16.2070
2	1		7	35.0000	16.2275
2	2		8	18.1250	12.8445
2	3		8	20.8750	17.7236
3	1		8	28.5000	13.1909
3	2		7	23.0000	12.4766
3	3		10	29.0000	11.8509
4	1		9	29.6667	10.5830
4	2		6	24.6667	15.5778
4	3		9	29.8889	9.9680
5	1		8	23.8750	16.0574
5	2		8	25.1250	10.2321
5	3		6	14.5000	7.4498
6	1		6	23.1667	10.1669
6	2		9	23.0000	17.4929
6	3		8	25.8750	12.9332

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Fmax for testing homogeneity of between subjects variances: 5.66

Number of variances= 18 df per variance= 6.

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Analysis of Variance Dependent variable: RL

Source	df	SS (H)	MSS	F	P
Between Subjects	137	24596.5762			
T (TRT)	5	668.6770	133.7354	0.742	0.5967
R (REP)	2	165.2368	82.6184	0.459	0.6359
TR	10	2144.6382	214.4638	1.190	0.3018
Subj w Groups	120	21618.0234	180.1502		

Carrot radicle length

Analysis of Variance File: rlcar7 Date: 05-30-1989

FILTER: None

Post-hoc tests for factor T (TRT)

Level	Mean	Level	Mean
1	25.238	6	24.043
2	24.217		
3	27.160		
4	28.500		
5	21.773		

Comparison	Tukey-A*	Bon-ferroni	~~Dunnett~~
1 > 2			
1 < 3			
1 < 4			
1 > 5			
1 > 6			
2 < 3			N.A.
2 < 4			N.A.
2 > 5			N.A.
2 > 6			N.A.
3 < 4			N.A.
3 > 5			N.A.
3 > 6			N.A.
4 > 5			N.A.
4 > 6			N.A.
5 < 6			N.A.

* The only possible P-values are .01, .05 or .10 (up to 0.1000).
A blank means the P-value is greater than 0.1000.

For Dunnett's test only the P-values .05 and .01 are possible and only for comparisons with the control mean (level 1).

DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

Post-hoc tests for factor R (REP)

Level	Mean
1	26.761
2	23.809
3	25.156

Comparison	Tukey-A*	Bon-ferroni	Dunnett
1 > 2			
1 > 3			
2 < 3			N.A.

* The only possible P-values are .01, .05 or .10 (up to 0.1000).
A blank means the P-value is greater than 0.1000.

For Dunnett's test only the P-values .05 and .01 are possible and only for comparisons with the control mean (level 1).

Seed Germination study

Oat Radicle Length

$Y = 4.552 + 1.749(X)$ $\quad r^2 = 0.99$

Y = probits, X = log concentration

EC50 = 1.80 lb ai/A

EC25 = 0.75 "

Oat % Germination

$Y = 14.35 + 44.85(X)$ $\quad r^2 = 0.91$

Y = % effect, X = log concentration

EC50 = 3.01 lb ai/A

EC25 = 1.73 "
